Progress
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Vol. 3 No. 1 Mar. 1998

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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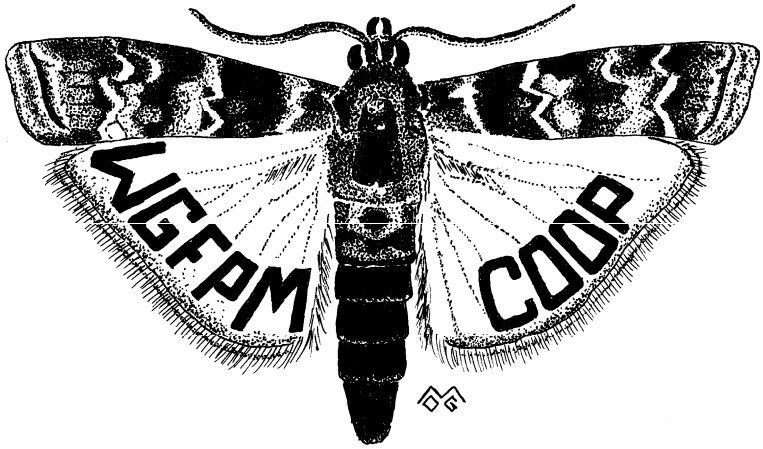
Announcements:

The WGFPMC welcomes Louisiana-Pacific Corporation as its newest member. L-P is a major manufacturer of building materials, industrial wood products and pulp. A land base of 1.5 million acres nationwide, 900 thousand acres in Texas and Louisiana, helps support the manufacturing base. Mr. Ken Addy, Jr., will represent L-P on the executive committee.

Pesticide Announcements:

Benlate (benomyl) - DuPont added to their label the control of white mold on radishes grown for seed. Also added to the label are usages on conifers, wheat, conifer seedling treatment and seed treatment on cole crops, canola, chickpeas, spinach, wheat, barley, oats and rye. (from PEP-Talk, Feb. 1998; Ag. Chem. News, January 15, 1998)



Southern Pine Coneworm, *Dioryctria amatella* (Hulst)

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

Pulp and Paper Mill Wastes - Good for Forestlands, but Bad for Insect Pests

A recent article in the Forestry Source (Nov. 1997) reported that pulp and paper mills in the southeast generate more than 3.5 million tons of sludge and ash residues each year, enough to fill 50,000 railroad cars. About two-thirds of this waste ends up in landfills.

Research at the University of Georgia, however, shows that mill wastes are a valuable source of nutrients and organic matter that can improve the productivity of forestlands. Larry Morris, UGA forest soil scientist says that "philosophically, reusing the wastes from mills makes perfect sense. The process of producing any food and fiber crop from the land takes nutrients from the soil. By returning these materials to the land, we are emulating the normal nutrient cycle." Preliminary data has Morris excited about the future of recycling the wastes. Future research will look at mixing pulp mill residue with poultry manure. Early data show dramatic increases in productivity when primary sludge, which is least useful alone, is mixed with animal manure. Such mixing has the potential to turn even wastes of marginal benefits into valuable products.

In addition to the potential benefits of mill waste on forest productivity, waste water recently has been shown to increase resistance of poplar trees to insect pests (Augustin et al. 1997, Environ. Entomol. 26(6): 1327). Cottonwood leaf beetles exposed to poplar clones irrigated with wastewater showed reduced survival and pupal weight compared to beetles on tree clones irrigated with fresh water. Although the host plant characteristic responsible for reduced beetle survival was not identified, it is hypothesized that resistance may be linked to changes in physical factors such as leaf thickness or surface waxes.

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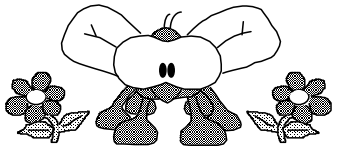

Evaluation and Management of Storm-damaged Timber

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

On February 10, 1998, wide spread timber damage occurred in Polk, Angelina, Nacogdoches, San Augustine, and Shelby counties in East Texas as a result of strong winds. According to the National Weather Service, most of the winds were classified as straight line winds rather than the rotational winds associated with tornadoes. The uprooted and broken trees damaged much property, and electrical and phone services were interrupted for several days in some areas. Forest landowners are often interested in knowing how to assess the damage to their timber. In addition to the direct damage caused by the wind, insects and fungi often cause additional losses. Forest landowners are especially concerned about a build-up of pine bark beetle populations, in particular the southern pine beetle (SPB).

