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**Vol. 11 No. 2 July 2006**

**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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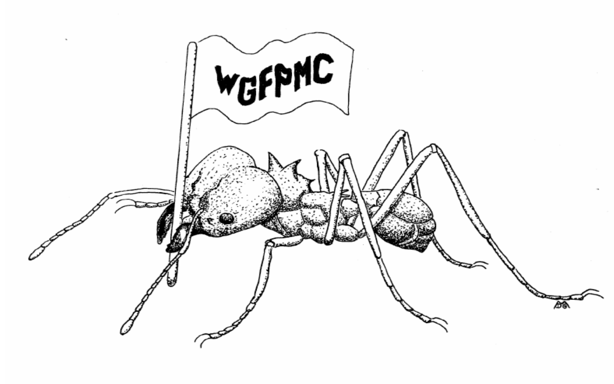
## Announcement:

**BASF Submits Label to EPA –** I was informed by BASF that they have submitted a draft label to the Environmental Protection Agency (EPA) to register fipronil for soil injection applications near newly planted pine seedlings for protection against pine tip moth. EPA's published time for review is 20 months although it can take a longer or shorter time than this. If all goes well, we hope that a product will be available for operational use for the winter 2007 / 2008. For more information about the effectiveness of fipronil against pine tip moth, see **Pine Tip Moth Control** on pages 3 – 5.

**Western Gulf Forest Pest Management Cooperative**




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

## Summary of 2005 WGFPMC Research Projects

In 2005, three research project areas – tip moth, leaf-cutting ant, and systemic injection - were continued from 2004. Results from systemic injection studies were presented in the last PEST newsletter (Apr. 2006). Summaries of the results from the tip moth and leaf-cutting ant studies, as well as a weevil control trial, are presented below.

The WGFPMC established a multi-faceted research project directed at pine tip moth in 2001 to: 1) evaluate the impact of pine tip moth on tree height and diameter growth, and 2) evaluate the potential use of systemic insecticides to protect pine seedlings for one or more years after planting. All facets of this project were continued and expanded upon in 2005.

**Pine Tip Moth Impact**

From 2001 to 2004, 40 study plots, in 29 plantations, were established in Texas, Louisiana and Arkansas. Treatments were continued on 5 second-year sites established in 2004. Six additional (first-year) study plots were established on 5 more sites in 2005. In each plantation, one area was selected and divided into two plots each; each plot contained 126 trees (9 rows X 14 trees). Treatments were randomly assigned to a plot in each area. The treatments included: 1) Mimic® 2F applied once per generation at 0.08 oz / gal. and 2) Check (untreated).

For the 13 plots established in 2004 and 2005, pesticides were applied by backpack sprayer to all trees within the plot (treatment area). Application dates were based the optimal spray periods predicted by Fettig et al, 2003. Plots established in 2001 - 2003 were not protected in 2005. Just prior to each spray date, the tip moth damage level was determined in each plot by surveying the internal 50 trees. Each tree was ranked on the extent of tip moth damage. Trees also were surveyed a final time in December 2005. At this time, data also were collected on tree height and diameter.

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**Table 1:** Mean percent of pine shoots (in top whorl) infested by Nantucket pine tip moth on one- and two-year old loblolly pine trees following treatment with Mimic® after 4 - 5 generations; Arkansas, Lousiana and Texas sites, 2001 - 2005.

| | Planted 2001 (N =16) | | Planted 2002 (N = 7) | | Planted 2003 (N= 10) | | Planted 2004 (N= 7) (N= 5) | | Planted 2005 (N= 6) | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | Year 1 | Year 2 | Year 1 | Year 2 | Year 1 | Year 2 | Year 1 | Year 2 | Year 1 | Year 2 | Mean Year 1 (N= 46) | Year 2 (N= 38) |
| Mimic® | 1.7 | 3.8 | 1.5 | 3.8 | 1.2 | 1.2 | 1.4 | 2.0 | 3.0 | | 1.7 | 2.9 |
| Check | 22.4 | 21.9 | 7.5 | 15.5 | 12.2 | 12.0 | 10.3 | 17.9 | 13.2 | | 14.9 | 17.6 |
| % Reduction | 92 | 83 | 80 | 75 | 90 | 90 | 87 | 89 | 78 | | 89 | 84 |

Tip moth infestation levels increased in 2005. They were somewhat higher overall (13% of shoots) on first-year check trees in 2005 compared to first-year check trees in 2004 (10%) (Table 1). Similarly, tip moth damage was higher (18% of shoots) on two-year old check plots in 2005 compared to $2^{nd}$-year sites in 2004 (12%). The Mimic® treatments provided good protection against tip moth on first and second-year sites in 2005 - reducing infestation levels by 78% and 89%, respectively.

