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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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Announcements:

Methyl Bromide Safety and Demonstration Meeting. All WGFPMC representatives, industry, and TFS foresters are invited to attend Methyl Bromide Safety Meetings scheduled for Tuesday, September 22nd and 29th. The meetings will begin at 9:00 AM at the City Hall in Jasper, TX. The meetings will cover methyl bromide equipment, safety and application guidelines, and a demonstration on the use of methyl bromide to control leaf-cutting ants. Both meeting dates are full, but we may have a third meeting in October. If still interested, call Martha Johnson or Don Grosman, TFS, at 409/639-8170.

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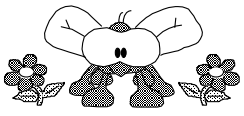

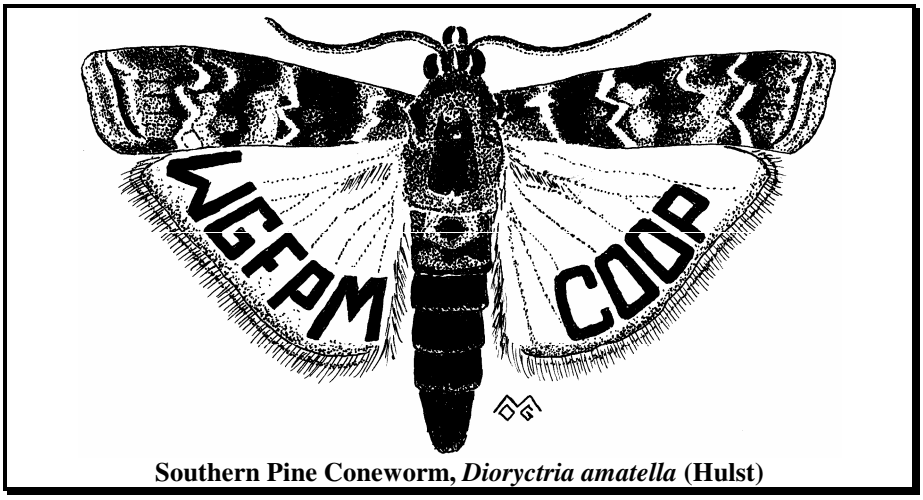

Southern Pine Coneworm, *Dioryctria amatella* (Hulst)

Texas Forest Service, Forest Pest Control Section, P.O. Box 310, Lufkin, Texas 75902-0310

Engraver Beetle (Not Southern Pine Beetle) Activity On the Increase in East Texas

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

If the extreme fire danger caused by the 1998 drought hasn't caused enough concern, now pine bark beetle activity has begun to appear. With the prolonged drought that many areas of the east Texas piney woods have experienced, an increase in *Ips* or engraver beetle activity has occurred. Engraver beetles are small, brown to black, cylindrical insects that attack and kill pine trees by feeding and laying eggs in the inner bark of the tree. Engraver beetles usually breed harmlessly in fresh logging debris and weakened trees and do not kill a significant number of pine trees to be considered a major pest. However, when trees are weakened or stressed due to drought or other conditions, engraver beetles may attack and kill a significant number of trees (almost any aged tree may be attacked). This has been the case in a good portion of the Western Gulf region this summer.

Ips beetle activity occurs every year, and attacks are usually quite scattered and involve only a few trees in an infestation. That pattern has continued this summer, but there are a greater number of scattered trees being killed. Some infestations containing 20-75 trees have been reported. It is believed that the beetles are responding to the drought-stressed pine trees. For example, I recently observed engraver beetles in an eight-year old loblolly pine plantation in San Augustine County.

Outbreaks of engraver beetles in North America historically have been associated with prolonged droughts, especially during the growing season. Timber growers can expect to experience a significant drought at least once during the life of a pulpwood stand and twice during a sawtimber rotation. Pine trees growing in shallow soils or heavy clay soils are especially subject to moisture stress during droughts. Fire, hail, ice, lightening, wind, standing water, disease, logging, and other factors may make pine trees more susceptible to engraver beetle attacks.

