Progress
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Vol. 5 No. 1 Mar. 2000

Quarterly Newsletter on Western Gulf Forest Pest Management Issues

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 in pine seed orchards and plantations. The newsletter focuses on, but is not limited to, issues occurring in the Western Gulf Region (including, Arkansas, Louisiana, Mississippi, Oklahoma, and Texas).

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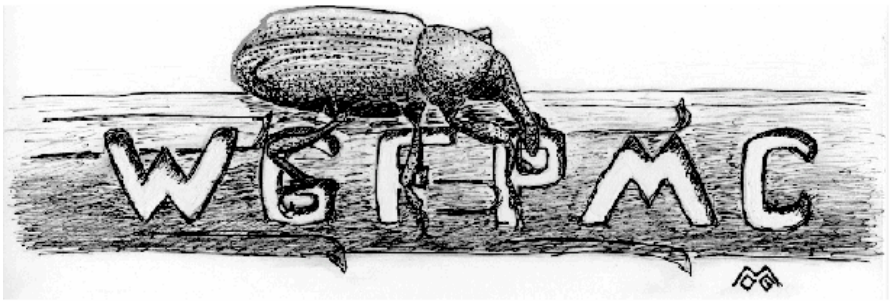
Announcement:

The WGFPMC welcomes The Timber Company, Willamette Industries, and Rohm and Haas Company as its newest members. The Timber Co., a separate operating group of Georgia-Pacific, manages 4.7 million acres nationwide and is a major producer of pine sawtimber and pulpwood. Marshall Jacobson will serve on the Exec. Comm. and Conner Fristoe and Jerry Watkins will be Contact Reps. Willamette Ind. is a diverse forest products company that manages 1.7 million acres across the U.S. and produces various paper products and building materials. Paul McMahen will serve on the Exec. Comm. and Jim Heard will be the Contact Rep. Rohm and Haas Co. is a large manufacturer of specialty chemicals, including forestry pesticides. Ken Buchert will serve on the Exec. Comm.

Western Gulf Forest Pest Management Cooperative



**Texas Forest Service, Forest Pest Management,
P.O. Box 310, Lufkin, Texas 75902-0310**

Summary of 1999 WGFPMC Research Projects

In 1999, three research projects - the leaf-cutting ant control study, pest survey, and systemic injection study - were continued from 1999. A fourth project, a tip moth pesticide evaluation study, was initiated in 1999. A summary of the results from the leaf-cutting ant and pest survey, is presented below. Results from the systemic injection study and tip moth pesticide study will be presented in the next PEST newsletter (June 2000).

Texas Leaf-cutting Ant Control Study

The Texas leaf-cutting ant (TLCA), *Atta texana* (Buckley), is a serious pest in first- and second-year pine plantations in east Texas and west-central Louisiana. With the scheduled withdrawal of methyl bromide by 2005, a study was initiated in 1996 to evaluate several alternative products for their effectiveness in halting ant activity.

Previous research by the Texas Forest Service, together with trials conducted by the WGFPMC between 1996 and 1998, showed that a bait containing sulfluramid was highly effective in halting leaf-cutting ant activity. Trials were continued during the winter of 1998-99 and summer of 1999 to determine the lowest rate that still provides 100% reduction in ant activity during each season and compared the effectiveness of applications of bait applied by spreader versus bait in bags. During the summer we also compared the effectiveness of applications of a Volcano™ bait formulation (produced in Mexico) to the standard Griffin (GX-483) bait that had been tested from 1996 to 1999.

Ninety (winter of 1998-99) and 110 TLCA colonies (summer of 1999) were treated and monitored in central east Texas on land managed by Temple-Inland, Louisiana-Pacific, Champion, International Paper, and the U.S. Forest Service. The level of TLCA activity was evaluated 2, 8, and 16 weeks post-treatment for each colony and compared to activity prior to treatment.

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During the winter trials, all six sulfluramid treatments significantly reduced ant activity after 2 weeks compared to the check colonies, but colonies treated with the 2g/m^2 rate (spreader and bag) were significantly more active after 2 weeks compared to the 6g/m^2 spreader treatment. All rates of sulfluramid baits were ultimately successful in completely halting ant activity in 100% of the treated colonies after 16 weeks (Fig. 1).