A large majority (11 of 16) of five-year Mimic®-treated plots (planted in 2001) showed significantly greater tree growth compared to the neighboring untreated trees (Table 2). Overall, the exclusion of tip moth on treated trees for the first two years improved tree height, diameter and volume index by 7%, 9% and 27%, respectively, compared to untreated trees.

Due to lower tip moth population levels in sites planted in 2002, the effects of the foliar sprays were not readily apparent. However, growth parameters have steadily improved in 2003 and 2004 on several sites. By 2005, mean volume in Mimic plots was significantly greater than checks on 4 of 7 sites. Overall, the exclusion of tip moth on treated trees for the first two years improved tree height, diameter and volume index by 5%, 3% and 13%, respectively, compared to untreated trees.

Although tip moth levels were low in the first and second year on sites planted in 2003, the protection provided by the Mimic® sprays was better than on sites planted in 2002. As a result, 6 of 10 sites saw significant gains in tree growth on Mimic® plots compared to untreated trees. Overall, tree height, diameter and volume growth has been improved through the third year by 14%, 33% and 91%, respectively, compared to untreated trees.

Because tip moth levels were higher in second-year sites planted in 2004 and the Mimic treatments provided good protection, 2 of 5 sites now saw significant gains in tree growth on Mimic® plots compared to untreated trees.

Tip moth damage levels tended to be higher on unprotected trees in 2005 compared to the previous year – plus protection with Mimic® was good. This resulted in 4 of 6 sites having significantly greater volume growth on protected trees. The study is being continued in 2006.

**Table 2:** Mean tree volume index ($cm^3$) and percent growth gain of one-, two-, three- and five-year old loblolly pine following treatment with Mimic® after 4 - 5 generations; Arkansas, Lousiana and Texas sites - 2001 to 2005.

| | Planted 2001 (N =16) | | | | Planted 2002 (N = 7) | | | Planted 2003 (N= 10) | | | Planted 2004 (N= 5-7) | | Planted 2005 (N= 6) | Mean | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yr 1 | Yr 2 | Yr 3 | Yr 5 | Yr 1 | Yr 2 | Yr 3 | Yr 1 | Yr 2 | Yr 3 | Yr 1 | Yr 2 | Yr 1 | Year 1 (N= 46) | Year 2 (N= 38) | Year 3 (N= 33) | Year 5 (N= 16) |
| Mimic® | 201 | 2824 | 6465 | 60808 | 131 | 2343 | 8187 | 141 | 2445 | 3161 | 22 | 356 | 265 | 158 | 2311 | 5829 | 60808 |
| Check | 138 | 2053 | 4680 | 47941 | 149 | 2393 | 7242 | 113 | 2091 | 1658 | 21 | 299 | 167 | 120 | 1895 | 4308 | 47941 |
| Pct. Gain Compared to Check | 46 | 38 | 38 | 27 | -12 | -2 | 13 | 25 | 17 | 91 | 6 | 19 | 58 | 32 | 22 | 35 | 27 |

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## Pine Tip Moth Hazard Rating

WGFPMC members have selected from 1 to 7 first-year plantations (many were the same as those used in the impact study). A plot area within each plantation was selected; each plot contained 50 trees (5 rows X 10 trees). Seventy-six (76) Western Gulf sites have been used to collect site characteristic data that included:

Soil - Texture and drainage, percent organic matter, soil description/profile (depth of 'A' and to 'B' horizons; color and texture of 'B' horizon), depth to hard-pan or plow-pan, depth to gleying, and soil sample (standard analysis plus minor elements and pH).

Tree - Age (1-2), percent tip moth infestation of terminal and top whorl shoots after of 4 - 5 generations, and height and diameter at 6 inches at end of 2nd year.

Site - Previous stand history, site index (at 25 yrs), silvicultural prescription (for 2-year monitoring period), topography (slope, aspect, and position), competing vegetation: (proportion of bare ground, grasses, forbes, and woody stems after 2nd and last generation each year), rainfall (on site or from nearest weather station), and acreage of susceptible loblolly stands (< 20 ft tall) within 1/2 mile of study stand boundary.

Tip moth infestation levels were determined in each plot by surveying the internal 50 trees during the pupal stage of each tip moth generation in the same manner as in the impact study. Data on tree height and diameter at 6 inches were collected in November or December on 2nd-year sites.

