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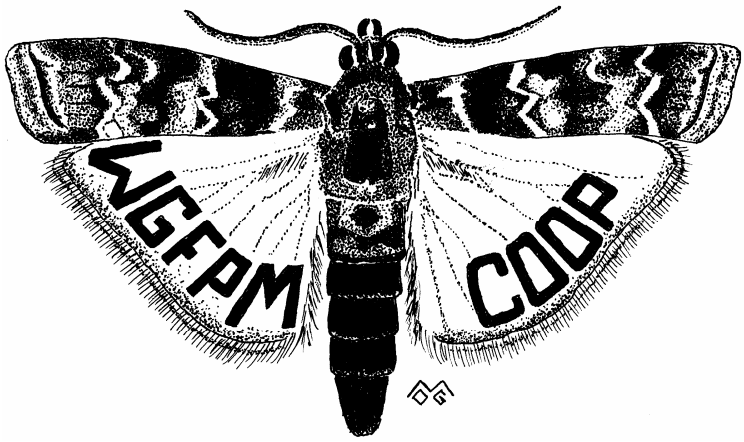
Quarterly Newsletter on Western Gulf Forest Pest Management Issues

Western Gulf Forest Pest Management Cooperative



Southern Pine Coneworm, *Dioryctria amatella* (Hulst)

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

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:

Entomology Seminar - 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 April 26-27, 2005. The meeting will be held from 1:00 PM until 8:00 PM on Thursday at Kurth Lake Lodge, north of Lufkin, and continue from 8:00 AM until noon on Friday at the College of Forestry and Agriculture, SFASU in Nacogdoches. Registration is $25, which includes an evening meal. For additional information and/or an agenda, contact Ron Billings at 979/458-6650 or rbillings@tfs.tamu.edu.

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Summary of 2006 WGFPMC Research Projects

In 2006, three research project areas – tip moth, leaf-cutting ant, and systemic injection - were continued from 2005. Summaries of the results from the systemic injection studies are presented below. Results from leaf-cutting ant control and tip moth impact, hazard-rating and control studies will be presented in the next *PEST* newsletter (June 2007).

Systemic Injection

Since 1996, the WGFPMC has been evaluating the potential of using systemic insecticide injections to protect pine seed orchard crops from coneworms and seed bugs. Two active ingredients, emamectin benzoate (EB) (Syngenta/Arborjet) and fipronil (FIP) (BASF), have been shown in several injection trials to be highly effective in reducing coneworm damage for extended periods. The discovery in 2004 that these two chemicals also are highly effective in preventing the colonization and mortality of injected trees by *Ips* engraver beetles in two separate trials has lead to the development of two new formulations specifically designed for tree injection. Both companies asked the WGFPMC to continue testing the efficacy of these new formulations against bark beetles and seed orchard pests in 2006.

Bark Beetle Trials

Nine separate trials were established in 2005 or 2006 to evaluate EB and FIP against:

1) ***Ips* engraver beetles on loblolly pine in TX,**
2 & 3) **Southern pine beetle (SPB) on loblolly pine in MS & AL,**
4) **Western pine beetle (WPB) on ponderosa pine in CA,**
5 – 7) **Mountain pine beetle (MPB)** on **lodgepole pine** in **ID, BC & CO**,
8) **Spruce beetle (SB)** on **Engelmann spruce** in **UT**, and,
9) **Douglas-fir beetle (DFB) on Douglas-fir in BC.**

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The *Ips* trial evaluated the duration of emamectin benzoate at two rates applied in 2005 and three rates of emamectin benzoate, fipronil or nemadectin applied at different times of the year (Fall 2005 and Spring 2006). The duration trial indicates that emamectin benzoate is effective against bark beetles 13 months after injection. The timing and rate trial indicates that all injection treatments, particularly emamectin benzoate at higher rates, were highly effective in preventing the successful colonization of logs from treated trees 2 and 8 months after injection (Fig. 1 & 2).