In 1983, the Pest Control Section of the Texas Forest Service monitored tree survival and bark beetle activity after a tornado damaged pine timber in Montgomery and Liberty counties. On-the-ground checks were made 10, 15, and 40 weeks after the May storm. Damaged trees were classified using the following categories: 1) broken bole w/ no limbs, 2) broken bole w/ 1-3 limbs, 3) broken bole w/ more than 3 limbs, 4) broken bole w/ crown still attached, 5) uprooted, and 6) other (bent, leaning, scarred, etc.)

As far as the bark beetle attacks were concerned, no SPB were found in the storm-damaged timber in 1983. However, depending on the amount of damage to the tree, one or more species of engraver beetles and/or black turpentine beetles attacked the trees.

Ten weeks after the storm, all uprooted trees were attacked by engraver beetles and/or turpentine beetles. Most (84%) of the trees with a broken bole and no limbs were attacked. Trees with a broken bole and one or more live limbs were largely uninfested at the 10-week check.

Fifteen weeks after the storm, more damaged (weakened) pine trees had come under bark beetle attack. Now many of the trees with broken boles that had one to three limbs were attacked as well as those that were bent, leaning, or scarred.

After 40 weeks, most of the severely damaged trees had succumbed to bark beetle attacks. However, 63% of the trees with more than three limbs remaining were still unattacked. Also, only 8% of the trees that had the crown attached to the broken bole survived. Interestingly, few undamaged trees were attacked by bark beetles indicating that healthy trees are of no interest to engraver or turpentine beetles, even in areas where populations of these bark beetles have increased.

Forest landowners with storm-damaged timber should consider salvage logging as a way to utilize the timber rather than letting it go to waste. Timber salvage operations are more time consuming than regular logging, therefore the prices paid for the damaged timber will be lower than standing, green timber prices. Salvage should be conducted as soon as possible after the damage occurs before various wood boring insects and decay and stain fungi further degrade the timber. Also, dead timber often dries out rapidly and has less dollar value if weight scaled. Large volumes of pine logs that will not be immediately processed at a mill can be kept under a water sprinkler system or in a log pond to prevent invasion of insects and fungi.

Following a wind storm, some pine trees may not exhibit any signs of damage other than leaning. These trees are commonly referred to as root sprung. Unless they are attacked by pine bark beetles, they may not die immediately, but they usually decline over a period of several years and eventually are attacked by bark beetles. Root sprung trees should be removed if a salvage operation is conducted.

Hardwood trees are seldom killed by storm breakage. Hardwood trees that are standing and have even a small portion of the crown remaining will probably recover in time. Large hardwood trees that are uprooted should be removed. It is important to remember that hardwood trees with large damaged areas on the trunk or large broken limbs may be infected with decay fungi. After several years, these decay fungi typically weaken a tree structurally and make the tree more susceptible to wind or ice damage. Damaged trees that are not removed should be properly pruned to eliminate broken branches and to promote rapid healing.

Reference

Barry, P.J., C. Doggett, R.L. Anderson, K.M. Swain. 1993. How to evaluate and manage storm-damaged forest areas. USDA For. Serv., So. Reg., Mange. Bull. R8-MB 63. 11 p.

Pest Spotlight:

Fusiform Rust and Its Incidence in East Texas

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

Fusiform rust, caused by the fungus *Cronartium quarcuum* f. sp. *fusiforme*, is the most destructive forest tree disease of pines in the southern United States. This rust is native to the South where it primarily infects slash pine and, to a lesser extent, loblolly pine. The common name of the fungus is derived from the fusiform or tapered galls that are produced on pines at the point of infection. Galls may develop on pine branches or on the main stem. Rust infections that develop on the main stem of pines less than five years old are likely to kill the tree. Main stem and branch infections that occur after age five normally do not kill the tree, but they often result in breakage from wind or ice. In addition, stem galls may cause merchantable volume loss at harvest. By age ten, rust infection levels usually have peaked in a stand.