Most data have been collected from each of the 76 plots established from 2001 through 2005. Mr. Andy Burrow, Temple-Inland, has used the data set to develop a preliminary regression model that indicates that site index and soil texture are the most important abiotic factors influencing tip moth occurrence and severity. In the Western Gulf region, sites having site indices of less than 65 and sand making up more than 30% of the soil component are at high risk for tip moth damage (Fig. 1).

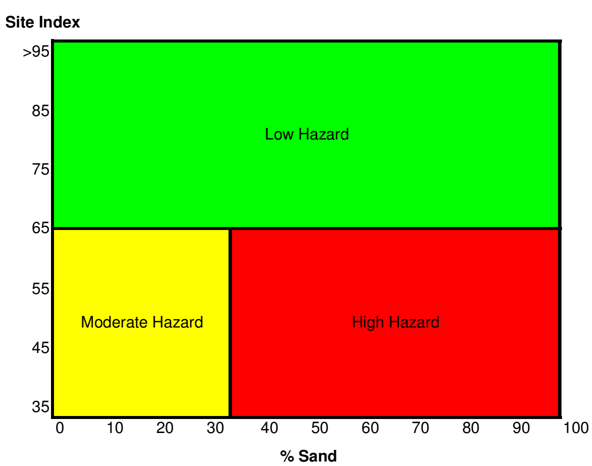


**Figure 1.** Tip moth hazard-rating graph for Western Gulf Region sites.

The model needs to be validated. Additional plots will be established yearly through 2008.

## Pine Tip Moth Control

A preliminary study, initiated in 2002, evaluated the potential of systemic chemicals for control of tip moth for one or more years. The results showed that fipronil was best at reducing tip moth damage well into the second growing season (see PEST 9.1). A subsequent trial was initiated in 2003 on 8 sites across the South to further evaluate the potential of fipronil for extended protection of pine seedlings against tip moth. This active ingredient was applied at different rates to nursery beds, lifted bare root seedlings, and plant holes. The results showed that fipronil, applied in plant holes, as a dip, or by higher rate root soak, was effective in reducing tip moth damage by > 75% over the first growing season. The dip and plant hole treatments continued to reduce tip moth damage through the second year. Tree measurements taken after 3 years indicate that on average plant hole-treated trees had twice the volume compared to untreated checks. Due to concerns about worker exposure, the focus of subsequent research was placed on the treatment of soil around seedlings in nursery beds or after transplanting. Below is a brief overview of the latest results of these trials.

Fipronil Technique and Rate Refinement Trial:
One of three new trials initiated in 2004 evaluated fipronil applied at different rates to seedlings in nursery beds alone or combined with a plant hole treatment. Four research plots were established in 2004 in second-year plantations in Texas and Louisiana. A randomized block design (with rows as blocks) was used for each trial. Ten seedlings from each treatment were planted on each of five beds. The treatments included:

1) Regent (fipronil) applied to nursery bed furrows in (Dec.) at 2x annual limit.
2) Regent 4x in furrow.
3) Regent 4x + methanol in furrow.
4) Regent 8x in furrow.
5) Regent 2x in furrow + Regent (0.3%) applied to plant hole.
6) Regent 4x in furrow + plant hole treatment.
7) Regent 4x + methanol in furrow + plant hole treatment.
8) Regent 8x in furrow + plant hole treatment.
9) Regent plant hole treatment alone.
10) Mimic foliar spray 5x at 0.8oz/gal
11) Check - Bare root seedlings (lift and plant)

Tip moth damage was evaluated after each tip moth generation (3-4 weeks after peak moth flight) in the same manner as in the impact, and other control

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**Table 3.** Effect of fipronil treatments on tip moth damage to loblolly pine shoots (top whorl) and volume growth during first two growing seasons on four sites in Texas and Louisiana, 2004 & 2005.