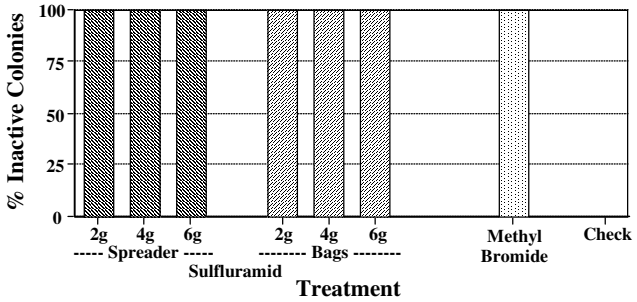

Figure 1. Percent of Texas leaf-cutting ant colonies inactive 16 weeks after treatment with sulfluramid (GX-483; applied by spreader or bag) or methyl bromide (winter 1998-99).

During the summer trials, all eleven chemical treatments (10 sulfluramid and 1 methyl bromide) significantly reduced ant activity after 2 weeks compared to the check colonies. However, only three sulfluramid spreader treatments (GX-483 at 6 and 8 g/m^2 and Volcano™ at 10 g/m^2) were 100% effective in completely halting ant activity after 16 weeks (Fig. 2).

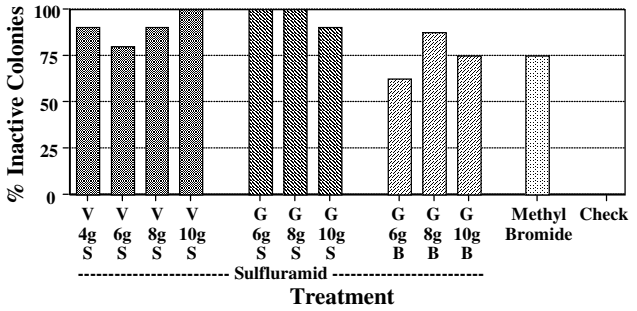

Figure 2. Percent of Texas leaf-cutting ant colonies inactive 16 weeks after treatment with sulfluramid [Volcano (V) or GX-483 (G); applied by spreader (S) or bag (B)] or methyl bromide (summer 1999).

As in 1997 and 1998, winter applications of sulfluramid were more effective at lower rates than summer applications; even the 2 g/m^2 application rate was 100% successful during the winter (Fig. 1). The better success of winter applications appears to be related to the lower availability of plant material, thus making the bait more attractive to the ants.

As in 1998, sulfluramid bait sealed in bags was slightly less effective compared to the spreader treatments at similar rates. However, the bag technique appears to have several advantages over loose bait applied by spreader. First, bait bags would reduce exposure of the applicator to the active ingredient. Bait bags would allow for easier treatment of colonies. In addition, because the bait readily disintegrates when it becomes wet, bait bags would lengthen the time the bait is available to the ants. Unfortunately, at this time packaging the bait in bags is not economically feasible.

Although, Volcano™ was 100% effective in efficacy trials at the 10 g rate and generally performed as well as the Griffin standard (GX-483) during the summer 1999 trials, it had not been tested during the winter months. Efficacy trials are currently underway to compare Volcano™ to the Griffin standard during the winter months.

Pest Survey

It is now common knowledge that pine growth and yield can be increased and rotations shorted through the use of more intensive site preparation methods and applications of herbicides and fertilizers. However the question has arisen - Do these more intensive silvicultural practices influence the occurrence and impact of insects and diseases in treated plantations? A survey was initiated in the fall of 1998 and continued through 1999 to answer this question.

One hundred & twenty-nine sites (plots) (including research sites, progeny tests, and plantations) containing 1 - 6 year-old loblolly pine in East Texas and Arkansas were surveyed during spring 1999 and 143 sites (plots) during the fall 1999. Research and progeny test sites contained 2 - 9 plots. Thirty-five to 50 trees were randomly selected within each treated area. Each tree was evaluated for occurrence of any biotic or abiotic-caused damage, ranked on the extent of damage, and evaluated for form (presence or absence of forks). Each site was categorized based on the intensity of site preparation, weed control, fertilization, and other practices applied by mid-summer 1999.

