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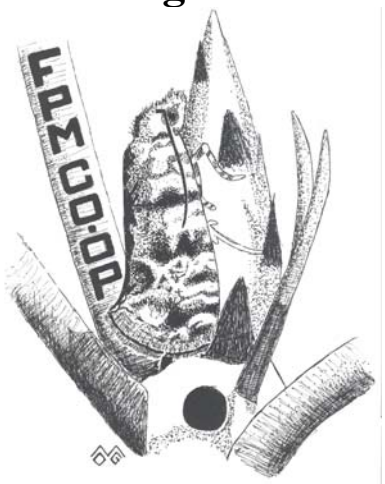
June 2016

Quarterly Newsletter 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 is a quarterly newsletter that provides 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 focuses on, but is not limited to, issues occurring in the South (Texas to Florida to Virginia,).

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ISA International Conference and Trade Show

The International Society of Arboriculture (ISA) is holding its annual International Conference and Trade Show on August 13-17 in Fort Worth, Texas. This conference provides a forum for the exchange of information and opportunities to network with others in the arboricultural profession. The event provides a lineup of educational sessions led by industry leaders from around the globe, sharing their thoughts and views about the newest trends in equipment, practice, technology and research in arboriculture and urban forestry. For more information, visit the website at http://www.isa-arbor.com/events/conference/index.aspx.

EAB Detected in Texas

It was just a matter of time. On May 23, 2016, the Texas A&M Forest Service announced that the invasive emerald ash borer (EAB) had been detected in Texas. Earlier last month, the Forest Health Protection branch of the U. S. Forest Service had collected four adult beetles on a pheromone-baited survey trap near Caddo Lake in Harrison County, Texas. The USDA Animal and Plant Health Inspection Service confirmed the finds as EAB, a destructive pest of ash trees previously found in Arkansas (2014) and northern Louisiana (2015).

Texas has anticipated the arrival of the EAB and has strategically placed beetle detection traps across the state for the past several in an effort to provide an early warning if and when the invasive pest arrived.

An adult emerald ash borer, *Agrilus planipennis* (Coleoptera: Buprestidae) (Photo courtesy of datacpservices.wisconsin.gov)

The EAB is a destructive, non-native, wood-boring pest of ash trees and poses a significant threat to urban, suburban and rural forests, killing both stressed and healthy ash trees. The trees typically die two or three years after becoming infested. Native to Asia, the EAB was first discovered in southeast Michigan in 2002. Since then, infestations of this invasive pest have been found in 26 states and have killed tens of millions of ash trees.

In the United States, there are 16 ash species susceptible to attack—Texas is home to seven of these species. Ash trees make up less than 5 percent of rural Texas forestlands but comprise a large population of the state's urban forests. Texas A&M Forest Service is working with APHIS, the Texas Department of Agriculture, and the U.S. Forest Service, among other state and federal agencies, to implement a response plan.

The statewide plan includes monitoring beetle movement, conducting educational campaigns, providing technical assistance in prevention, preparation and recovery, and working with regulatory agencies in considering and establishing quarantines in affected counties.

"Early detection of this destructive pest minimizes its spread and enables us to effectively work with those affected by providing information and science-based solutions to potential attacks," said Texas A&M Forest Service Forest Health Coordinator Shane Harrington. "TFS is working with other state and federal agencies to ensure that the general public, home- and landowners know fact from fiction and what to look for when monitoring for EAB."

"The Texas Department of Agriculture, through our biosecurity program, is committed to defending Texans from invasive species like the EAB, which have the power to decimate our crops and landscapes," Texas Agriculture Commissioner Sid Miller said. "Working together with Texas A&M Forest Service and our federal counterparts, we will implement a comprehensive response plan to tackle this threat to all Texans."

Texas A&M Forest Service is also working with the state's forest industry, rural landowners, urban communities and homeowners on detecting possible infestation and taking measures to slow the movement of the beetle. No infested ash trees have been found near the traps or elsewhere in Texas to date. Measures of control include protecting ash trees through the use of insecticide tree injections and soil drenching and bolstering the urban forests with other tree species not susceptible to the emerald ash borer.