| Treatment § | N | Pct. Shoots Infested (**Pct. Reduction Compared to Check**) 2004 | | | 2005 | | | Volume Growth ($cm^3$) (**Growth Diff. ($cm^3$) Compared to Check**) 2004 | | | 2005 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Furrow 2x R | 200 | 15.0 | * | **18** | 28.9 | | **2** | 18.4 | | **2** | 284.3 | | **7** |
| Furrow 4x R | 200 | 16.2 | | **11** | 29.1 | | **1** | 19.4 | | **3** | 233.9 | | **-43** |
| Furrow 4x R + meth | 200 | 17.6 | | **3** | 26.1 | * | **11** | 20.2 | | **4** | 299.7 | | **22** |
| Furrow 8x R | 200 | 16.3 | * | **11** | 25.3 | * | **14** | 18.4 | | **2** | 227.2 | | **-50** |
| Furrow 2x R + PH | 200 | 3.0 | * | **84** | 4.1 | * | **86** | 29.5 | * | **13** | 445.9 | * | **169** |
| Furrow 4x R + PH | 200 | 0.8 | * | **96** | 4.3 | * | **85** | 37.5 | * | **21** | 546.9 | * | **270** |
| Furrow 4x R + meth + PH | 200 | 0.5 | * | **97** | 3.2 | * | **89** | 26.0 | * | **9** | 369.0 | | **92** |
| Furrow 8x R + PH | 200 | 0.6 | * | **97** | 3.4 | * | **89** | 25.9 | * | **9** | 337.4 | | **60** |
| Plant Hole only | 200 | 0.6 | * | **97** | 2.2 | * | **93** | 26.9 | * | **10** | 374.3 | | **97** |
| Mimic spray | 200 | 0.9 | * | **95** | 1.3 | * | **96** | 14.6 | | **-2** | 227.1 | | **-50** |
| Check | 200 | 18.2 | | | 29.5 | | | 16.6 | | | 277.3 | | |

§ R = Regent, meth = methanol, PH = plant hole
* Means followed by an asterik are significantly different from checks at the 5% level based on Fisher's Protected LSD.

studies. Each tree was measured for diameter and height in the fall (November) following planting.

In-furrow treatments alone (regardless of rate) had little or no effect on tip moth protection and tree growth (Table 3). The data suggests that more time may have been needed to allow seedlings to uptake fipronil from the soil. Because an in-furrow treatment of fipronil to nursery beds is likely to be the safest and most economical way of treating seedlings, additional trials were established in 2005, to look at the effects of earlier bed treatments (July and September) on in-furrow treatment efficacy. Unfortunately, this later trial again showed that in-furrow treatment are ineffective in reducing tip moth damage to newly planted pine seedlings.

In contrast to in-furrow treatments alone, all treatments that included a plant hole treatment provided good to excellent protection (84% - 97% reduction in damage) against tip moth and significant gains (9% - 21%) in volume growth in 2004. Further evaluations in 2005 indicate that all plant hole treatments continued to protect young trees through the second year. The conclusion was to focus on the development of soil injection as a means to treat pine seedlings.

<u>Soil Injection Trial</u>: A trial was initiated in 2005 to further evaluate the efficacy of different formulations of fipronil applied by soil injection at different volumes.

Two first-year plantations were selected in Texas. A randomized block design (with rows as blocks) was established at each site in May. Ten seedlings from each treatment were planted on each of five beds. The treatments included:

1) Regent 4SC solution applied by soil injector 3 ml/seedling
2) Regent 4SC solution applied by soil injector 30 ml/seedling.
3) Regent 2.5EC solution applied by soil injector 3 ml/seedling
4) BAS350 UB 120EC solution applied by soil injector 3 ml/seedling
5) Check - Bare root seedlings (lift and plant)

Tip moth damage was evaluated in each plot after the 2nd, 3rd, 4th and 5th tip moth generation (3-4 weeks after peak moth flight) in the same manner as in the impact and other control studies. Each tree was measured for diameter and height in the fall (November).

The fipronil treatments showed no effect on tip moth damage levels for the second generation. However, by the 4th generation, all treatments were significantly reducing tip moth damage. Tip moth damage was reduced by 55 – 74% over the 4 generation period,

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**Table 4.** Effect of different fipronil formulations applied by soil injection on tip moth damage to loblolly pine shoots (top whorl), volume growth and survival during the first growing season on two sites in Texas - 2005.

| Treatment § | N | Pct. Shoots Infested | **(Pct Reduction Compared to Check)** | Volume Growth ($cm^3$) | **(Growth Diff. ($cm^3$) Compared to Check)** | Mean % Tree Survival | **(Pct. Gain Compared to Check)** |
|---|---|---|---|---|---|---|---|
| Regent 4SC 3ml | 100 | 11.7 * | **58** | 210.5 * | **-49** | 97 | **-2** |
| Regent 4SC 30ml | 100 | 7.2 * | **74** | 256.6 | **-3** | 97 | **-2** |
| Regent 2.5EC 3ml | 100 | 10.2 * | **63** | 249.5 | **-10** | 94 | **-5** |
| BAS350 UB 3ml | 100 | 12.2 * | **55** | 203.3 * | **-56** | 90 | **-9** |
| Check | 100 | 27.5 | | 259.4 | | 99 | |

§ R = Regent, PH = Plant Hole, RD = Root Dip
* Means followed by an asterik are significantly different from checks at the 5% level based on Fisher's Protected LSD.

but none of the treatments resulted in significant gains in growth parameters (height, diameter or volume) compared to the checks (Table 4). A new trial has been established in 2006 to evaluate the operational application of fipronil by hand or machine equipment.