The Nantucket pine tip moth, *Rhyacionia frustrana*, was the most common biotic factor damaging loblolly pine plantations in Texas and Arkansas during both the spring and fall of

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Research Projects (Continued from Page 2)

1999. All (100%) of 129 sites (plots) visited in the spring and nearly all (99%) of the 143 plots/sites visited in the fall had some level of tip moth infestation. Two-year old plots in southern Arkansas were generally the hardest hit during the spring with 83% of all trees infested, 24% of all evaluated tips infested, and 35% of all terminals infested. Comparable Texas plots were significantly less impacted. The levels of infestation in Texas remained fairly stable across tree/stand age classes. In the fall, tip moth infestation levels increased dramatically in most Arkansas and Texas sites (plots), but were generally highest in two- and three-year old stands.

Only two other biotic factors (southern pine coneworm, *Dioryctria amatella*, and aphids) were observed at levels that warrant mentioning. During the spring, coneworm was most prevalent on two-year old seedlings (30%) in Arkansas sites and five- and six-year old trees (23% and 31%, respectively) in Texas sites. Larvae of coneworm were commonly found boring in lateral and terminal shoots; however, occasionally these insects were discovered boring in branch forks and/or main stems. In a few instances, the coneworm damage was so extensive as to cause the main stem to snap. By fall, coneworm populations had apparently declined, but signs of damage were still fairly common in six-year old stands.

Aphids were most commonly found (30%) during the spring on three- to five-year old trees in Texas sites. However, in most cases, individual trees exhibited less than 10% infestation levels. This accounts for the low level of sooty mold observed.

Data analyses were performed to evaluate the influence of different levels of stand management on the occurrence and impact of insect and disease pests. As in 1998, the data from 1999 indicate that infestation levels of Nantucket pine tip moth increased significantly with silvicultural intensity, but only in one- and two-year old sites during the fall (Fig. 3). Similarly, coneworm and aphid infestation levels also increased as silviculture practices intensified (Figs. 4). The primary influence during the first year in Texas appeared to be the intensity of site preparation. However, both site preparation and weed control significantly influenced the extent of tip moth damage on trees in Arkansas.

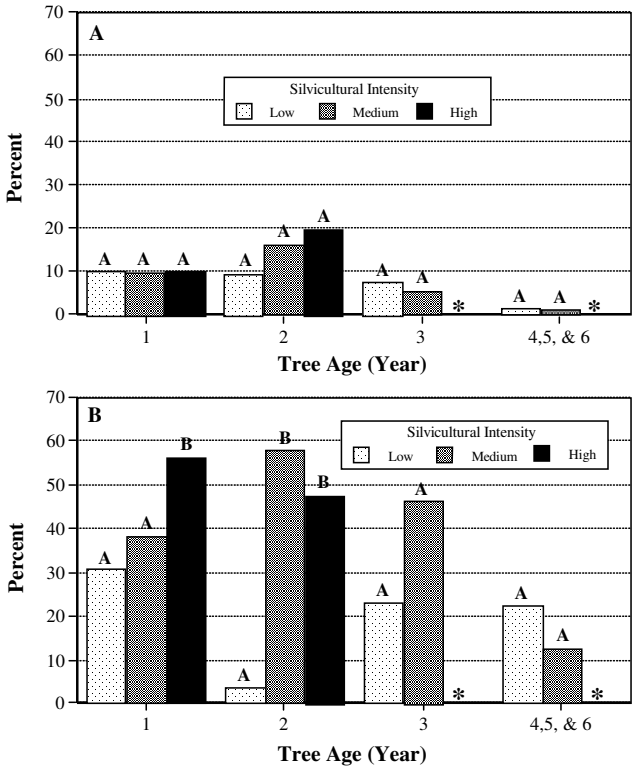

Figure 3. Pine tip moth damage on loblolly pine by tree age and silvicultural intensity in **A.** Spring and **B.** Fall, 1999. * = No trees of this age were surveyed at the high intensity level. Bars, within each age, with the same letter are not sig. diff. at 5% level.