"Proper planning can reduce the impact of EAB in our communities," said Texas A&M Forest Service Urban and Community Forestry Program Coordinator Paul Johnson. "Removal of poor quality ash, planting trees that aren't susceptible to EAB, and protecting high value ash by treating them will help us weather this attack. Work with a forester or an ISA-certified arborist to help you assess your EAB risk and care for your trees."

SPB Activity Expected to Increase in Certain Areas of the South in 2016

Southern pine beetle (SPB) populations throughout the South are monitored each spring using pheromone-baited traps to predict pending outbreaks. Using a protocol developed by the Texas Forest Service in the mid-1980s, typically three traps are placed in each county or National Forest ranger district to be monitored. Traps are deployed in the spring when dogwoods begin to blooms or loblolly pollen is released, physiological events that are believed to coincide with the long-range dispersal of SPB and the initiation of new infestations. Mean numbers of SPB per trap per day, plus the percentage of SPB in the total catch (SPB plus the clerid beetle *Thanasimus dubius)*, are used to forecast whether an SPB outbreak is to be expected in the coming months. Only when mean numbers of SPB exceed ca. 20/trap/day and more SPB adults than clerid beetles show up in the traps is an outbreak likely.

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FPMC Forester Bill Upton monitors a SPB pheromone trap.

Results of the 2016 South-wide survey are now in and the news is good. Few if any SPB were caught in traps located west of the Mississippi River, indicating another year without SPB outbreaks. However, SPB levels appear to be increasing in several parishes in LA – for the first time since 1999 – but, numbers are insufficient in any single parish to suggest an outbreak in 2016.

In the remainder of the South, SPB populations are expected to remain low in 2016, with the possible exception of the Bienville and Homochitto National Forests, Franklin, Lincoln and Smith counties in MS, the Oakmulgee Ranger District and Barbour County in AL, Putnam County in FL, Edgefield and Oconee counties in SC, the Cheoah R. D. in NC and Dorchester and Somerset counties in MD where increasing beetle activity may occur. The complete results of the 2016 SPB prediction survey are available on the Forest Health section of the Texas A&M Forest Service webpage at http://texasforestservice.tamu.edu.

Increased Ips Activity in AR and OK

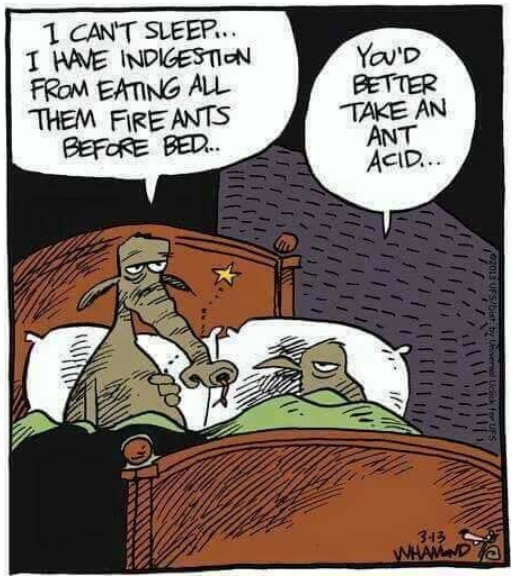
Ips attacks can be identified by the "Y-" or "H"-shaped galleries the adult beetles construct beneath the bark of infested trees. Unlike the "S"-shaped galleries of the southern pine beetle, Ips galleries are maintained free of sawdust by the adult beetles. (Photo by R. Billings)

While SPB activity remains at historically low levels west of the Mississippi River, FPMC members with Hancock (David Wilkinson and Ken Smith) reported increased Ips beetle outbreaks in pine stands, particularly in Arkansas and Oklahoma. They had received this information from an entomologist with the US Forest Service out of Pineville, LA. This problem was confirmed by Conner Fristoe, formerly the plantation contact with Plum Creek Timber Company. Since the recent merger of Plum Creek and Weyerhaeuser, Conner is now with Weyerhaeuser in Crossett, AR.