Be aware that BASF submitted a packet to EPA in May 2005 to register fipronil use after planting for protection of pine seedlings against pine tip moth. The average turn around for product registration is 18 moths. If all goes well, BASF hopes to have a fipronil product available for use by the winter of 2007/2008. I'll keep you informed as we move along.

## Leaf-cutting Ant Control

The production and sale of Volcano® Leaf-cutter Ant Bait was discontinued in 2003 and Bayer has decided not to support the registration of the BES-100 fipronil bait. A new ant bait, Amdro® Ant Block, was registered in Texas and Louisiana in late 2004. A small trial was initiated in 2005 to evaluate the efficacy of this bait against the Texas leaf-cutting ant. Fifteen ant colonies were selected in East Texas on land owned by Temple-Inland and private landowners. Ten colonies were treated with Amdro® Ant Block at labeled rates (3/4 lb per colony) in March 2005. The remaining 5 colonies were evaluated as untreated checks. All colonies were evaluated for ant activity at 0, 2, 8, 16 and 33 weeks post-treatment.

The bait treatment quickly reduced ant activity (61%) on treated colonies compared to initial activity within 2 weeks after treatment (Table 5). It appeared that a number of treated colonies had become inactive (5 out of 10 after 8 weeks and 8 out of 10 after 16 weeks). Unfortunately, a reassessment 33 weeks post-treatment found that all treated colonies were still active, although at a reduced level (63%) compared to initial levels. The inactivity of some of the colonies (16 weeks post treatment) may have been due, in part, to prevailing drought conditions. It is possible that the efficacy of the bait may be improved if it were applied in the winter when little green plant material is available.

**Table 5.** Efficacy of hydramethylnon (Amdro®) applied by spreader to control the Texas leaf-cutting ant (*Atta texana* ) in east Texas (Winter - Summer 2005).

| Treatment | No. of Colonies Treated | Mean Nest Area ($ft^2$) | Mean # Mounds @ Trt. | 2 wk N | 2 wk | 8 wk N | 8 wk | 16 wk N | 16 wk | 33 wk N | 33 wk |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean % initial activity a (% inactive colonies): | | | | | | | |
| **Hydramethylnon** (Amdro® Ant Block) | 10 | 733 | 88 | 10 | 38.5 (10) | 10 | 10.7 (50) | 10 | ---- (80) | 9 | 37.3 (0) |
| **Check** (no treatment) | 5 | 515 | 87 | 5 | 110.8 (0) | 5 | 92.4 (0) | 5 | ---- (0) | 5 | 100.0 (0) |
| Total | 15 | | | | | | | | | | |

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## Regeneration Weevil Control

Pounce® 3.2 EC (FMC, permethrin) applications to pine seedlings prior to lifting in conifer nurseries has been an effective means of protection against pine regeneration weevils in the South. However, FMC began to phase out production of Pounce® in 2004 and supplies were difficult to find. Fipronil was recently found to be effective in protecting young seedlings against pine tip moth. A trial was initiated in 2005 to evaluate the potential of fipronil for protection of seedling against regeneration weevils.

Two first-year plantations were selected in Texas (Quitman and Livingston). Ten block plots were established at each site in January. Ten seedlings from each treatment were planted on four beds. The treatments included:

1) Regent 4SC solution applied in-furrow to nursery bed in July 2004
2) Regent 4SC solution (30 ml) applied to plant hole at planting.
3) Regent 4SC solution applied by soil injector 30 ml/seedling
4) Check - Bare root seedlings (lift and plant)

All seedlings were evaluated monthly for weevil feeding damage from February through November. The amount of damage on each seedling was ranked from 0 (no damage) to 3 (extensive damage or mortality).

Severe drought conditions in the northern (Quitman) site caused significant mortality of seedlings planted early in the year (i.e. check and soil injected). Thus, this site was not included in the data analysis.

In the southern (Livingston) site, weevils began to emerge and cause damage to seedlings in March. At first there were no differences among treatments in the level of weevil-caused damage or mortality. However, from April through the remainder of the year, seedlings treated with fipronil by soil injection experienced significantly less mortality than those of the other treatments (Figure 2). Survival of seedlings with any fipronil treatment was significantly greater than the check. (Note: the results are confounded by differences among treatments in other mortality, i.e., improper planting).

