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Beetle-Killing Pesticide Is One of TFS Cooperative's Success Stories

By Steve Wilent

Two decades ago, most state funding and federal support for research on forest pests was aimed at bark beetles and certain defoliators (such as the gypsy moth). That's not surprising, given the scale and severity of damage these pests can cause, but, of course, they are not the only forest pests that can limit productivity or cause mortality. Pests of pine seed orchards and young pine plantations, for example, are of particular interest in the US South. With this in mind, the Texas A&M Forest Service (TFS) established the Western Gulf Forest Pest Management Cooperative in 1996. One of the co-op's achievements was the development of emamectin benzoate, a systemic pesticide that is not only effective in seed orchard trees, but also in protecting mature trees from a variety of bark beetles and even the emerald ash borer.

Now known simply as the Forest Pest Management Cooperative (FPMC), the partnership is about to complete its 19th year. Dues paid by FPMC members, financial support from TFS, and research grants from the US Forest Service and various chemical companies are used to support a small staff of 4–5 full- and part-time TFS employees. The mission of the

FPMC is to conduct applied research on forest health problems that co-op members consider important, develop pest management recommendations, and transfer information and new technology to the field.

Under the leadership of TFS forest entomologists Ron Billings (at the co-op since 1996), Don Grosman (1996–2012), and Melissa Fischer (2013–2014), membership in the co-op has increased from an initial six members — mostly forest-products companies — to 12 in 2015. In the late 1990s, as forest industries sold their lands, most dropped from the co-op, to be replaced by the new landowners, including several timber investment management organizations (TIMOs) and real estate investment trusts (REITs). The TFS and the US Forest Service's Forest Health Protection division are charter members that continue to support the co-op.

Co-op research has focused on development of methods to protect valuable cone and seed crops in pine seed orchards and newly planted pine seedlings in commercial plantations. Based on the co-op's findings, several new chemical insecticides have been registered with the

Environmental Protection Agency (EPA) to improve forest pest management, including Amdro Ant Block and PTM for controlling Texas leaf-cutting ants (*Atta texana*), and Pounce for controlling regeneration weevils (*Hylobius* and *Pachylobius* spp.) that affect pine seedlings.

One systemic chemical, emamectin benzoate (EB), injected into selected seed orchard trees, proved particularly effective for reducing cone losses to cone-worms (*Dioryctria* spp.). Up to six years of protection were achieved with a single injection. But the FPMC faced a major obstacle in getting EB registered with EPA: The market for seed orchard insecticides was too small for a chemical company to justify the cost of a new registration. Several years of FPMC trials with EB as a preventative treatment against the more ubiquitous species of southern and western pine bark beetles were required as a means to widen the potential market for EB. Initial field trials in east Texas showed that injections of EB were effective for preventing attacks by engraver beetles (*Ips* spp.) in both weakened trees and fresh log sections.

In cooperation with other researchers, FPMC entomologists tested EB for efficacy against more aggressive bark beetles, including the southern pine beetle (*Dendroctonus frontalis*) in Alabama, Virginia, and Mississippi, and the mountain pine beetle (*D. ponderosae*), western pine beetle (*D. brevicomis*), and spruce beetle (*D. rufipennis*) in the western United States and British Columbia. Results showed efficacy, particularly for western pine beetle in ponderosa pine and southern pine beetle in loblolly pine. Research results on southern pine bark beetle treatments were published in the *Journal of Economic Entomology* (2006 and 2009), and results on western bark beetles appeared in the *Western Journal of Applied Research* (2010).

In 2010, EB was registered in all states except Alaska as a restricted-use pesticide for operational use in seed orchards and prevention of a wide variety of bark beetle and wood-boring insects. It remains the only insecticide currently registered for use against southern pine bark beetles in forest settings. EB also has been deemed one of the most effective means for protecting ash trees from the invasive emerald ash borer, *Agrilus planipennis*, which is killing ash trees in 25 states and two provinces in Canada (in February, the emerald ash borer was found attacking ash trees in northern Louisiana).

FPMC research has addressed the impact of Nantucket pine tip moth (*Rhyacionia frustrana*) on young pine plantations, developed hazard rating methods, and tested new insecticides for prevention. Results from FPMC field trials supported the registration in 2006 of Bayer's SilvaShield Forestry Tablets (containing 20 percent imidacloprid plus fertilizer)



FPMC entomologists tested EB for efficacy against more aggressive bark beetles, including the southern pine beetle (*Dendroctonus frontalis*) in Alabama, Virginia, and Mississippi. Results showed efficacy, particularly for the southern pine beetle in loblolly pine. Courtesy of USFS, Bugwood.org.

for tip moth and other plantation pests. In 2007, further FPMC research led to registration of PTM (9 percent fipronil), a BASF product, for the control of pine tip moth and aphids in young pine plantations. The same chemical also proved effective for controlling the Texas leaf-cutting ant, and fire ants. These pests have been added to the PTM label.

Recent research has focused on developing more effective toxic baits for the Texas leaf-cutting ant, treatments for pinewood nematodes and conifer mites, and chemicals for protecting black walnut trees against the walnut twig beetle, a vector of the fungus that causes thousand cankers disease. In addition, field trials are being conducted in Virginia and Alabama to ascertain whether EB can be incorporated into a trap-tree method for maintaining southern pine beetles at low population levels. Future plans are to expand research activities to include urban tree pests and invasive plants and insects.

Other accomplishments include preparation and distribution of the quarterly newsletter entitled *PEST* (Progress, Education, Science, and Technology), and periodic reports and training sessions on pest management for members. To keep membership dues low, the FPMC has received federal grants from the US Forest Service and donations from insecticide companies amounting to more than \$850,000 since 1996. **FS**

The position of FPMC research coordinator, stationed in Lufkin, is currently vacant and the search for a new coordinator is underway. For more information about the co-op and the position, contact Ronald F. Billings, manager, Forest Health, Texas A&M Forest Service, rbillings@tfs.tamu.edu.

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Forest Pest Management Cooperative researchers William Upton (left) and Larry Spivey inject a high-value pine with emamectin benzoate in a campground at Bastrop State Park, near Bastrop, Texas, to protect it from bark beetle attack following a devastating 2011 wildfire. SOURCE: Ronald F. Billings, Texas A&M Forest Service.