Conner said "It rained nearly 7 inches (in AR) on July 5, 2015 then not again until November. I believe the saturated soils in the early- to mid-growing season messed with root growth, then it turned brickbat dry." This may well have led to the Ips outbreaks now being observed in these

states. No widespread Ips damage has been seen in east Texas, according to TFS regional forest health specialist Allen Smith.

In contrast to SPB, there is seldom any direct control that is justified for Ips infestations in commercial forests, other than salvaging the dead trees if volumes are sufficient. A return to normal rainfall patterns should solve the problem.



Formosan Termites on the Move

The Formosan termite, *Coptotermes formosanus*, is an introduced subterranean termite, found in states across the southern U.S., including Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas and Tennessee. They also occur in California and Hawaii and have been located in smaller populations as far north as the Canadian border.

Formosan termites are social insects with three distinct forms (castes): the wingless or winged reproductives (alates), the protector soldiers and the workers. Since Formosan termite workers look very much like workers of other termite groups, the soldiers and winged alates are the castes that are useful to provide a correct identification. Since differentiation between Formosan termites and other termite groups is not easy, it is best to contact your pest management professional for help with providing an accurate identification.

The Formosan termite feeds on wood and other cellulose-containing materials such as paper and cardboard. They are known to chew through foam insulation boards, thin lead and copper sheeting, plaster, asphalt, and some plastics. They also may colonize live trees.

The head of a Formosan termite soldier is oblong, whereas indigenous subterranean termites have rectangular heads. Formosan termite soldiers are also more aggressive when defending the nest than native subterranean termite soldiers.

Formosan termites are native to East Asia and were introduced to the United States in the 1940s, following World War II. Formosan termites were thought to have entered the country via various port cities, resulting in patchy concentrations. Their populations have continued to spread throughout the United States on cargo shipments of wood and other cellulose-based goods. Most scientists believe that Formosan termites can be spread through infested wooden railroad ties, often sold for landscape timbers.
In late spring or early summer, Formosan colonies may produce swarms of winged males and females called reproductives. They are about 15 mm long, including their wings. They can be differentiated from winged ants by their straight antennae, equal-length front and hind wings, as well as their straight-sided waist.

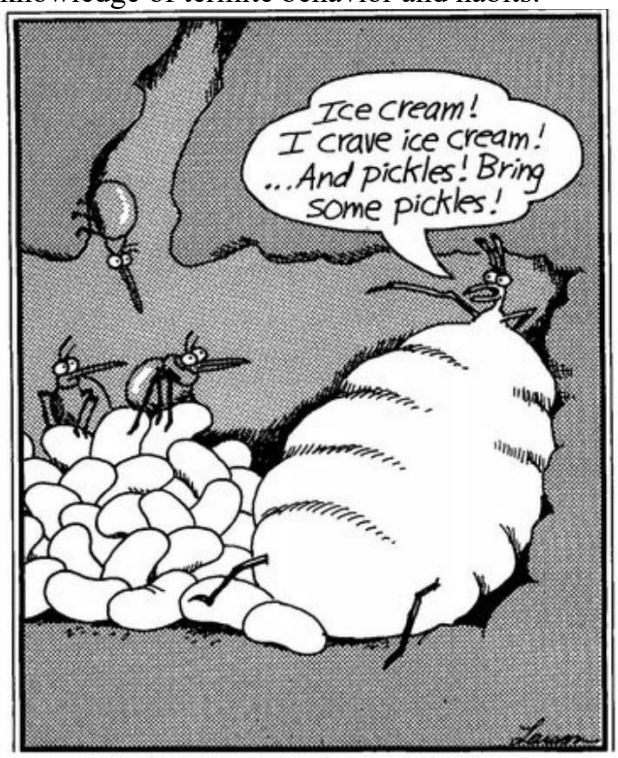
In May, 2016, the FPMC received two reports of swarming Formosan termites in East Texas. Joe Pase, retired TFS entomologist, collected Formosan termite alates at his porch light in Lufkin, Texas on May 25, 2015 and May 12, 2016. He sent them to the Department of Entomology at Texas A&M University to confirm his suspicions.