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There are three principal species of engraver beetles that attack and kill southern pines. They are the eastern six-spined engraver (*Ips calligraphus*) which is about 5 mm long, the eastern five-spined engraver (*Ips grandicollis*) which is about 4 mm long, and the small southern pine engraver (*Ips avulsus*) which is about 3 mm long. The six-spined engraver usually is found in large diameter material such as the tree's trunk and large branches. The five-spined engraver usually is found in medium-sized material such as the upper trunk and large branches. The small southern pine engraver is almost always confined to branches in the top of the tree. It is not uncommon to find all three species in a single tree. If only the small southern pine engraver attacks a tree, the top portion of the crown may die, while the lower limbs remain alive.

Two other bark beetle species may also be present in beetle-killed pine trees. The southern pine beetle (*Dendroctonus frontalis*) is the most serious insect pest in the southern forests of the United States. Besides fire, this beetle is usually the main concern of forest landowners. It is capable of killing large numbers of trees (even healthy trees) and a single infestation may encompass hundreds of acres. Populations of southern pine beetles fluctuate from year to year in east Texas, and 1998 is proving to be a very low year for this insect. During the worst year on record (1985), over 15,000 infestations caused by southern pine beetles were reported in east Texas alone.

The other pine bark beetle of concern is the black turpentine beetle (*Dendroctonus terebrans*). This beetle readily responds to fresh pine sap (resin) associated with injured trees. Like the engraver beetles, the black turpentine beetles are not usually a serious problem. This beetle is most commonly found in stumps and injured residual trees following logging.

It is important to determine which of the five bark beetles mentioned above has attacked a tree. All of the beetles chew holes through the bark and feed and lay eggs in the inner bark (the area between the bark and the wood). The three species of engraver beetles construct distinct galleries in the shape of a "Y," "H," or "I" as they lay their eggs in the inner bark. The small southern pine engraver usually constructs the "I-" shaped gallery. As the beetles construct these egg galleries, the pattern is etched on the inside of the bark as well as the outer sapwood of the tree. The presence of the "Y-," "H-," or "I-" shaped gallery pattern that tends to be oriented vertically up and down the tree is the easiest way to identify engraver beetle attacks.

By contrast, the southern pine beetle constructs a winding gallery in the shape of the letter "S." The gallery of the black turpentine beetle has no particular shape, but the attacks of this beetle are usually limited to the bottom six to eight feet of the trunk of the pine tree and a large mass of pitch or resin will usually form where the beetles attack. It is a good idea to remove some bark from a recently-attacked tree to look for the distinct gallery pattern made by the adult bark beetle since all five of the pine bark beetles are quite small and can easily be confused with other insects found in dead pine trees.

Although it is often overlooked, the first sign of attack by engraver beetles is the presence of reddish-brown boring dust in the crevices of the bark. When a tree is healthy and has a good supply of moisture, sufficient pitch or resin will be produced such that a glob of resin, called a pitch tube, will form where the beetle attacks the tree. This pitch tube will often have a reddish-brown appearance because of boring dust mixed with the resin. During periods of drought, pitch tubes may not form on the bark of the trees and only the boring dust will be visible. Once the tree becomes colonized by engraver beetles, it will soon die.

The next visible characteristic of attack will be the foliage (needles) of the tree turning from green to yellow to red. During the extreme heat this summer, the tree's foliage will turn from green to red in about three weeks. Pine trees seldom survive when they have been attacked by engraver beetles. It is important to keep in mind that engraver beetles may have attacked the upper portion of the tree and killed the top, but have yet to attack the lower portion of the bole where a person could reach while standing on the ground.

As the engraver beetles construct their egg galleries underneath the bark, the female beetles will lay eggs along the sides of the gallery. From these eggs hatch small, white grubs which feed and soon pupate in the inner bark. When the pupae mature, they transform into new adult beetles. The new adults then chew a small, round hole in the bark, emerge, and fly in

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search of another tree to attack. During the summer months when daily high temperatures are in the upper 90s (or higher), the time from egg to new adult beetle (one generation) may be as short as 21 days. Overlapping generations of the beetles occur such that all stages of the beetle are present at all times. When temperatures drop below about 59 degrees F., very little beetle development will occur.