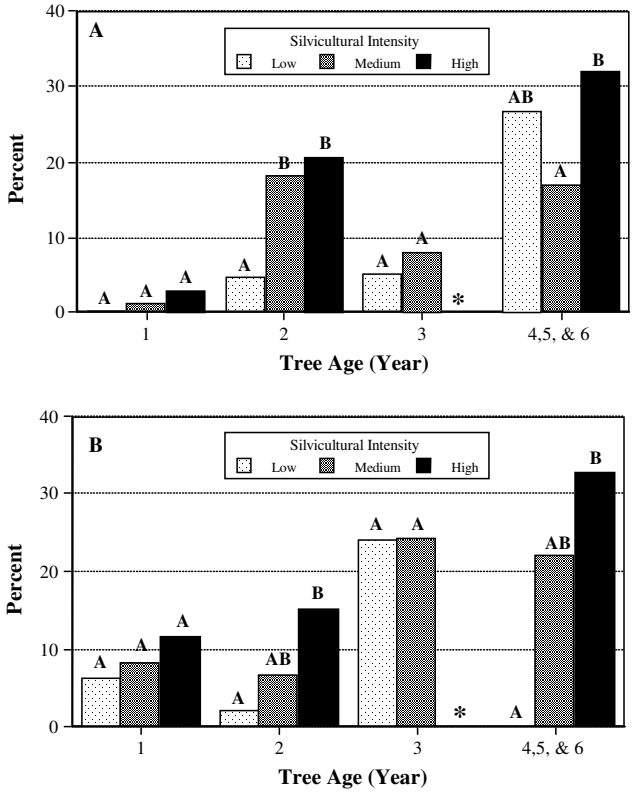

Figure 4. **A.** Southern pine coneworm or **B.** aphids infestation by age and silviculture intensity level in Spring, 1999. * = No trees of this age were surveyed at the high intensity level. Bars, within each age, with the same letter are not sig. diff. at 5% level.

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Research Projects (Continued from Page 3)

The true impact of tip moth on tree growth and yield has not been determined in the Western Gulf region. However, tree form rank (incidence of branch forking) was significantly related to the percent of trees infested with pine tip moth (Fig. 5). In fact, the relative percent of trees with at least one fork more than doubled (24% to 53%) as the level of tip moth infestation increased from 0 to 100%.

Additional surveys are planned for most sites during the spring and fall of 2000. Sites (plots) which are moving into their sixth growing season will be dropped, but several new one-year old sites (plots) will likely be added in Texas, Arkansas, and Louisiana. Call Don Grosman at 936/639-8170 if you have any sites or plots (1 - 5-year old with any level of silvicultural intensity) you would like included in the 2000 pest survey.

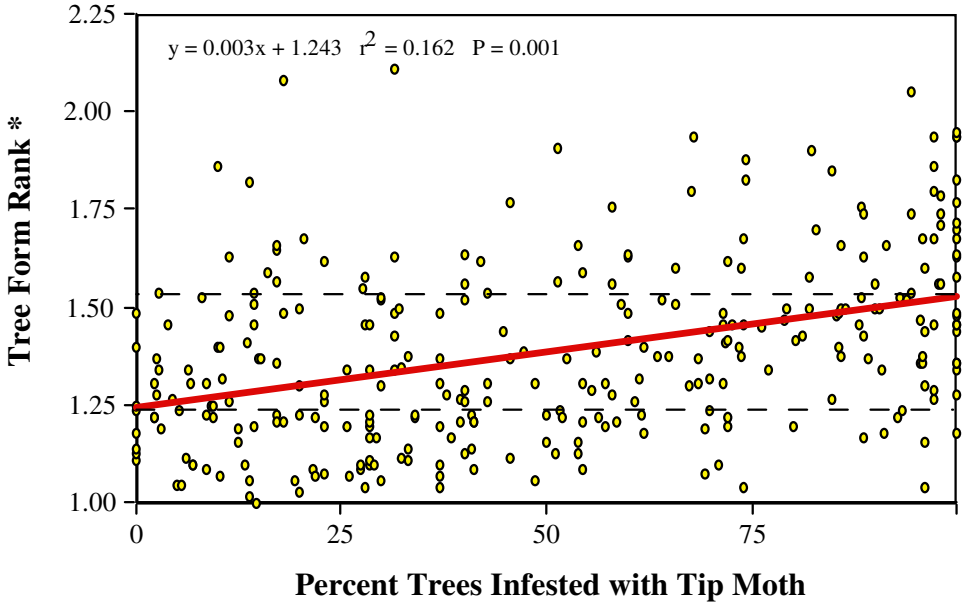

Figure 5. Relationship between percent of trees infested by pine tip moth and tree form rank.
* Tree form rank: 1 = no forks; 2 = one fork; 3 = two to four forks.