Symptoms of fusiform rust infection vary with the different stages of spore and gall development (Anderson et al. 1980). The fungus has five spore forms in its life cycle; two occur on pine and three occur on alternate hosts, primarily water and willow oaks. The fungus can not spread directly from pine to pine. Fungus spores produced on the oak hosts during the cool, humid weather during the spring infect the pines through needles or tender stem tissue.

To detect initial infection on pine, look for slight swelling and discoloration on new shoots.

Year-round, look for spindle-shaped swellings on the branches or main stem. Main stem infections on older trees are somewhat depressed and the trees commonly break at the gall.

In early spring, look for orange-yellow, powdery spores produced from galls on pines. These spores are carried by the wind to infect the oak host.

In the late spring or early summer, look for orange uredia or brown hair-like telia on the underside of oak leaves. The uredia produce spores which reinfect the oaks, but can not infect pines. The telia, on the other hand, produce the spores which cause new infections on pine, thus completing the cycle.

Information on fusiform rust incidence on slash and loblolly pine in the East Texas area is available from several surveys dating back to 1969. These surveys have shown that the level of rust infection increased, especially in slash pine, until the early 1990s when infection levels began to decline. The increasing infection trend from the 1960s through the 1980s is probably associated with the wide-spread planting of slash and loblolly pine, coupled with forest fire control programs. This resulted in increasing acreages of susceptible pines and increasing populations of the alternate host - oaks - which are necessary for the fungus to complete its life cycle and cause infections in pines. However, as rust problems began to develop in slash pine stands, planting of this species has declined by 23% since the mid-1980s. In addition, most slash pine planted since the late-1980s has consisted of seedling stock that is genetically resistant to fusiform rust.

It should be noted that rust incidence varies greatly from site to site, with some stands being heavily impacted and other stands being rust free. Incidence of the disease is governed by several variables: weather, amount of inoculum, abundance of oaks (the alternate host), and susceptibility of the pine species. In general, loblolly pine has not been seriously impacted by fusiform rust in East Texas. On the average, rust incidence in loblolly pine has declined slightly, but remains at about 10% (Lenhart et al. 1994, Starkey et al. 1997). Slash pine infections, on the other hand, now average about 40%, a 20% decline from earlier surveys.

Anderson et al. (1980) suggested that the incidence and impact of fusiform rust may be reduced by various forest management activities, including one or more of the following:

1) use rust-resistant seeds or seedlings;
2) use protective fungicide treatments;
3) cull seedlings with obvious swellings on the stem;
4) reduce local oak populations;
5) delay fertilization to age 8-10 if more than 25% of trees are infected;
6) prune or excise fusiform galls and cankers;
7) use thinning strategies to remove infected trees at mid-rotation and to capture volume that would otherwise be lost;
8) use seed tree or shelterwood regeneration;
9) consider increasing planting density to compensate for expected losses;

Continued on Page 4

Fusiform Rust (Continued from Page 3)

10) properly match tree species to the site; and/or
11) delay prescribed burning to age 8.

References

Anderson, R.L., H.R. Powers, Jr., G.A. Snow. 1980. How to identify fusiform rust and what to do about it. USDA For. Serv., SE Area, St. & Prvt. For., For. Bull. SA-FB/P 24.

Lenhart, J.D., T.G. Gregoire, G.D. Kronrad, and A.G. Holley. 1994. Characterizing fusiform rust incidence and distribution in east Texas. So. J. of Appl. For. 18: 29-34.

Starkey, D.A., R.L. Anderson, C.H. Young, N.D. Cost, J.S. Vissage, D.M. May, and E.K. Yockey. 1997. Monitoring incidence of fusiform rust in the South and change over time. USDA For. Serv., So. Reg., For. Health Protection. R8-PR 30. 29 p.