Maintaining a healthy stand of trees is a landowner's best policy for preventing engraver beetle attacks. Good forest management practices are also good beetle prevention practices. If direct control is needed for an infestation of engraver beetles in a forest situation, cutting and removing the infested trees is about the only feasible course of action to follow. In yard situations, prompt removal of visibly infested trees is recommended and adjacent pines can be sprayed with a preventive insecticide registered for pine bark beetles (Lindane or Dursban 4E).

During this time of drought when pine trees are stressed, landowners are encouraged to keep a close watch of their pine stands. If engraver beetles attack, direct control may be warranted. For additional information, you can visit three websites (www.ifas.ufl.edu, fhpr8.srs.fs.fed.us/idotis/insects/ipsengrv.htm, and www. bugwood. caes.uga.edu/ppb/html/background.html) or contact your nearest Texas Forest Service office or the Pest Control Section, P.O. Box 310, Lufkin, TX 75902.

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Thought You Might Be Interested to Know . . .

DEET

(from Chemically Speaking July 1998 / EPA Press Release; April 24, 1998)

With the abundant amount of rain we have had recently, it will quickly become mosquito season here in the Western Gulf region, but bug zappers, bats, and ultrasonic devices alone do not completely work in controlling them. In fact, despite decades of pesticide and mosquito physiology research, a June 1 report in the Annals of Internal Medicine says that nothing repels the bugs better than DEET, an insecticide first patented in 1946 by the U.S. Army. DEET (N,N-diethyl-meta-toluamide), is the active ingredient in some of the most widely used insect repellents (used by about one-third of the U.S. population each year).

One study carried out under extreme mosquito conditions in Alaska found that subjects wearing DEET on their skin and permethrin on their clothing were ignored by 99.9 percent of all mosquitoes over an 8-hour period. Unprotected subjects, on average, were bit 1,188 times per hour.

Simultaneously, EPA's Office of Pesticide Programs has issued new labeling requirements to ensure the continued safe use of insect repellents containing DEET. A review by EPA has determined that DEET, if used as directed, does not pose significant health risks to consumers. However, EPA is requiring changes to current labels to ensure that DEET is applied safely, particularly on children. New directions for use will also include the following statements:

> Do not use on hands or near eyes and mouth of young children;
> Do not use under clothing;
> Avoid over application of this product;
> After returning indoors, wash treated skin with soap and water and wash treated clothing.

DEET is registered by EPA for both human and veterinary uses to help prevent bites from pests such as mosquitoes, ticks, chiggers, fleas and other biting insects that may transmit diseases including malaria, encephalitis, yellow fever, dengue fever, Lyme disease and others. Manufacturers and distributors will be required to incorporate these labeling changes within two years. More information on DEET and the use of other insect repellents is available on EPA's website at: http://www.epa.gov/pesticides/ or by calling EPA at (703) 305-5017.

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Pest Spotlight:

Pine Seed Bugs, *Leptoglossus* and *Tetyra* spp.

In pine seed orchards of the southeastern U.S., seed bugs are one of the most important groups in the insect complex that limit seed production. Seed bugs are sucking insects that feed upon the developing cones. The southern pine seed bug, (*Leptoglossus corculus* Say), is the most important species, but the shield-backed pine seed bug (*Tetyra bipunctata* H.-S.), also is very destructive in orchards established to provide genetically-improved seed. This pest spotlight is a review of the biology, impact, and currently recommended pest management options for these two seed bug species.