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More Announcements

East Texas Forest Entomology Seminar - Spring Fling

All WGFPMC executive and contact representatives, industry, and TFS foresters are invited to attend the spring session of the East Texas Forest Entomology Seminar scheduled for May 4 - 5, 2000. The meeting will begin at 1:00 PM on Thursday at Kurth Lake Lodge, north of Lufkin, and continue until noon on Friday at the Arthur Temple College of Forestry at SFASU in Nacogdoches. Registration is $20, which includes an evening meal. For additional information and/or an agenda, contact Ron Billings at 936/639-8170 or tfs.pcs@inu.net.

WGFPMC Research Funding

Griffin L.L.C. has graciously provided the WGFPMC with a $5,300 grant to continue evaluations of Volcano™ and other sulfluramid bait formulations through the first half of 2000.

In addition, Don Grosman and Ron Billings were awarded an $18,000 grant by the FSPIAP (Forest Service Pesticide Impact Assessment Program) for the 2000 proposal entitled "Continued evaluation of systemic injections of emamectin benzoate, imidacloprid, and thiamethoxam for control of cone and seed insects in loblolly pine seed orchards."

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More Announcements (continued from page 4)

New Products

(Source: Federal Register, vol. 64, 10-20-99, via Illinois Pesticide Review Vol. 2000 Issue 1 2000)

EPA recently received an application from Novartis to register the new active ingredient, thiamethoxam, for the foliar and systemic control of insects in greenhouses and ornamentals. Registration would be conditional. Note: WGFPMC has been testing this same active ingredient using the Wedgle Tip™ and Helson injectors in pine seed orchards. It has shown good potential for control of seed bug.

Cancellations

(Source: Federal Register, vol. 64, 11-3-99, via Chemically Speaking, Jan. 2000)

EPA announced the receipt of requests by registrants to voluntarily cancel certain pesticide registrations. Unless the request is withdrawn, the cancellations will become effective May 1, 2000. Notable among the list of requests of registrations to be voluntarily canceled are AgrEvo Environmental Health and AgrEvo USA Company's request to cancel their registrations for technical and formulated products containing the carbamate insecticide **bendiocarb** (Ficam, Turcam, and Bendiocarb).

Chorothalonil and Captan REDs and WPS Implications

(Source: Chemically Speaking, Jan. 2000)

The Pesticide Information Office recently reviewed Reregistration Eligibility Decisions (REDs) for the fungicides captan and chlorothalonil (Bravo®). These REDs require the registrants to make several changes on their labels. The mitigation of eye irritation risks for field workers is noted here.

Both fungicide labels will have "Special Eye Irritation Provisions" which will state the product is a severe eye irritant and will require at least one container designed especially for flushing eyes to be available in operating condition at the WPS-required decontamination site for agricultural workers who enter the treated area AFTER the expiration of the restricted entry interval (REI) but BEFORE 7 days from the time of application of these fungicides. The new REI for chlorothalonil products will be 12 hours. The REI for captan products will range from 12 hours to 96 hours depending on the use.

In addition to the required eye flushing container at the decontamination site, employers must inform workers in a manner they can understand:

1) that residues in the treated area may be highly irritating to their eyes,
2) that they should take precautions, such as refraining from rubbing their eyes, to keep the residues out of their eyes,
3) that if they get residues in their eyes, they should immediately flush their eyes using the eyeflush container that is located at the decontamination site or using other readily available clean water,
4) and how to operate the eyeflush container.

This may be the first time a container for eye flushing will be required at an worker decontamination site after the REI expires. This action adds a product specific requirement to the generic decontamination site requirements for workers established by the WPS (clean water, soap and single use towels). In the case of these two fungicides, employers will need to check the labels to make certain that they have the required decontamination supplies on hand if workers go into treated areas after the REI expires and before seven days after the application. The captan RED was issued 9/99 and the chlorothalonil RED was issued 9/98. A spot check of labels posted on the registrants web sites indicates the labels have not yet been modified to reflect these new requirements. REDs may be viewed at http://www.epa.gov/REDs/index.html.