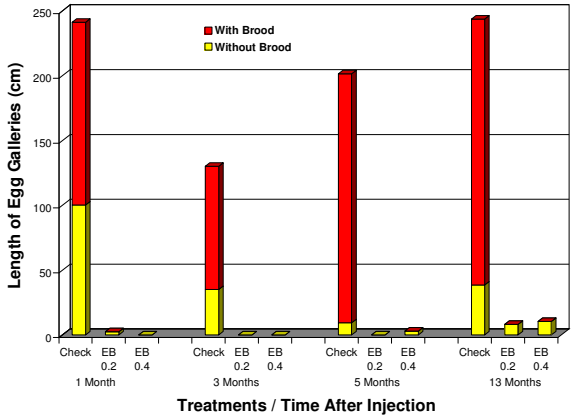

Figure 1. Effect of injection treatment in *Ips* engraver beetle attack success expressed as length of egg galleries with and without brood. EB = emamectin benzoate.

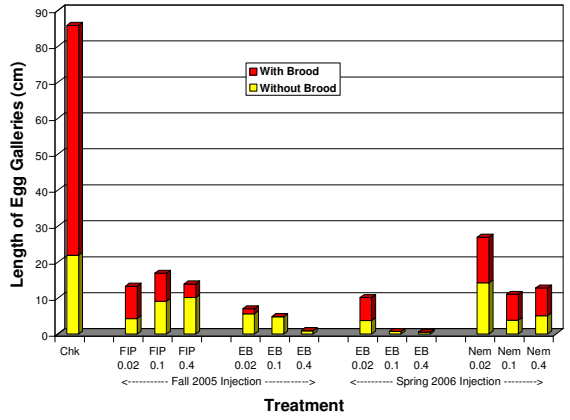

Figure 2. Effect of injection treatment in *Ips* engraver beetle attack success expressed as number of nuptial chambers with and without egg galleries. EB = emamectin benzoate; FIP = fipronil; NEM = nemadectin.

In each of the SPB, WPB, MPB and SB trials, 60 trees were injected, 30 with each chemical. At the CA and ID sites, an additional 30 trees were sprayed with bifenthrin or carbaryl, respectively. Four to six weeks later, all trees (treated and untreated) in the SPB, WPB and MPB (ID) trials were baited with species-specific pheromones to induce beetle attack. SPB and *Ips* populations were sufficient to kill >60% of check trees in AL and MS, respectively. However, the beetle attack levels on injected trees were markedly lower than those on untreated checks (Fig. 3 & 4).

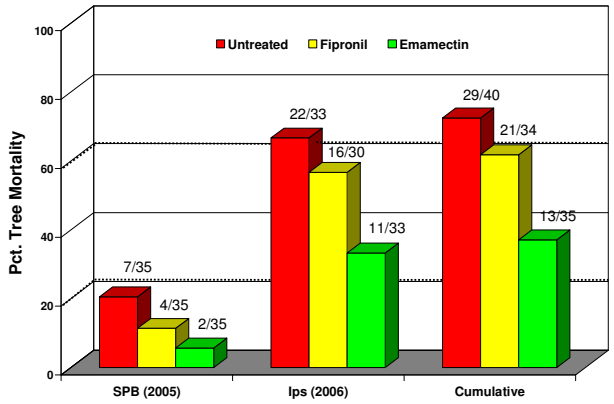

Figure 3. Effects of injection treatments on mortality of loblolly pine attacked by southern pine beetle and *Ips* engraver beetle in 2005 & 2006, Chickasawhay R.D., DeSoto N.F., MS.

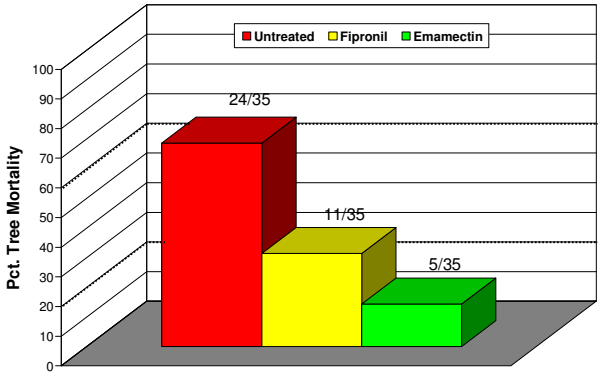

Figure 4. Effects of injection treatments on mortality of loblolly pine attacked by southern pine beetle in 2006, Oakmulgee R.D., Talladega N.F., AL.