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Summary of 1997 WGFPMC Research Projects

In 1997, three research projects were continued from 1996 including the reproduction weevil impact study, leaf-cutting ant control study, and the systemic injection study. A summary of the results for the weevil study is presented below. Results for the leaf-cutting ant and systemic injection studies, along with a summary of evaluations of WGFPMC progress in 1997, will be presented in the June 1998 PEST newsletter.

Pine Reproduction Weevil Impact Study

In 1996, a study was initiated to determine the extent to which different site preparation methods influence pales weevil, *Hylobius pales* (Herbst), and pitch-eating weevil, *Pachylobius picivorus* (Germar), populations and subsequent pine seedling mortality due to these insects. Because overall weevil-caused pine seedling mortality was quite low, presumably due to the severe drought, few conclusions could be made. As a result, the weevil study was continued in 1997 to determine the impact of weevils and identify factors which influence their populations in the Western Gulf region. Given that weevils are a problem, the goal was to develop a means to predict the level of weevil activity one can expect on a site given certain site characteristics.

Thirty-six pine plantations treated with one of five site preparation treatments (burn only, shear only, shear and bed, shear and subsoil, and no site preparation) were selected in Texas, Louisiana, and Arkansas. Four to ten sites were selected for each site preparation method. Most sites had been harvested between June and December of 1996 and were replanted in the winter or early spring of 1997. Baited pit- and funnel traps were set up in each no site preparation site prior to replanting. Traps were visited every four weeks until August. Ten monitoring plots, containing a total of 100 seedlings, were set up on all sites and were checked every four weeks until November to determine the percent seedling mortality attributable to weevil feeding.

In 1997, overall pine seedling mortality was 24%, with an average of 9.5% due to weevils, 5% due to improper planting, and 9.5% due to other factors (i.e., disease, drought, flood, animal damage, etc.). Distribution of mortality factors by site preparation method is shown in Fig. 1.

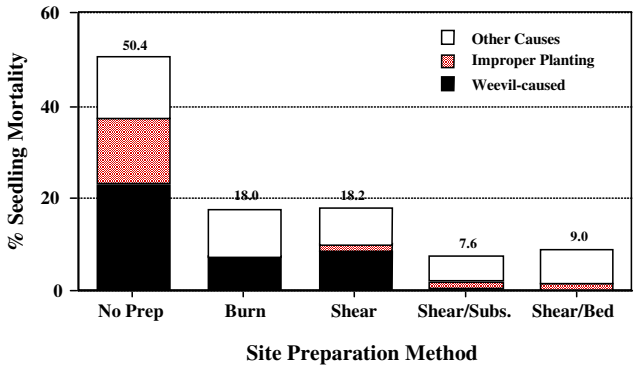

Figure 1. Causes and amount of first-year mortality of loblolly pine seedlings by site preparation method.

No site preparation sites had the highest mean percentage of total mortality (50%), weevil-caused mortality (23%), and improper planting-caused mortality (14%) compared to the other site preparation methods.

Regression analysis indicated three primary factors influenced the extent of weevil-caused mortality. As reported by Cade et al. (1981), harvest to April 1 interval (r^2 = 0.646) was the most important factor (Fig. 2). This was followed by, in order of importance, site preparation intensity (r^2 = 0.391), and volume of slash left after harvest (r^2 = 0.341).

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Research Projects (Continued from Page 4)

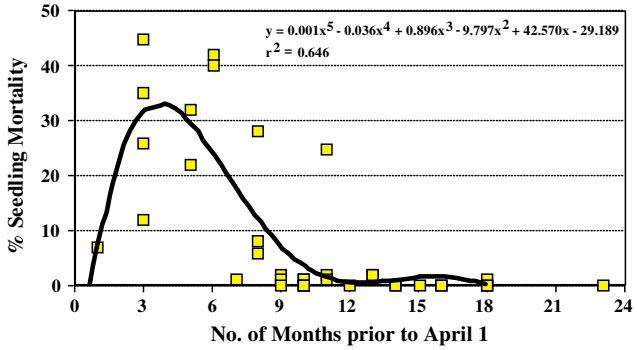


Figure 2. Relationship between harvest to April 1 interval and weevil-caused pine seedling mortality.