During the second week of May, 2016, Dr. David Kulhavy, entomology professor at Stephen F. Austin State University found Formosan termites in a house in Nacogdoches. Neither Dr. Kulhavy or Mr. Pase found any damage associated with the termites. Continued on page 5

Adult Formosan subterranean termite (*C. formosanus*). The ones with brown heads are soldiers, the others are workers. (Photo courtesy Scott Bauer, USDA Agricultural Research Service, Bugwood.org).

Formosan termites are the most aggressive and destructive timber pests in the United States. They can develop huge nests containing millions of termites aggressively and relentlessly seeking and devouring structural timbers, utility poles and other timber structures, including ships and barges. Infestation can occur to living trees, such as oak, cypress, pine and maple.

Can Formosan subterranean termites be effectively controlled? Yes. Professional-use termiticides, baits and wood treatments are effective against Formosan termites at the same concentration levels used for native subterranean termites. Remember, individual Formosan workers are not resistant to insecticides and they are not "super termites." Professional-use products do not have special, higher concentration recommendations for Formosan subterranean termites over native subterranean termites. However, it is very important that soil and wood treatments be applied properly (labeled concentrations and volumes) and that baiting systems be meticulously monitored. Seldom is it possible for homeowners to inspect and effectively self-treat their own house for termites without the proper training, equipment and knowledge of termite behavior and habits.



The termite queen in her egg chamber

Planting Trees with Drones

From *Morning Ag Clips, Texas Edition*, May 26, 2016

BioCarbon Engineering, a drone start-up, plans to counter industrial scale deforestation using industrial scale reforestation. Former NASA engineer Lauren Fletcher and his team recognize that emerging technologies including unmanned aerial vehicles (UAVs, or drones), remote sensing and machine learning can be combined to enable rapid landscape reforestation and restoration.

BioCarbon Engineering wants to use drone technology to seed up to one billion trees a year, all without having to set foot on the ground.

Throughout the world, 26 billion trees are currently being burned down every year while only 15 billion are replanted. If successful, the

initiative could help address this shortfall in a big way.

BioCarbon's system for planting is really quite sophisticated, and should provide better uptake than traditional dry seeding by air.

The drones will fire pods containing pre-germinated seeds at the ground

First, drones fly above an area and report on its potential for restoration, then they descend to two or three meters above ground and fire out pods containing seeds that are pre-germinated and covered in a nutritious hydrogel.

Fletcher doesn't pretend that the method is as good as hand-sowing, but he says it would be much quicker.

Pyro Bugs Help Restore Burned Forests in Alberta

By Wallis Snowden, *CBC News*, May 10, 2016

The blackened landscape around Fort McMurray (Alberta) is far from a dead zone, despite a wildfire that reduced more than 229,000 of hectares of boreal forest to cinders and ashes.

Amid the charred skeletons of spruce and still smoldering muskeg, Alberta's fire-loving insects are on the move. "Every step you take, there is just ash and soot, and you see these little beetles shimmering like little jewels on these black-burned trees, laying their eggs and doing their thing," said Peter Heule, an insect expert with Edmonton's Royal Alberta Museum.

Some bugs thrive in burned landscapes, and Heule said these pyrophilus creatures are critical to rejuvenating the boreal forest. The most famous of these fire-loving insects is the white-spotted long-horn beetle (*Monochamus scutellatus*). Heule said the bugs help turn deadwood back into soil, allowing seedlings to return to the landscape in a matter of months. Research shows that if the insects aren't there to chew their way through the blackened logs, the burned landscape remains stagnant for much longer.

"Obviously, the wildfire is an absolute tragedy for the communities that are affected, but the boreal forest will certainly grow back and it's just part of that renewal process," said Heule.

"And the bugs will have their part to play." The pitch-black, long-antennaed sawyers feed on conifers such as spruce, pine and fir trees in forests across North America.