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Texas Forest Pest Conditions - 1999

(by H. A. (Joe) Pase III, Texas Forest Service)

Pine bark beetles are the most destructive group of insects in the forests of the United Sates. There are five (5) species of pine bark beetles that inhabit the forests of the South. Populations of the dreaded southern pine beetle were at very low levels during 1999. However, populations of three species of pine engraver beetles (*Ips* spp) were very high in 1999 resulting in pine tree mortality across all of East Texas. The black turpentine beetle was only slightly above normal levels. The information below summarizes forest insect and disease activity in East Texas for 1999.

DROUGHT

For the second consecutive year (and three of the last four years), Texas has experienced severe drought. Pine seedling mortality was high on most tracts planted during the winter of 1998-1999 and *Ips* activity was much higher than usual across all of East Texas.

PINE ENGRAVER BEETLES

The severe drought that began in 1998 in East Texas continued into 1999 resulting in another year of significant *Ips* beetle activity. Many landowners and homeowners were impacted by *Ips* beetles this year. These beetles tend to attack and kill scattered single trees or small groups of trees (seldom more than 10-15 trees in a group). Cutting and removing infested trees is about the only control method that can be used. Once the bark begins to "slip" from a dead tree, the beetles that killed the tree have all left and there is no need to cut the tree down unless there is danger of the tree eventually falling on a building, road, fence, power or utility line, etc. Insecticides typically are not economical or practical to use for engraver beetles. It is common for all three species of *Ips* beetles to attack a single pine tree. If drought conditions persist across East Texas in 2000, engraver beetles will continue to kill pine trees.

BLACK TURPENTINE BEETLE

Black turpentine beetle activity was slightly higher than normal in Texas in 1999, probably due to the drought. These bark beetles seldom attack a tree more than six to eight feet above the ground. Of the five pine bark beetles in East Texas, the turpentine beetle is usually the least damaging.

SOUTHERN PINE BEETLE

No infestations were reported on state, private, or federal lands in Texas (or west of the Mississippi River) in 1999. Some additional positive news was that cooperative technology development efforts by the Texas Forest Service, University of Georgia, Virginia Tech, and USDA Forest Service resulted in EPA registration of the inhibitory compound verbenone for southern pine beetle suppression. Early indications are that SPB activity in 2000 will continue to be very low in the Western Gulf region.

FOREST TENT CATERPILLAR

Localized activity by this defoliator occurred in the Dallas/Ft. Worth area in the spring of 1999. This defoliation does not cause serious harm to the trees, unless it occurs several years in succession. Defoliated trees produce new leaves and look normal by early summer. The caterpillars are sometimes a nuisance.

NANTUCKET PINE TIP MOTH

In Texas, pine tip moth activity increased from about 50% infested tips in 1998 to about 75% in 1999. Some areas were heavily infested while other areas experienced little damage. The larvae of this insect attack the growing tips of young pine trees. Their feeding causes some growth loss, but once trees are taller than about eight feet, tip moth seldom attack them. Drought may have contributed to the increased activity.

BLACKHEADED PINE SAWFLY

Blackheaded pine sawfly was present during October and November 1999 in Angelina, Nacogdoches, Houston, Cherokee, Smith, Upshur, and Wood counties. Trees in some areas were completely defoliated and will remain that way through the winter. However, they are expected to develop new needles in the spring. The main concern over this defoliation is that it adds additional stress to trees already suffering from drought and could result in increased *Ips* activity. Feeding by this sawfly is not known to directly kill trees. Outbreaks tend to be short in duration and high larval populations usually are controlled by parasites, predators, and disease.

REPRODUCTION WEEVILS

Very little weevil activity was noted in 1999.

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This was probably because most planting in 1999 was replants of trees killed during the 1998 drought. These weevils may kill recently planted seedlings by feeding on the tender bark.

TEXAS LEAF-CUTTING ANT
In 1999, this insect continued to defoliate young pine trees in East Texas and west central Louisiana. Research by Texas Forest Service entomologists has led to approval of a Special Local Need (SLN) registration by the Texas Department of Agriculture for a new bait for the control of leaf-cutting ants in Texas. A single application of Volcano™ Leafcutter Ant Bait completely eliminates ant colonies in as little as four weeks.