Although site preparation method apparently explained 37% of the variability in weevil-caused mortality, it was not independent of harvest to April 1 interval (Fig. 3); that is, the mean harvest to April 1

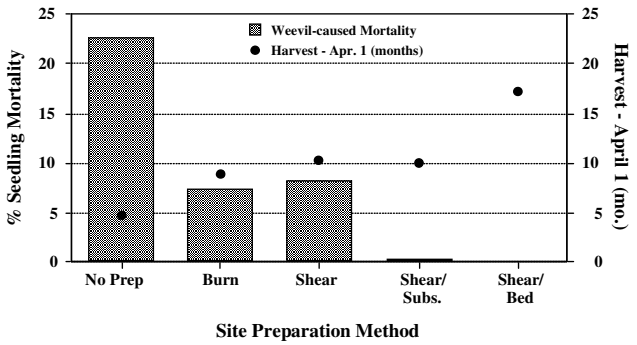
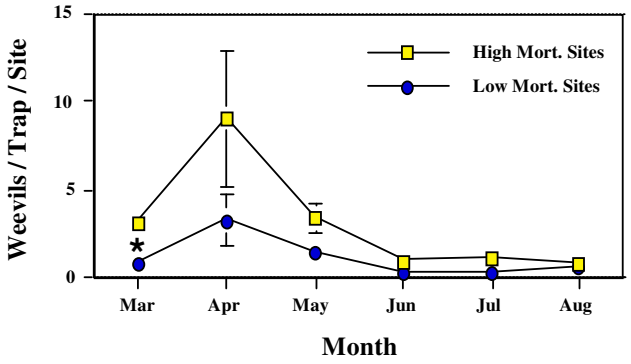


Figure 3. Confounding of site preparation method with harvest - April 1 interval as related to weevil-caused seedling mortality.

interval increases with site preparation method intensity. This makes it difficult to determine to what extent each of these two factors influence weevil-caused mortality.

In contrast to 1996, peak emergence in the spring of 1997 was generally similar for the two species of reproduction weevils. As indicated by funnel trap collections, warm weather in 1997 allowed an early emergence of weevils and subsequent flight migration into each site in March. This was followed by an increase and subsequent peaking of ground populations of weevils in April as indicated by pit trap collections.

The numbers of weevils captured in funnel and pit traps were compared on high and low mortality sites. No differences were found in numbers of both pales and pitch-eating weevils from funnel traps. However, two instances were found showing a significant relationship between weevil numbers from pit traps and seedling mortality. Although, the number of pales weevil captured in pit traps was consistently higher on high mortality sites than low mortality sites, differences were significant only in March (Fig. 4). Similarly, pitch-eating weevils captured in pit traps were higher on high mortality sites, but for this species the differences were significant only in June.



* Significant difference at the 10% level based on Fisher's Protected LSD.

Figure 4. Comparison of the number of pales weevil captured in pit traps on high versus low seedling mortality sites.

Conclusions

In contrast to 1996, reproduction weevils were found to have a significant impact on pine seedling survival in 1997. Mortality due to weevils alone was over 20% (range: 22 - 45%) in one-fourth of the plantations monitored in 1997. By far, the greatest weevil-caused damage occurred on sites harvested 3 - 5 months (November - January) prior to April 1 of the replanting year; on those having had little or no site preparation; and on those having a high volume of slash material left on site after harvest. Based on the regression curve for harvest to April 1 interval (Fig. 2), a graph illustrating potential risk of weevil damage was developed (Fig. 5). Moderate to high seedling mortality (10 - 45%) due to weevils alone can be expected on sites harvested November through January. Low to moderate mortality (0 - 25%) can be expected on sites harvested between August and October of the previous year and February or March of the replanting year. Sites harvested between April and July of the previous year are at low risk (0 - 10%) to weevil damage. No damage is expected on sites harvested prior to April of the previous year. However, caution needs to be taken when assessing the risk on sites harvested in February and March of the replanting year as only one site was monitored in 1997. The risk may actually be quite high as indicated by a previous study (Cade et al. 1981) probability curve. Additional sites (not just those harvested in February or March) are to be monitored in 1998 to strengthen