A two-year assessment of WPB attacks in CA indicates that 35% of the untreated trees died in 2005 and 2006 (Fig. 5). In contrast, 21% of the FIP-treated

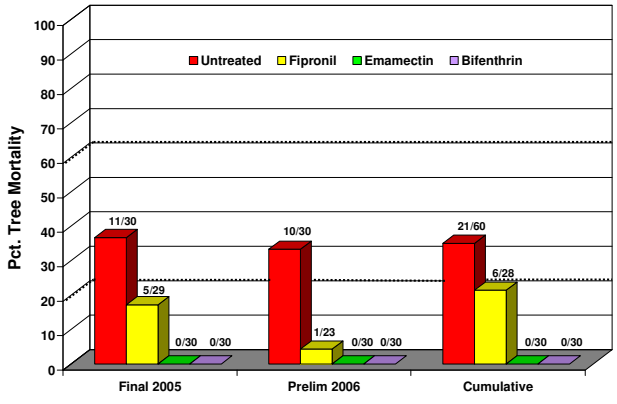

Figure 5. Effects of injection treatment on ponderosa pine mortality by western pine beetle (*Dendroctonus brevicomis*) as of October 2006, Calaveras Co., CA.

Systemic Injections – Continued from Page 2

trees, 0% of EB-treated trees, and 0% of bifenthrin-sprayed trees are likely to die. Preliminary evaluations in ID and UT indicate that insufficient time and/or cold conditions prevented the chemicals from fully circulating the trees. Subsequently, mortality of injected trees was similar to that of check trees at both locations. Final assessments will be made at the CA and ID sites in July 2006. Trees injected in BC were attacked by beetles in 2006, but will not be evaluated until 2007.

Seed Orchard Trials

Six separate trials also were installed in 2005 to evaluate the efficacy of EB and FIP against:

1) **Coneworms and seed bugs** on **loblolly pine** (Plum Creek's Hebron orchard, LA).
2) **Coneworms and seed bugs** on **loblolly pine** (International Paper's Bellamy orchard, FL).
3) **Coneworms and seed bugs** on **slash pine** (Temple-Inland's Forest Lake orchard, TX).
4) **Slash pine flower thrips, coneworms and seed bugs** on **slash pine** (Smurfit-Stone's Brewton orchard, AL).
5) **Cone gall midge, coneworms and seed bugs** on **Douglas-fir** (Plum Creek's Cottage Grove orchard, OR).
6) **Acorn weevil** on **cherrybark oak** (Texas Forest Service's Hudson orchard, TX)

In all pine seed orchard trials, 10 – 12 trees were injected with each chemical. At the TX, FL & AL sites, an additional 10 trees were treated with a foliar spray. In both 2005 & 2006, survival was evaluated by counting cones and conelets first in April and again in August. All cones from each study tree were collected in the fall and evaluated for coneworm damage. Seeds were extracted from 10 cone samples and x-rayed to evaluate for seed bug damage. The cone crops were lost in OR and AL in 2005 due to frost and hurricane winds, respectively. The OR crop was also poor in 2006. Cone survival but not conelet survival was improved by injections. Both EB and FIP significantly reduced coneworm damage at all southern orchards in 2006 (more than 12 months after injection). Mean reductions were 86% and 77%, respectively (Fig. 6). Analysis of seed lots for seed bug damage revealed only moderate protection (16 – 37% reduction) in 2005 and little or none in 2006 (Fig. 7).

In the hardwood seed orchard trial, 10 cherrybark oak trees were injected with each chemical. The plan was to collect acorns periodically from September – December for evaluation of acorn weevil damage. Unfortunately, as in 2005, very few acorns were produced on the study trees in 2006. Evaluation of the few acorns that were produced indicates that