Southern Pine Seed Bug

The southern pine seed bug, *Leptoglossus corculus,* occurs throughout the eastern U.S. All species of pine grown in seed orchards in the South are hosts. Other pine species, native or introduced, are also likely hosts. Both the adults and nymphs are reddish-brown to gray and have long legs. Adults are about 3/4 inch long, with a white zigzag line across the wings and flattened, leaflike hind tibiae. The large adults readily take flight with a loud buzzing sound when disturbed. They overwinter in the duff and other protected spots and emerge to begin breeding at flowering time (April). Eggs are laid end to end in a line along a single needle. There are several generations per year in the South.

Nymphs and adults have sucking mouthparts that they insert into conelets and cones to penetrate the developing ovules and seeds. Attacked cones show no external damage symptoms. In early life stages, nymphs are gregarious and feed upon the needles and conelets. Second-stage nymphs destroy ovules in conelets, and extensive ovule destruction causes conelet abortion. Third-, fourth-, and fifth-stage nymphs and adults feed primarily on seeds within second-year cones. Seeds damaged in late summer and fall can be detected on radiographs. These seeds appear to be undeveloped, collapsed or hollow, or they may retain residues of tissue. In seed orchards, losses are often reflected by poor survival of conelet crops, high numbers of empty seeds, poor seed viability, and low yields of sound seeds per cone.

Shield-backed Pine Seed Bug

The adult of the shield-backed pine seed bug, *Tetyra bipunctata,* is shield-shaped, about 1/2 to 3/4 inch long, and from yellowish to dark reddish-brown with black markings. Like the southern pine seed bug, this seed bug attacks all pines grown in seed orchards throughout the southeastern U.S. The adults overwinter in the duff, but usually remain inactive until summer. The eggs are dark green and about a dozen are laid in two alternate rows along a single needle. Nymphs of all stages are gregarious. First-stage nymphs do not feed, but later stages and adults (with sucking mouthparts) feed upon the seeds of developing cones. In the fall, the new adults become gregarious, often appearing in large numbers on a particular tree or group of trees, where they feed on mature cones. This species has a single generation per year.

Impact of Seed Bugs

The southern pine seed bug ranks among the most destructive cone and seed insects in the southeastern U.S. It may well be the single most detrimental insect in seed orchards. Data for three years indicate that 10% of seed from loblolly and 15% from slash pine seed orchards were destroyed by seed bugs. These percentages reflect only seed damage detectable by radiography. Additionally, only about 1/2 of the total potential seed yield per cone was attained. Much of this loss is attributed to seed destruction by the southern pine seed bug in spring to early summer before seedcoats harden. Abortion is a major cause of conelet loss under natural conditions. Although it is not possible to place all blame for conelet abortion on this seed bug, shortleaf and loblolly conelets seldom abort when protected in cages.

Since the shield-backed pine seed bug delays activity and reproduction until summer and produces only one generation per year, its damage to host seeds is more limited than that of the southern pine seed bug. Its habit of feeding gregariously in seed orchards in the fall has been reported frequently. Such aggregations likely contributed to late season seed damage.

Methods of control to reduce seed bug damage are limited to the aerial or ground applications of insecticides. Currently, bifenthrin (Capture), esfenvalerate (Asana XL), and permethrin (Ambush, Pounce) are registered for use in all five Western Gulf states against pine seed bugs. Although aziphosmethyl (Guthion) is not registered specifically for use against seed bugs,

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Seed Bugs (Continued from Page 4)

applications to control coneworm damage also provide significant reductions in seed bug damage.

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Number Puzzle (try it out, you might be amazed.)

Follow these six steps:

- First of all, pick the number of days a week that you would like to go out (or eat pizza, whatever).
- Multiply this number by 2.
- Add 5
- Multiply it by 50
- If you have already had your birthday this year, add 1748. If you haven't, add 1747.
- Last step: Subtract the four digit year that you were born.