Data from this study indicates that fipronil has some activity against regeneration weevils. The trial also indicates that survival of seedlings can be improved with fipronil treatments, but mortality can not be prevented. The fact remains that the weevils need to chew through the bark and feed on the cambial tissue of the seedling in order to be exposed to the fipronil within the seedling. If weevil populations are high, enough feeding damage can occur on seedlings to cause mortality to a portion of the trees. Fipronil can be used to reduce potential mortality, but it is the author's opinion that better protection of seedlings will nearly always be obtained from the use of contact poisons such as permethrin.

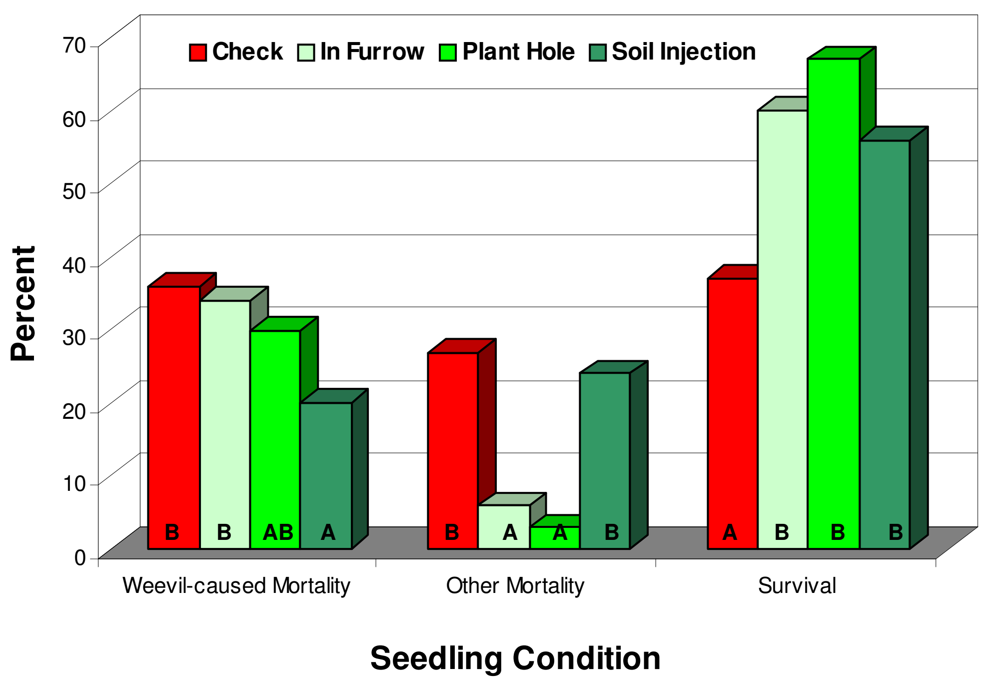


**Figure 2.** Condition of pine seedlings in September 2005 after attack by pine regeneration weevils; Livingston, Texas, 2005.

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# Southern Pine Beetle South-wide Trend Predictions for 2006

by Bill Upton and Ronald F. Billings (with data contributed by southern forest pest specialists)

(See http://texasforestservice.tamu.edu/xls/forest/pest/sbp%20tbl1%2005.xls)

The southern pine beetle (SPB), *Dendroctonus frontalis*, has a well-deserved reputation as the most destructive forest pest of pine forests in the South. In 2000, nearly 60,000 multiple-tree infestations were detected on federal, state and private forest lands throughout the South, resulting in the loss of millions of dollars of resources. By 2005, the number of SPB infestations had declined to 4,415 for all southern states combined. The Texas Forest Service (TFS) has developed a reliable system for predicting infestation trends (increasing, static, declining) and levels (low, moderate, high, outbreak) that has been implemented across the South since 1986. This information provides forest managers with valuable insight for better anticipating SPB outbreaks and more lead-time for scheduling detection flights and preparing suppression programs.

Each spring, traps baited with SPB attractant (frontalin) and southern pine turpentine are set out in pine forests when dogwoods begin to bloom. Dogwood blooms mark the primary dispersal season for populations of the destructive SPB as well as certain beneficial insects. The traps are monitored weekly for a 4-6 week period by federal and state cooperators. Of particular value for forecasting purposes are catches of clerids (also called checkered beetles), known predators of SPB. Using data on the average number of SPB captured per trap per day and the relative proportion of SPB to checkered beetles, infestation trends for the current year can be forecasted (see related article entitled "How to Forecast Southern Pine Beetle Infestation Trends with Pheromone Traps"), available at http://texasforestservice.tamu.edu.