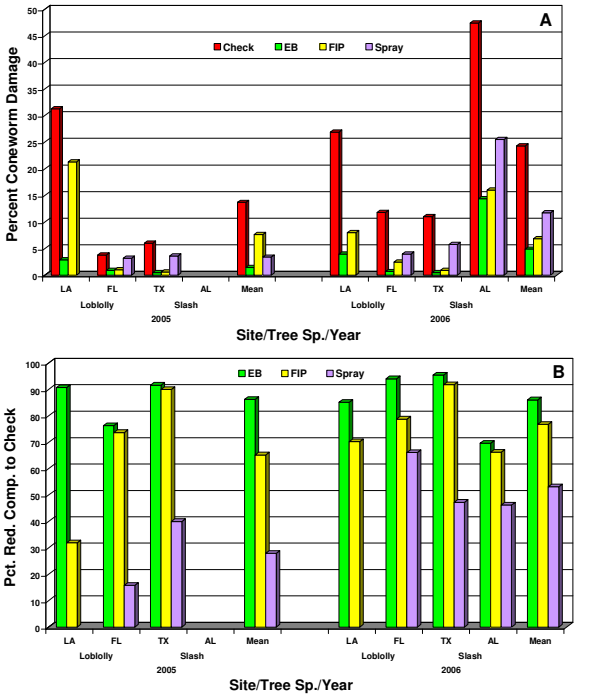

Figure 6. Percent coneworm (*Dioryctria* spp.) damage (A) and reduction in damage (B) on second-year loblolly pine (Lp) or slash pine (Sp) cones treated with injections of emamectin benzoate (EB) or fipronil (FIP) or foliar treatments in LA, FL, TX or AL, 2005 & 2006.

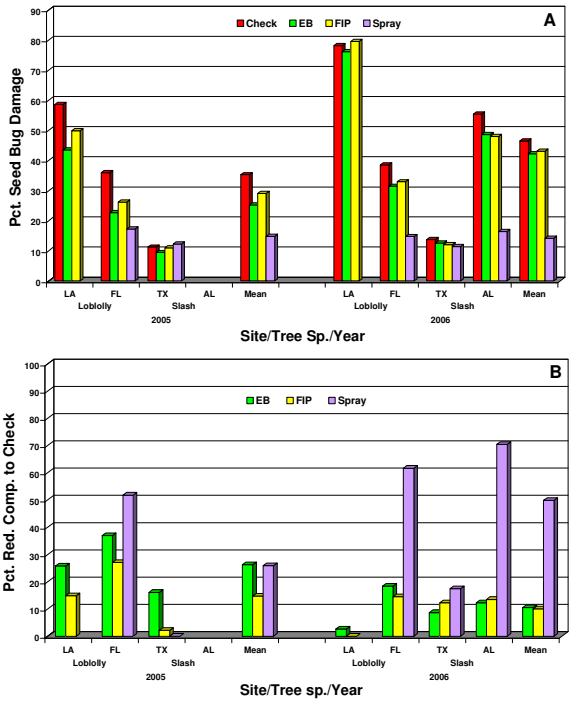

Figure 7. Percent seed bug (*Leptoglossus* and *Tetyra* spp.) damage (A) and reduction in damage (B) on loblolly pine (Lp) or slash pine (Sp) seed collected from trees injected of emamectin benzoate (EB) or fipronil (FIP) or foliar treatments in LA, FL, TX or AL, 2005 & 2006.

neither emamectin benzoate nor fipronil were able to reduce damage to acorns by acorn weevils.

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Systemic Injections – Continued from Page 3

The WGFPMC is continuing to look at other potential markets including evaluating the potential of emamectin benzoate and fipronil for protection of wood against termites. Because the new formulations of EB and FIP appear to be effective against both bark beetles and cone and seed insects, the WGFPMC is asking Syngenta/Arborjet and BASF to also include conifer seed orchard use on any registration package submitted to EPA. Syngenta/Arborjet may be submitting its registration package to EPA by this summer. BASF has developed three new formulations of its active ingredient (fipronil) that will be tested in 2007, so registration will likely be delayed at least two or more years. Stay tuned.

Acknowledgements - We greatly appreciate the effort and support provided by:

International Paper (Tim Slichter)
Plum Creek (Gerry Watkins, Tim Smith (OR), Doug Sharp)
Temple-Inland (Jim Tule, Emily Goodwin)
Texas Forest Service (Joe Hernandez, Tom Byram, I.N. Brown)
USDA Forest Service (Alex Mangini, Steve Clarke, Chris Fettig, Steve Munson, Carl Jorgensen)
Smurfit-Stone (Chris Rosier)

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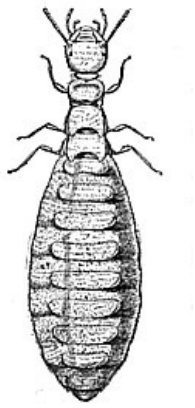
Thought You Might Be Interested to Know . . .