(See the result on p.7)

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Thought You Might Be Interested to Know . . . (Continued from Page 3)

Atrazine Disperses Widely

(from Pesticide Reports July 1998 / Pesticide & Toxic Chemical News June 1998)

In a presentation delivered at the spring meeting of the Boston Geophysical Union, researchers from the University of Virginia said their studies show that atrazine migrates "extensively" after it is applied. These results are the latest gleaned from four years of water and soil sampling at the Muddy Creek research site. The area investigated is a 4.5-square-mile "catchment" with a mixture of forest, pasture, and crops. Although none of the atrazine levels detected in the latest phase of this investigation were deemed to be excessive, the researchers were "surprised at how widely [the herbicide] dispersed through the hydrologic system." Given its application at the soil surface, the herbicide was expected to remain in the area around the roots, but it was observed at a 1 meter depth in the soil and 50 feet down in the ground water, as well as in stream water and stream sediments.

Researchers Janet Herman and George Hornberger had been studying the transport of colloids through ground water when, in 1993, they learned that the U.S. Geological Survey was shutting down its National Ambient Water Quality Assessment Study wells at the Muddy Creek site. It was decided to pursue a study of the water in those wells to see how chemicals, which can be associated with colloids, might be transported into the ground water. Atrazine was selected as the representative herbicide for the latest experiment, which ran from May through September of 1997, because it is relatively persistent in the environment, and had been heavily applied at the site. The EPA has set a maximum contaminant level for atrazine at 3.0 micrograms per liter (= 3 parts per billion). The highest levels of atrazine, 16 ppb, were observed in overland flow from a cornfield. It was observed at a maximum level of 0.8 ppb, following rainfall, in stream water. "Concentrations of atrazine in ground water were found to be very sensitive to method of collection and highly variable between sites, from less than 0.05 ppb to 2.5 ppb. Overland flow samples and some stream water samples indicated the possibility of sediment-associated atrazine transport."

New Spray Nozzles Can Help Prevent Drift

(from Arkansas Pesticide News July 1998 / Western Producer ; May 14, 1998 / Soybean Digest; May/June 1997)

For pesticides to do their intended job, they must reach the target site, not be lost in the air where they can move and harm neighboring environments. The Spray Drift Task Force says that if a pesticide is applied correctly, only one-tenth of 1% of the chemical should drift. The key to reducing spray drift often is simply increasing the droplet size by using a nozzle that is specialized for that purpose. While coarser sprays can help minimize drift, the large drops sometimes do not stick and therefore are not as effective on certain plant or hard non-porous surfaces, which may be difficult to make wet. The large drops tend to bounce or roll off these surfaces, similar to how water acts on automobiles after a fresh coat of wax. But some new nozzles mix air with the spray liquid inside the nozzle, which results in large droplets containing air bubbles. These droplets shatter on impact with the plant or sprayed surface, and this spreads many smaller droplets over the area where they are more easily retained. These nozzles are venturi or air induction types, and are available from most nozzle manufacturers.

Spray applicators also want to ensure they spray when the atmosphere is unstable (yes, unstable). Under sunny daytime conditions, the atmosphere is considered unstable because the air near the ground is much warmer than the air above. Under these conditions, there is considerable turbulence in the atmosphere, and adjacent air layers mix readily with each other. So if the air does contain some drift, this drift is quickly dispersed upward and downward, which dilutes it with clean air and reduces its impact on the off-target plants. Most drift complaints involve spraying under stable or temperature-inversion conditions. Inversions occur at night when the earth cools off and the air near the ground is cooler than the air above it. Air layers do not mix, so any drift in the air remains concentrated and may hang over the treated area for a long time. If wind speed increases, a concentrated spray drift cloud is moved off the treated area and can cause considerable damage at its destination. Inversions are usually associated with dead-calm conditions, which may cause well-meaning applicators to spray in a misguided effort to avoid wind. The danger is that the initial wind after an inversion is often very slow and unpredictable in direction. This can cause the concentrated drift, which had been hanging over the field like a cloud of fog, to move to a sensitive area and cause damage.

Where practical, drift can be reduced by taking the following measures:

- Spray under ideal environmental conditions.
- Reduce travel speed.
- Use higher carrier volumes.
- Use low-drift nozzles or shrouds.
- Take extra care on the outer spray boundaries.