Adult white spotted longhorn beetle, *Monochamus scutellatus* (Coleoptera: Cerambycidae) (Photo from Wikipedia.org)

New Southern Forest Health Website

The Southern Forest Health Website, sponsored by the USDA Forest Service and Southern Regional Extension Forestry, was recently launched at www.southernforesthealth.net. This new website provides general information, education and training materials on noxious weeds, insects and diseases affecting forestlands in the South.

To Bee or Not to Bee Informed

From *Morning AgClips, Texas Edition*, May 16, 2016

Honey bee. (Photo courtesy of www.genehanson.com)

The U.S. Department of Agriculture's National Agriculture Statistics Service (NASS) released the results of its first ever Honey Bee Colony Loss survey today. The survey queried 3,300 bee-keeping operations with five or more colonies on a quarterly basis, following their operations throughout the year. Data included tallies of the number of colonies, colonies lost, colonies added, and colonies affected by certain stressors.

According to the survey released today, there were 2.59 million or 8% fewer honey bee colonies on January 1, 2016 than the 2.82 million present a year earlier on January 1, 2015 for operations with five or more colonies. New quarterly colony data allow new levels of analysis.

For example, there was an 18% loss of colonies in the January-March quarter in 2015 and a 17% loss in the same quarter in 2016. Honey beekeepers with five or more colonies reported Varroa mites as the leading stressor affecting colonies. They also reported more colonies with symptoms of Colony Collapse Disorder lost in the first quarter of 2016 with 113,930 than the 92,250 lost in the same quarter in 2015.

Based on another survey, beekeepers across the United States lost 44 percent of their honey bee colonies during the year spanning April 2015 to April 2016, according to the latest preliminary results of an annual nationwide survey. Rates of both winter loss and summer loss—and consequently, total annual losses—worsened compared with last year. This marks the second consecutive survey year that summer loss rates rivaled winter loss rates.

The survey, which asks both commercial and small-scale beekeepers to track the health and survival rates of their honey bee colonies, is conducted each year by the Bee Informed Partnership in collaboration with the Apiary Inspectors of America, with funding from the U.S. Department of Agriculture (USDA). Survey results for this year and all previous years are publicly available on the Bee Informed website.

The researchers note that many factors are contributing to colony losses. A clear culprit is the varroa mite, a lethal parasite that can easily spread between colonies. Pesticides and malnutrition caused by changing land use patterns are also likely taking a toll, especially among commercial beekeepers.

A recent study, published online in the journal *Apidologie* on April 20, 2016, provided the first multi-year assessment of honey bee parasites and disease in both commercial and backyard beekeeping operations. Among other findings (summarized in a recent University of Maryland press release), that study found that the varroa mite is far more abundant than previous estimates indicate and is closely linked to several damaging viruses. Varroa is a particularly challenging problem among backyard beekeepers (defined as those who manage fewer than 50 colonies).

New FPMC Research Project Funded

Oak wilt, caused by the vascular pathogen *Ceratocystis fagacearum*, has had a devastating impact on live oaks and red oaks in Central Texas. Traditionally, the preferred method for protecting high value residential and urban trees is application of the fungicide Alamo® (propiconazole) using macro-injection systems.

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Discoloration of the veins (veinal necrosis) is diagnostic for oak wilt, caused by the fungus *Ceratacistis fagacearum*, in live oaks. (Photo by Ron Billings)

The Forest Pest Management Cooperative (FPMC) recently received word that its proposal entitled *Evaluation of Macro- and Micro-injection Systems for Application of Propiconazole in Live Oak to Prevent Oak Wilt* has been funded by the USDA Forest Service Pesticide Impact Assessment Project (FS-PIAP) for 2016. The funds ($58,000) will be shared with co-investigator Dr. David Appel, forest pathologist and recognized expert on oak wilt at Texas A&M University.

Dr. David Appel, with Texas A&M University's Department of Pathology and Microbiology and an expert on oak wilt, will collaborate with the FPMC in the new oak wilt injection study. (Photo by Ron Billings)

The primary objective of the project, to be carried out over three years, is to evaluate effectiveness of macro-infusion compared to one micro-infusion (Arborjet's Tree I.V.®) system for injecting propiconizole into live oak for prevention of oak wilt.