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Research Projects (Continued from Page 5)

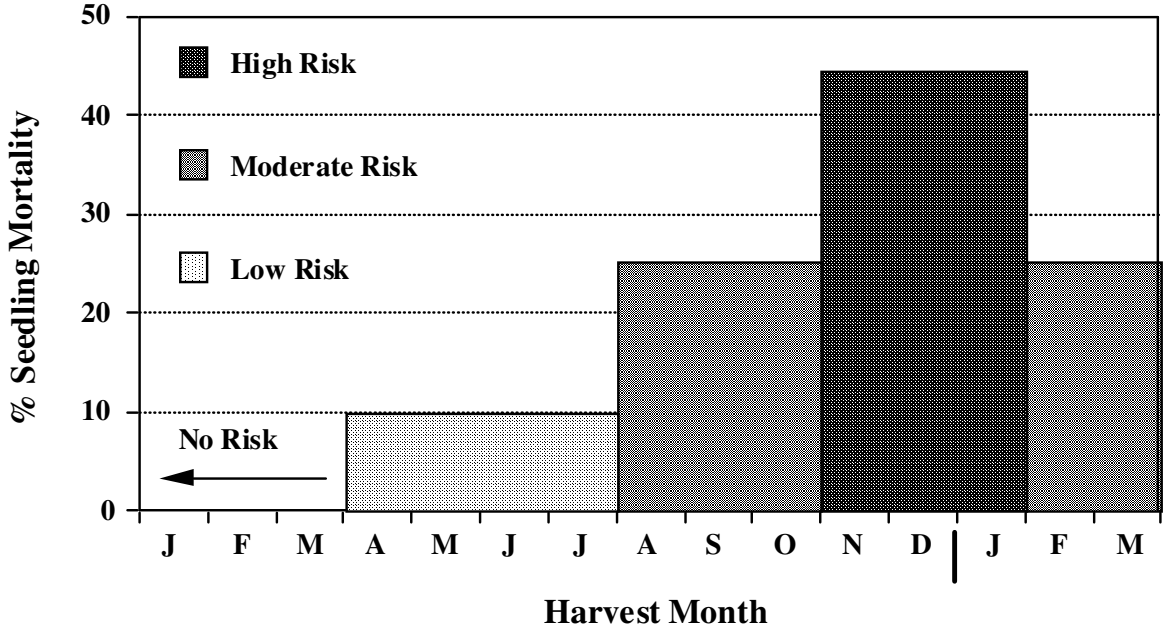

Figure 10. Potential risk of weevil-caused pine seedling mortality based on harvest - April 1 interval.

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the risk rating system for the Western Gulf region .

Although site preparation method / intensity appeared to have had a significant effect on the occurrence of weevil damage, the fact that this factor was confounded by the harvest to April 1 interval (Fig. 3) prevented a true assessment of its importance. Additional sites, with different site preparation methods, but the same average harvest to April 1 interval, are to be monitored in 1998 (although this may not be possible for certain site preparation methods that are seasonally dependent).

The significant correlation between the number of pales weevil captured in pit traps in March and the percentage of weevil-caused pine seedling mortality suggests the possibility that monitoring weevil populations early in the spring may allow prediction of weevil damage later in the year. Trap-based monitoring is needed in the fall of the previous year and early the following year (January - March) to develop such a predictive tool.

References

Cade, S.C., A.M. Lynch, R.L. Hedden, & J.D. Walstad. 1981. Seedling debarking weevils: a site hazard-rating system case history. In: Hedden, R. L. et al. (eds). Hazard-rating systems in forest insect pest management. USDA For. Serv. Gen. Tech. Rep. WO-27.

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Thought You Might Be Interested to Know . . .