AGDrift Computer Model

(from Chemically Speaking June 1998 / Ontario Farmer Daily; May 8, 1998)

A computer model that assesses spray drift and deposit for aerial application of pesticides for agricultural and forestry applications will now be used in Canada's environmental evaluations of proposed pesticide registrations. Use of the AgDrift Model reportedly will make spray drift prediction more scientific and allow buffer zones to be set more precisely. The need for expensive field studies should also be lessened, saving time and resources for industry and regulatory agencies. The U.S. Spray Drift Task Force and the Crop Protection Institute of Canada support the use of this model. For additional information or to request a copy of the AgDrift software, contact agdrift@cdiprincton.com or (609) 734-9282.

Genetic Engineering

(from Short Subjects & Timely Tips August 1998 / Federal Register Aug. 1998)

EPA announced (OPP-50845) that American Cyanimid Co. will test a genetically engineered virus (*Autographus californica*) Multiple-embedded Nuclear Polyhedrosis Virus (AcMNPV). This modified AcMNPV will 1) express an insect-specific pesticidal toxin TXP-I, and 2) prevent expression of the ecdysteroid UDP glucosyltransferase gene. Infected Lepidopterous (moths and butterflies) larvae will not eat or molt. Although the proposed testing will evaluate the efficacy of this baculovirus against lepidopteran pests on cotton and leafy vegetables, perhaps this virus has a host range that could include some forest pests.

Moving Toward Integrated Management of Root Diseases in Northern Forest Nurseries

(from Short Subjects & Timely Tips June 1998 / Methyl Bromide Alternative Website April 1998)

"From 1994 to 1996 investigations were conducted in five northern nurseries with varying cultural regimes to: 1) document physical and biological soil conditions resulting from each nursery's practices and consider their relationships to root rot development, and 2) interpret operational fumigation practices in view of these conditions. The results of these studies suggest a number of non-chemical control actions that could be readily implemented in an integrated manner with or without soil fumigants to control root rot. Principal investigators on this project are Jennifer Juzwik, research plant pathologist, USDA Forest Service and Raymond Allmaras, research soil scientist, USDA-ARS, St. Paul, MN. For a copy of the article, contact Pat Skyler, USDA Forest Service at (916) 454-0817.

Facts About Organophosphate Pesticides

(from Chemically Speaking July 1998 / AP; May 28, 1998)

Here are some quick facts about the 39 organophosphate pesticides now undergoing review under FQPA that could result in the eventual elimination of products and/or uses:

① About 60 million pounds of organophosphates (OPs) are applied to 38 million acres of U.S. farmland each year.

② Field corn accounts for 19 million pounds and cotton for 15 million pounds; fruit, nuts, and vegetables use a combined 16 million pounds.

③ OPs account for 50 percent of all acreage treated with insecticides each year.

④ Roughly 17 million pounds of OPs are used each year to control termites and mosquitoes in homes and businesses.

⑤ Five OP products account for 60 percent of all uses: chlorpyrifos (Dursban/Lorsban), terbufos (Counter), profenofos (Curacron), tribuphos (Folex/Def), and malathion.

Critters in Your Fitters

(from Chemically Speaking July 1998)

Not trying to give anyone any ideas, but police detectives in suburban Toledo are questioning high school seniors to determine who carried out a class prank of breaking into the local school and releasing about 600 giant cockroaches. The roaches forced the closing of the school and exterminators had to be called in to counterattack the arranged invasion. Personnel arriving at the school the morning in question found hamburger, raw eggs, milk, and chocolate syrup smeared on the walls and floors of the school's main hallway. The hundreds of Madagascar hissing cockroaches were crawling in the food and into adjacent classrooms, lockers, and other areas where discovery lead to abundant surprises.

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Number Puzzle Answer (from page 5)

You should have gotten a three digit number for your answer:

The first digit of your number was your original number (i.e., how many times you want to go out each week).

The second two digits are your age.

P.S. 1998 is the only year this number puzzle will ever work.