A secondary objective is to evaluate the two types of delivery system for speed and distribution of propiconizole movement within live oaks by monitoring uptake and movement of the fungicide in study trees at periodic intervals following injection.

The macro-infusion system uses Alamo® mixed in high volumes of water whereas the Tree I.V.® uses Alamo® mixed in low volumes of water. The macro-infusion approach, although in widespread use for over thirty years for treatment of oak wilt, is more labor intensive, requiring excavation of root flares to expose injection sites. In contrast the Tree I.V.® system uses injection plugs drilled at spatial intervals into the lower trunk with no need for root-flare excavation.

Plans are to treat at least forty live oaks with each treatment. Target trees will be selected on the periphery of expanding oak wilt centers in Central Texas. An equal number of threatened live oaks will be followed up to three years as checks. Although there is a variety of micro-injection systems on the market, Arborjet's Tree I.V.® was chosen for this evaluation, based on its superior performance in side-by-side comparisons with other micro-injection systems conducted previously by the FPMC.

Duration of Emamectin Benzoate for SPB Prevention

In April, 2016, the FPMC received a small grant from Syngenta, Inc. to test the duration of emamectin benzoate injections for southern pine beetle (SPB) prevention.

Previous FPMC research, financially supported by Syngenta, Inc. and conducted on the Oakmulgee Ranger District (Talladega National Forest) in Alabama demonstrated that loblolly pine trees injected with 1.25 – 5.0 ml/diameter inch of emamectin benzoate (Arborjet's TREE-äge®) are effective as trap trees for absorbing attacking beetles in the summer and fall months. Baited pines containing emamectin benzoate accumulate densities of SPB attacks comparable to those of uninjected (check) trees, but no SPB galleries are

constructed and no broods emerge from insecticide-treated trees.

The current study involves baiting injected trees ca. 18 months after insecticide injections to evaluate whether the emamectin benzoate will provide long-lasting protection against SPB. In this study, trees were injected with emamectin benzoate (TREE-äge®) at 1.25, 2.5 or 5 ml/diameter inch in October of 2014, but SPB attacks were not induced with pheromones until April, 2016. Treated and check trees (baited in April, but not injected with insecticide) are currently being monitored.

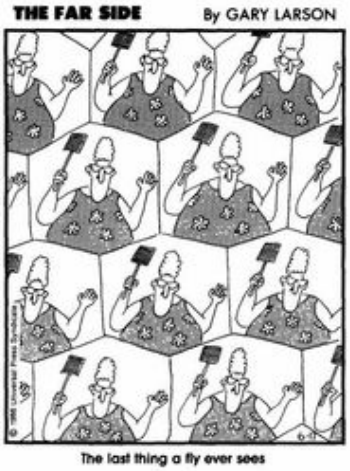
Attacked trees, regardless of treatment, will be felled and sampled at the time of foliage fade or at the end of the 2016 season, whichever comes first. Data to be collected on treatment and check trees include density of SPB attacks, length of SPB parent galleries, extent of larval galleries, SPB emergence, and abundance of blue stain and sawyer galleries.

Staff Forester Bill Upton places pheromone baits on a loblolly pine injected with emamectin benzoate to induce SPB attacks; Oakmulgee Ranger District, AL.

FPMC Hosts Mexican Forestry Student

Sebastián Yerena Yamallel at the TFS Forest Health office and laboratory in Lufkin (Photo by Ron Billings)

Sebastián Yerena Yamallel, a graduate student at the Universidad Autónoma in Nuevo León, Mexico, was invited to spend two weeks with the staff of the Forest Pest Management Cooperative in Lufkin in May. He is working on his Master's degree in forest entomology and wanted to observe the FPMC facilities and on-going research projects. During his stay, he was introduced to our research on Texas leafcutting ants, seed orchard pests, and pine bark beetles. During the second week, he accompanied FPMC researchers to the Oakmulgee Ranger District in Alabama to learn how to monitor SPB activity and evaluate insecticide injections for SPB prevention. Sebastián expects to complete his degree by next December.



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