Biological Insecticides for Control of Pine Tip Moths

(from Enterprise Team Update, Winter 1998)

Recent screening trials indicate that the biological insecticides Mimic™ (an insect growth regulator) and Foray™ (a *Bacillus thuringiensis* product) show considerable promise for the control of the Nantucket pine tip moth, *Rhyacionia frustrana*. Both agents were reported to provided control competitive with that of conventional insecticides currently in use for operational control of tip moths. Current and future research will focus on evaluating the efficacy of these biological insecticides and their effects on natural enemies (parasites and predators). Also, the currently available spray timing model will be modified to provide optimal control in areas where control attempts historically have not been very effective.

A Little Humor Goes a Long Way

Queer Animal Seen Damaging Seedlings

(from Texas Forest News, 1949)

A small boy saw a stray circus elephant in his father's pine plantation. He telephoned the sheriff immediately. "Sheriff," he said, "there's a queer looking animal out here in our plantation. He's pulling pine trees up with his tail!" "Yes," said the sheriff, "and what's he doing with them?" Never mind," said the boy, "you wouldn't believe me if I told you."

The Lemon Squeezer

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

The local bar was so sure that its bartender was the strongest man around that they offered a standing $1000 bet. The bartender would squeeze a lemon until all the juice ran into a glass, and hand the lemon to a patron. Anyone who could squeeze one more drop of juice would win the money. Many people had tried over time (weightlifters, longshoremen, etc.) but nobody could do it. One day this scrawny little man came in, wearing thick glasses and a polyester suit, and said in a tiny, squeaky voice, "I'd like to try the bet." After the laughter had died down, the bartender said OK, grabbed a lemon, and squeezed away. Then he handed the wrinkled remains of the rind to the little man. But the crowd's laughter turned to total silence as the man clenched his fist around the lemon and six drops fell into the glass. As the crowd cheered, the bartender paid the $1000, and asked the little man, "What do you do for a living? Are you a lumberjack, a weightlifter, or what?" The man replied, "I work for the IRS."
Editor's Note: Happy Tax Day! We hope you are not squeezed too hard this year.

Hmmmm....

If a fly loses its wings, should it then be called a walk?

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More Announcements

NAPIAP Proposal Funded for 1998: Drs. Don Grosman and Ron Billings, Texas Forest Service, recently were awarded a one year grant of $18,300 by the National Agricultural Pesticide Impact Assessment Program (NAPIAP) to continue research to evaluate new Texas leaf-cutting ant control options. The research will focus on determining the optimal application rates of sulfluramid as an alternative to methyl bromide which is scheduled to be phased out by 2001.

Verbenone Technology Transfer Proposal Funded for 1998: Drs. Ron Billings, Texas Forest Service, C. Wayne Berisford, U. Georgia, Scott Salom, Virginia Tech, and Steve Clarke, U.S. Forest Service also were awarded a one year grant extension of $78,000 by Forest Health Protection, Technology Development Program. The research will focus on refinement of operational methods for suppression of southern pine beetle infestations using verbenone. In addition, training sessions are planned this summer for industry personnel to ensure that the tactics are successfully incorporated into an integrated southern pine beetle suppression program.

East Texas Forest Entomology Seminar: WGFPMC Executive Committee and Contact representatives, industry, and TFS foresters are all invited to attend the Spring 1998 East Texas Forest Entomology Seminar scheduled for Thursday afternoon and Friday morning on April 30th and May 1st. Thursday's session will begin at 1:00 PM at Champion's Kurth Lake Lodge, between Lufkin and Nacogdoches, while Friday's session will be held from 8:00 AM - 12:00 noon in the Fire Control Training Room at the Texas Forest Service, Cudlipp Forestry Center in Lufkin. Drs. Ron Billings, TFS, and Dave Kulhavy, SFASU, are coordinators of the seminar. A panel is planned to discuss storm-damaged timber issue. The registration fee is $15.00, which includes the Thursday evening meal. For more information, to make reservations, or to request a seminar agenda and map to the meeting location, call Martha Johnson, TFS, at 409/639-8170.

The Annual Southern Pine Beetle Survey is currently underway in most areas of the southern United States. The prediction results for the Western Gulf region should be available by mid-April and will be presented on the Texas Forest Service web site at http://txforestservice.tamu.edu/.