The results from the 2006 prediction survey, based on 188 trapping locations within 13 states, indicate declining or continued low SPB populations throughout the South. Of those locations surveyed, only the Bankhead Ranger District in Alabama, and Jones County in Georgia, as well as Edgefield and McCormick counties in South Carolina, are expected to experience high beetle populations. Moderate levels of SPB activity may occur on the Bienville Ranger District in Mississippi, the Oakmulgee and Shoal Creek Ranger districts in Alabama, and the Croatan National Forest in North Carolina. Overall, beetle activity is predicted to be declining from last year's relatively low levels or remain low in most areas surveyed in other states. Very few or no SPB infestations are expected again this year in Texas, Arkansas, Oklahoma, Louisiana, Kentucky, Tennessee, Florida, Maryland, Delaware or New Jersey. Local increases at low levels may be seen in certain counties in Virginia and North Carolina. A state-by-state summary of trap catches for SPB and clerids for 2005 and 2006, together with SPB predictions for 2006, are listed in Table 6.

Annual predictions of infestation trends have proven to be 75-85% accurate. Collectively, trend predictions from numerous specific locations provide insight into SPB population shifts within a given state as well as across the South. Also, comparison of trapping results for the current year with those from the previous year for the same localities provides additional insight into SPB population changes.

In general, average trap catches that exceed 30 SPB per day, especially those in which SPB make up more than 35% of the total catch (of SPB and clerids), are indicative of increasing or continued high SPB infestation levels in the current year. Conversely, when catches of predators far outnumber those of SPB and fewer than 20 SPB adults are caught per day, infestation trends are likely to decline or remain at low levels. It is uncertain whether the predator population is directly responsible for declines in SPB outbreaks. Most likely, predators are just one of many contributing factors. It is interesting to note, however, that average trap catches of clerid beetles remained about the same as last year across the South (Average = 6.8 clerids/trap/day in 2006 versus 6.5 in 2005), down from 16.8 clerids per trap in 2004. Average numbers of SPB/trap/day across the South was 3.1 in 2006, compared to 4.9/trap/day in 2005. The significance of this low population of clerids in terms of future SPB outbreaks remains to be determined.

The South-wide SPB survey results and trend predictions will also be posted on the Internet at http://texasforestservice.tamu.edu. Appreciation is expressed to the many state and federal cooperators who provide the data for this annual survey. For additional information, contact Dr. Ronald Billings, Texas Forest Service, at (979) 458-6650 or by e-mail at rbillings@tfs.tamu.edu.

## Table 6: Summary of Southwide Southern Pine Beetle Trend Predictions for 2006.

| State | No. of Infestations in 2005 | 2006 No. of Locations Trapped | 2005 % SPB | 2005 SPB/ trap/day | 2005 Clerids/ trap/day | 2006 % SPB | 2006 SPB/ trap/day | 2006 Clerids/ trap/day | 2006 Prediction Trend / Level | Most Likely Locations of SPB Activity |
|---|---|---|---|---|---|---|---|---|---|---|
| Oklahoma | 0 | 3 | 0% | 0.0 | 2.7 | 0% | 0.0 | 1.5 | Static/Low | ----------- |
| Arkansas | 0 | 4 | 1% | 0.0 | 4.9 | 3% | 0.1 | 2.9 | Static/Low | ----------- |
| Texas | 0 | 22 | 0% | 0.0 | 3.1 | 0% | 0.0 | 1.9 | Static/Low | ----------- |
| Louisiana | 0 | 24 | 3% | 0.0 | 1.3 | 0% | 0.0 | 1.1 | Static/Low | ----------- |
| Mississippi | 158 | 16 | 56% | 27.1 | 16.0 | 21% | 5.8 | 17.7 | Declining/Low | Bienville R.D. |
| Alabama | 1,494 | 10 | 51% | 24.9 | 15.4 | 52% | 14.3 | 13.4 | Declining/Moderate | Bankhead R.D., Oakmulgee R.D., Shoal Creek R.D. |
| Kentucky | 0 | 2 | 0% | 0.0 | 7.0 | 0% | 0.0 | 3.1 | Static/Low | ----------- |
| Georgia | 73 | 12 | 43% | 5.7 | 6.5 | 32% | 6.6 | 14.3 | Increasing/Low | Jones Co. |
| Tennessee | 257 | 6 | 10% | 1.0 | 9.6 | 27% | 1.5 | 4.0 | Static/Low | ----------- |
| Virginia | 10 | 6 | 11% | 1.3 | 8.6 | 37% | 4.0 | 6.7 | Increasing/Low | ----------- |
| Florida | 10 | 25 | 36% | 4.8 | 0.6 | 28% | 1.0 | 1.6 | Static/Low | |
| South Carolina | 4,324 | 35 | 28% | 7.1 | 10.4 | 33% | 4.1 | 9.5 | Declining/Low | Edgefield Co., McCormick Co. |
| North Carolina | 10 | 23 | 26% | 4.1 | 6.6 | 37% | 3.1 | 5.2 | Increasing/Low | ----------- |
| Maryland | 0 | | 32% | 1.5 | 3.1 | | | | | ----------- |
| New Jersey | 45 | | 11% | 0.8 | 6.9 | | | | | ----------- |
| Delaware | 0 | | 11% | 0.1 | 0.9 | | | | | ----------- |
| Southern States | 6,381 | 188 | 20% | 4.9 | 6.5 | 31% | 3.1 | 6.4 | Possibility of increases in local areas of GA, VA,and NC; moderate activity in AL; declining to low levels in most counties of SC, MS; static, low levels elsewhere. | Alabama |