Termites May Provide the Key to Cheaper Fuel. Termites are a major pest especially for homes and buildings built in the southeastern USA, but University of Florida (UF) researchers say the wood-chomping insects might help in the search for alternatives to fossil fuels such as gasoline. UF scientists published a report recently in the journal *Gene* that advances the understanding of how termites digest the tough part of wood known as cellulose. Termites break cellulose down into a form of sugar, and insight into how that's done could help develop alternative fuels. The study identified four genes that produce enzymes that help take cellulose molecules apart, one gene in the eastern subterranean termite and three that belong to microscopic organisms that live inside the termite's digestive tract. The potential payoff down the road could be a method to produce ethanol more cheaply and abundantly. Michael Scharf, a co-author of the study, said the research also might help unlock ways to control termites. (Source: CheckBiotech, 3/2/07 via Chemically Speaking, March 2007).



Several Companies Contribute to WGFPMC Research. BASF Corporation, Research Triangle Park, NC, recently provided $26,000 in research funds to the WGFPMC. The funds are to cover costs incurred as part of several fipronil-related research projects. In particular, the research is evaluating tree injections of fipronil for protection of pines against southern pine bark beetles and soil injection volumes for protection of pine seedlings against pine tip moth.

Syngenta Crop Science, Research Triangle Park, NC, has contributed $24,500 toward the evaluation of emamectin benzoate for protection of pines against southern pine bark beetles and cone and seed insects. In addition, funding will support the evaluation of several injection systems for their ability to inject this chemical.

Bayer Environmental Science, Research Triangle Park, NC, will be contributed $18,000 toward the evaluation of imidacloprid tablets also for protection of pine seedlings against pine tip moth.

Fort Dodge Animal Health, Princeton, NJ, is contributing $3,000 / year over the next 3 years toward the evaluation of nemadectin (an avermectin derivative) tree injections for protection of pines against southern pine bark beetles.

Editor's Note: We thank each of these companies for its support of our projects.

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Pest Spotlight: Loblolly Pine Decline

At a recent WGFPMC meeting, a Coop member representative expressed concern to me about the occurrence of "loblolly pine decline" on their land. Although I have heard of it, I admit that I was not all that familiar with it as a problem on loblolly pine. I decided that it would be prudent to learn more about it and thought I would pass some information about it on to you.

Forest decline and mortality syndromes have been increasingly reported in the past 20 years in many areas in the southeastern United States. Extensive mortality of loblolly pine has been observed with increasing frequency at various locations in AL (since 1959), LA and SC. The decline and death of loblolly pine was at first thought to be symptomatic of "littleleaf disease" as it was most frequent in sawtimber-size trees over age 50. The symptoms associated with this "disease" are nonspecific in general. They include sparse crowns, short chlorotic needles, reduced radial growth at age 40-50, heavy cone crops, and, eventually, death (Fig. 9). Mortality occurs 2 to 6 years after onset of visible symptoms. However, whereas littleleaf disease is characterized by a strong relationship between poorly drained sites with clay soils and infection of trees by *Phytophthora cinnamoni* Rands, the decline and death of loblolly pine in AL, LA and SC have been found to occur on sandy, well-drained soils and have roots infected with one or more species of *Leptographium* fungi.

Figure 8. Loblolly pine showing symptoms of loblolly pine decline – sparse crown, short chlorotic needles and heavy cone crop.

Forest tree declines have been described as resulting from complex interactions of biotic and abiotic stressors. Recent research studies of loblolly pine decline in AL indicate that fungal, insect, soil and/or man-made parameters are associated with this decline. Root-infesting bark beetles (*Hylastes salebrosus* and *H. tenuis*) and weevils (*Hylobius pales* and *Pachylobius picivorus*) are much more abundant in plots containing declining trees than in asymptomatic plots. These insects consistently carried fungal pathogens *Leptographium serpens*, *L. procerum*, and *L. terebrantis*. Sampled roots had high levels of root damage, mortality, and staining typically associated with *Leptographium* species.

The attraction of root-feeding insects by a reduced vigor host can begin as one or more abiotic environmental stressors. One proposed stress factor is fire. Prescribed fire can increase stand vigor by eliminating hardwood competition but fire used improperly can create damage conditions that are attractive to these insects. The influence of previous agriculture, landform and planting loblolly offsite (on sites better suited for longleaf) are other factors that may have a role in the loblolly decline complex.