GYPSY MOTH
No gypsy moth infestations are known to exist in Texas. The US Department of Agriculture, Animal and Plant Health Inspection Service and Texas Department of Agriculture cooperatively deploy traps in Texas each year and a few male moths are caught. This insect was introduced to the northeastern United States over 100 years ago and has slowly spread, mostly due to man's activities. Most of the northeastern US, the Lake States, and some localized areas in the Pacific Northwest have established infestations. Male moths that are trapped in Texas are brought here from infested areas by tourists who unknowingly transport pupae or egg masses on their vehicles, camping gear, or other items.

ANNOSUM ROOT DISEASE
Localized mortality and growth loss from annosum root disease occurred in Texas in 1999. Most activity was noted in northeast Texas. This disease attacks the roots of pine trees (usually loblolly pine and slash pine) and eastern red cedar. This disease is not considered a serious problem in Texas.

FUSIFORM RUST
Moderate levels of fusiform rust occurred on scattered and occasional tracts in Texas in 1999. On a statewide basis, fusiform rust infection levels have declined slightly in the past few years. This rust disease infects slash and loblolly pine trees. Rust diseases are interesting in that they must have an alternate host to develop. Fusiform rust spores produced on pine trees in the early spring infect newly developing oak leaves (they cannot directly infect other pine trees). Then in early summer, spores produced on the oak leaves infect the growing tips of pine trees (these spores cannot infect other oak trees). The disease does little if any harm to oak leaves. Rust infections on the main stem of pines less than 10 years old may cause mortality.

OAK WILT
Oak wilt continues to devastate over 60 counties in Texas, mostly between Dallas and San Antonio. Urban and rural oaks are affected. Live oak, the premier tree species in the region and highly valued for beauty, shade, and wildlife benefits, is severely impacted by the disease. The Texas Forest Service began its 13th year of a cooperative suppression project in October 1999. Since the Project's inception, more than 2.4 million feet (>450 miles) of barrier trenches have been installed around 1,600 oak wilt centers in 34 counties. Placing trenches between diseased and healthy trees severs interconnected root systems and halts the spread of disease centers.

CONEWORMS
Losses caused by coneworms in unsprayed pine seed orchards remained static at about 25% in Texas in 1999. Losses in treated orchards were considerably less. Insects can cause serious losses to seeds and cones in pine seed orchards. These orchards are established with genetically improved trees. The seed collected from the cones that develop on these trees will produce genetically superior trees - trees that grow faster and straighter, have better quality wood, and are resistant to various pests. Coneworms destroy cones and seeds in cones.

SEED BUGS
Seedbugs were abundant in untreated pine seed orchards in Texas in 1999. These insects extract the contents of seeds inside cones. They do this from outside the cone by inserting a long beak between the cone scales to find the seeds. About the only way to detect seed bug damage is to x-ray seeds and observe what is inside the seeds.

PITCH CANKER
About 30% of the pine cones harvested from state seed orchards in 1999 in Texas were damaged by what was apparently pitch canker (unconfirmed). Pitch canker is a disease that appears to be increasing, especially in pine seed orchards.

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More Announcements (continued from page 5)

Mergers

(Source: Farm Chemical, Jan., 00, via Alabama Pesticide Information Vol. 4 No. 1 2000).

Zeneca and Novartis have merged into a company called "Syngenta." Some of the common pesticides that Novartis has labeled are Avid, Award, Curacron, Diazinon, Fulfill, Precision, and Proclaim. Zeneca has such products as Karate, Warrior, Dual, Gramoxone, Touchdown, Ridomil, and Bravo. So, as you can see, Syngenta will have a wide spectrum of pesticides under their banner.

Aventis Cropscience is the result of a merger between Rhone-Poulenc Ag Co. and AgrEvo.

Monsanto and Pharmacia is a merging of a biotechnology company with a large pharmaceutical company. The new company, whose name has yet to be selected, will quickly separate the ag division from the pharmaceuticals.

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Thought You Might Be Interested to Know . . .