# Pest Spotlight: *Ips* Engraver Beetles

Low southern pine beetle (SPB) populations had been predicted again for this year in Texas and much of the South (see SPB article). However, many foresters and private landowners are probably noticing the death of numerous small groups of pines and are wondering if perhaps the predictions were wrong - that SPB is back. The appearance of these small infestations is likely to be the work of three species of pine engraver beetles (the small southern pine engraver, *Ips avulsus*, the eastern five-spined engraver, *Ips grandicollis*, and the six-spined engraver, *Ips calligraphus*).

Most of the time these beetles breed harmlessly in logging debris and weakened trees, but numbers of beetles and infested trees can increase dramatically during prolonged droughts when large numbers of trees have been stressed or damaged by fire, lightning, wind (i.e., hurricanes and tornadoes), ice, logging/thinning, or disease.

The three *Ips* species commonly attack all species of pine in their range, but are of particular importance in loblolly, shortleaf and slash. Attacks by bark beetles can be determined even before the foliage begins to discolor by the presence of reddish-brown boring dust in the crevices of bark and/or dime-sized, resinous pitch tubes formed at the beetles' entrance holes into the tree. The presence of *Ips* can be confirmed by cutting away the bark at the entrance hole with a hatchet to reveal the gallery pattern. For *Ips*, the forester will find a "Y-" or "H"-shaped pattern. This pattern differs from the "S"-shaped gallery patterns constructed by SPB.

The three species differ in their distribution on the host. The small southern pine engraver often infests the crown area and upper bole of its host. The five-spined engraver infests the intermediate portions of the bole as well as large limbs in the crown. The six-spined engraver tends to infest the lower portion of the bole. There can be considerable overlap in these distributions on the host tree.

The effects of last fall's hurricane and the recent drought and fires have stressed large areas of forest in Texas and Louisiana. *Ips* beetle infestations have long been associated with prolonged droughts during the growing season. Generally, timber growers can expect that a severe drought will occur at least once during the lifetime of a pulpwood stand and twice during the lifetime of a sawtimber stand. Pines growing in shallow soils or in heavy clay soils are especially subject to moisture stress during droughts.

Trees whose trunk and roots have been charred by fire become susceptible to *Ips* attack. The probability of beetle attack is high when 80% or more of the trunk is charred and 50% or more of the foliage is consumed. Storm-damaged pines also invite infestations of *Ips* bark beetles.

Plantation trees often have a higher incidence of *Ips* infestations than do trees in natural stands. The higher susceptibility in plantations may be due to planting errors, such as planting the wrong species on a given site; planting seedlings incorrectly in the field; or planting seedlings too close together.

Logging/thinning operations tend to increase the incidence of *Ips* attacks when fresh logging debris is left on site and/or when cutting, skidding, and hauling result in injuries to above- and below-ground portions of residual trees.

Preventative actions that help maintain stands in a healthy, beetle-resistant condition are recommended. Among these are careful establishment of plantations, thinning of overstocked stands, prescribed burning, and avoidance of logging injuries. Pine stands should be promptly inspected following incidences of drought, wildfire, lightning, wind, and ice-storms. The rapid salvage of heavily damaged, merchantable timber can often minimize losses and reduce the threat of *Ips* infestations. Control of *Ips* infestations with insecticides is seldom recommended in forested areas. However, preventative sprays, using permethrin (Astro®, Dragnet®, Permethrin Pro), carbaryl (Sevin®), or bifenthrin (Onyx®) may be warranted to protect especially high-valued stands or seed orchard trees. Although not available for use at this time, WGFPMC research (see PEST 11.1) has shown that injections of emamectin benzoate or fipronil can prevent mortality by *Ips* engraver beetles. We hope that one or both of these chemicals will be registered for use by spring 2008.

**References:**

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