Once the insects are attracted, a cascade of effects is correlated to their increasing numbers. Root disease symptoms develop and root infection, deterioration and mortality increase in symptomatic sites. Loblolly pine stands showing decline symptoms are more susceptible to attack by southern pine beetle.

Management options for this decline problem may include: 1) maintaining healthy forests through proper management; 2) development of hazard maps using predictive variables of loblolly pine decline such as slope, aspect, convexity and elevation of sites; 3) use hazard maps to convert from loblolly to longleaf on sandy, well-drained sites; and 4) proper use of prescribed fire to reduce damage to roots.

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Announcements - continued from Page 1

New Seasonal Technician – We would like to welcome Mrs. Billi Kavanagh to the WGFPMC. She was hired April 19th by the Texas Forest Service to provide assistance with some of the many WGFPMC research projects. Billi can be contacted by phone: (936)-639-8170 or by e-mail: bkavanagh@tfs.tamu.edu.

Thought You Might Be Interested to Know . . . – continued from Page 4

Confirm 2F for Use in Forests and Trees. Dow AgroSciences has two products (Mimic® 2LV and Confirm® 2F) that contain the active ingredient tebufenozide. This chemical is an insect growth regulator that interferes with normal hormonal processes that regulate growth and molting. It is specific to lepidopteran insects (moths and butterflies). Prior to 2006, Mimic® was the only tebufenozide product registered for use in forested areas against Nantucket pine tip moth, gypsy moth and other forest insects and was the only effective alternative to organophosphate and pyrethroid insecticides in conifer seed orchards. However, production of Mimic® was discontinued in 2006. At the request of the U.S. Forest Service and Tree Improvement Programs (Western Gulf and NC State), Dow agreed to create a supplemental label for the Confirm® product that allows use in forests[1] and trees[2]. Recently, EPA approved this label (http://www.cdms.net/LDat/ld5PP008.pdf).

[1]Forests include commercial, private and public forestland, conifer release sites, shelterbelts and windbreaks, and forest plantings.

[2]Trees include Christmas trees, nurseries and plantations, conifer seed orchards, ornamental and shade trees.

New Tablets Registered to Protect Young Seedlings Against Forest Pests. The registration of Bayer's SilvaShield™ Forestry Tablets was recently approved by EPA. The tablets, containing the insecticide imidacloprid + fertilizer (12N-9P-4K), are currently approved for use in both hybrid poplar and pine plantation forestry sites (additional uses may be approved in the near future). Cottonwood leaf beetles and aphids are the target pests in poplar plantations, while Nantucket pine tip moth, soft scales and aphids are the targets in pine plantations. These tablets are applied by placing 1 or 2 tablets in each planting hole at seedling transplant, or pushing the tablet(s) into the soil within 3 inches of each seedling after transplant. Be aware that no more than 450 tablets can by applied per acre per year.

The WGFPMC has been working with Bayer to evaluate the efficacy of the SilvaShield™ tablets in pine plantations against pine tip moth. A trial was established in 2006 on two sites (1 in TX and 1 in LA). However, severe drought conditions caused extensive seedling mortality on both sites. The TX site was a complete loss, but results from the LA site showed that the tablet treatment reduced tip moth damage by nearly 80% compared to the untreated check. Additional trials were established on 6 sites (3 in AR, 2 in TX, and 1 in LA) this spring (2007) to further evaluate the effects of these tablets on reducing tip moth damage and improving tree growth. Stay tuned.

Marestail Confirmed Glyphosate-resistant in Nebraska. As with most things in life, too much of anything rarely is a good thing. That saying also holds true when it comes to the use of glyphosate, a popular non-selective herbicide. After a year of testing, University of Nebraska-Lincoln research confirmed marestail, also known as horseweed, is resistant to glyphosate. This is the first glyphosate-resistant weed to be confirmed in the state, UNL weed scientists say.

Weed resistance usually results from repeated use of the same herbicide, said Steven Knezevic, integrated weed management specialist at the university's Haskell Agricultural Laboratory near Concord. Widespread use of glyphosate herbicide has resulted in selection pressure on weed populations in recent years.

"Prior to the introduction of glyphosate-tolerant crops, only a few weed species – ryegrass and goosegrass – had developed resistance worldwide," he said. "However, the number of glyphosate-resistant weeds tripled in just over eight years of repeated glyphosate use due to the introduction of Roundup Ready crops." Other glyphosate-resistant weeds in the U.S. include waterhemp, lambsquarters, giant ragweed, common ragweed and palmer amaranth.