Evergreen Trees: A Pesticide Filter

(Source: The New York Times, November 23, 1999, via Pesticide Broadcast Vol. 11 No. 1, Feb. 2000)

A car's air filter is a simple device, usually just a ring of paper through which all of the air entering the engine must pass. Scientists at Ohio State University have studied what amounts to a similar filter for farmland. But it is one that treats exiting, not entering, air, and is made not of paper but of evergreen trees. The scientists studied how effective rows of evergreens were in reducing the movement of pesticides beyond fields where they were sprayed. Using droplets of dye in wind tunnel experiments, they found that pine trees and other evergreens collected two to four times more droplets than deciduous trees like maples. Evergreen needles, the researchers noted, have more surface area than flat leaves and create swirling air patterns that lead to more droplets' being deposited. Evergreens have another advantage as well; they never lose all their needles. The researchers, who plan to build a longer wind tunnel for more studies, suggest that windbreaks made of evergreens could be useful in limiting the drift of pesticides from agricultural land.

Gotta Do A Presentation, Huntin' For Digital Photos?

(Source: USDA Photo Center web site, via The Label, Vol. 12 No. 3, Mar, 2000)

Have you ever been in need of just that perfect agriculturally-related digital photo? Then, check out the USDA Photo Center and live in luxury. And, there is more than just ag pictures here. Lots more. All images are in a high quality jpg format and perfect for your next electronic presentation.

The photo library contains 20,000 images and is sorted into twenty categories such as horticulture, food safety, crops, farmsteads, nutrition, animals, marketing, pesticides, etc. The "crops" category is in turn divided into seven subgroups: grain, fruits & vegetables, tobacco, exotics, peanuts, and cotton and tea. The "animals" category contains groupings of nine species, plus wildlife.

To further understand the magnitude of the digital reference library, the grain subgroup contains libraries of six major crops: barley, sorghum, corn, soybeans, rice and wheat. Forty five images of corn are available for your use.

So, can you use the photos? You bet. All photographs in the USDA Online Photography Center site are in the public domain. You may use them as you wish, with the blessing of USDA. However, USDA states that the images may not be used to infer or imply USDA endorsement of any product position. Neither should they be used to distort the reality of the image they portray.

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Thought You Might Be Interested to Know . . . (continued from page 8)

SAFETY FIRST !!!!

(Source: Delta Farm Press 1-14-00, via Alabama Pesticide Information 1-19-00)

Last summer in Missouri, a farmer nearly lost his life by ignoring one the basic tenets of pesticide safety. John Atwill unknowingly contaminated his drink can while loading a spray rig with insecticide. After a short time, Atwill began to see double and became 'fuzzy minded.' By the time he walked back to the barn, Atwill was staggering. A friend took Atwill to the hospital for emergency treatment. Fortunately, the friend called the hospital and told them what insecticide Atwill had ingested. The doctors were waiting with an antidote, and Atwill soon recovered. What if Atwill had collapsed in the field? What if the friend had not been home?

According to Ron Billings, the moral of the story is . . . If misused, pesticides may kill At-will! NEVER eat or drink around pesticides!

Texas 24C Registrations for Forestry Crops

(Source: Ms. Ann White, Texas Department of Agriculture)

Below are several pesticides registered for special local needs (24C) on forestry-related sites in Texas:

1. Weedone 2,4-DP (Union Carbide Agri. Prod. Co.); for use before planting pine seedlings to control oaks, elm...(maybe more she's not sure); tx-790025

2. Weedone 2,4 DP (Rhone-Poulenc Ag Co.); woody plant herbicide for control of hardwoods for pine seedlings; tx-790025

3. Earthfire Vaporizing fluid (Ant Fire Inc.); for control of the Texas leaf cutter ant; tx-860011

4. Talstar 10WP (FMC Corp.); Outdoor produced nursery stock; tx-900011

5. Capture 2EC (FMC Corp.); application in pine seed orchards for control of coneworm and seed bugs; tx-930005

6. Reflex Herbicide (Zeneca Inc.); for control of yellow nutsledge; tx-960015

7. Pounce 3.2 EC Insecticide (FMC Corp.); application to pine seedlings in nurseries for protection against regeneration weevils; tx-970012

8. Krenite, UT brush control (Dupont) ; post-harvest control of natural pine (wildlings) and hardwoods in the establishment of genetically improved pines; tx-980007

9. Volcano Leafcutter Ant Bait (Griffin LLC); for control of Texas leaf cutting ants, *Atta texana*; tx-990018