"We believe that glyphosate- and herbicide-tolerant crops, including those based on glyphosate herbicide, can remain useful components of crop production systems only with proper management," said Alex Martin, UNL weeds specialist. "It is easy to fall into a trap of overusing glyphosate versus combinations of pre-emergence herbicides or tank mix partners when one Roundup Ready crop is grown after another." This makes proper use of herbicide tolerant technology an important component of an integrated weed management program to preserve the long-term benefits of this technology and concerns of its use or misuse, Martin said. (Source: UNL / IANR News Release, 10/26/06 via The Label, Nov. 2006)

A Little Humor Goes a Long Way

The Affects of GM Crops are Out of This World. Buck Uranus, chief astronomer for the William H Carpenter Foundation in Nevada, believes that extraterrestrials are refusing to create crop circles in genetically-modified (GM) maize, and other crops because of fears of possible side-effects. The scientist has conducted a major survey of crop circles created over the past five years and says he has not found a single example left in fields containing GM crops. "In my spare time, I channel messages from alien beings," said Uranus, "and from what I've been hearing, these guys have got some serious reservations about what we're doing down here. One of them told me he's even thinking of using another planet for his artwork." According to Uranus, one shape-shifting lizard said: "The long-term effects of these 'Frankenstein crops' are just so uncertain. Let's face it, it's not natural. And after the rigors of crossing many light years of space in order to leave some pretty patterns in your fields, we'd rather not take that extra risk." The visitors from outer space also have fears about contamination of plants on their own worlds, says Uranus. He claims that one alien told him: "Just imagine - we accidentally pick up a few seeds on our undercarriage and take them home without knowing. They could spread like wildfire then and we'd end up paying Monsanto an annual fee just to grow flooble beans on our own planet. Madness." Monsanto has not commented on these allegations. (Source: *Weekly World Inquisitor*, 3/2/07 via Chemically Speaking, March 2007).

A Fool Proof Way to Keep Mosquitoes OFF You

The OFF! company sends these pointers about biting mosquitoes:

- Bigger people are often more attractive to mosquitoes because these people are larger targets, and they produce more mosquito attractants, namely CO_2 and lactic acid.
- Active or fidgety people also produce more CO_2 and lactic acid.
- Women are usually more attractive to mosquitoes than men because of the difference in hormones produced by the sexes.
- Dark clothing attracts mosquitoes.
- Some perfumes and other fragrances attract mosquitoes.
- Movement increased mosquito biting up to 50 percent in some research tests.
- Unkempt lawns and dense bushes are favorite resting sites for mosquitoes.
- A full moon increased mosquito activity 500 percent in one study.

So, to avoid mosquito bites, check the personal ads for a tall or big woman who is very fidgety. Give her gifts of dark clothes and cover her with perfume. Ask her to walk around close to you while you stand quite still. (Source: OFF! Mosquito Bite Prevention Guide via Georgia Pest Management Newsletter, August, 2000)

Insect Tidbits

- An acre of British pastureland near Cambridge supported over 1 billion arthropods, of which nearly 400 million were insects, 666 million were mites, and the remaining 38 million were myriapods (centipedes and millipedes).
- The otherwise inconspicuous springtails have been recorded at densities as high as 100 million per square meter in the ordinary farm soil of Iowa.
- African swarms of desert locusts may contain as many as 28 billion individuals. Although each individual locust only weighs about 2.5 grams, added together this comes to 70,000 tons of locust.
- Ants are social animals that live in colonies. Some colonies are small, containing only 50 or so individuals. However, one super colony of *Formica yessensis* ants on the coast of Japan is reported to have over 1 million queens and 306 million workers in 45,000 interconnected nests.
- There are approximately 4,000 species of cockroaches in the world. Of these 4,000 species, however, only about 25 to 30 (<1%) species are actually pests. (from Pest Management Quarterly; Dec. 1998)
  Note: Save those super fast roaches you find in your kitchen. On January 26, the Aussies (in the land Down Under) celebrated Australia Day, marking the beginning of the European settlement more than 200 years ago. One of the ways Aussies celebrate the day is at the annual cockroach races at Kangaroo Point, where the little pests compete in a five-race program. (from Business Wire; Jan. 22, 1999)