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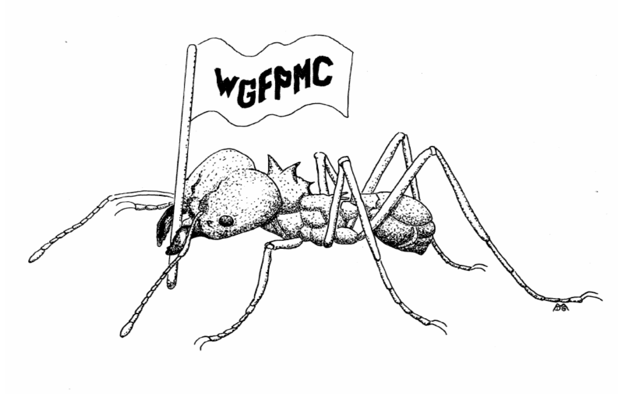
Quarterly Newsletter on Western Gulf Forest Pest Management Issues

Western Gulf Forest Pest Management Cooperative



Texas Forest Service, Forest Pest Management,
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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:

Contact Meeting - All WGFPMC executive and contact representatives, industry, and TFS foresters are invited to attend the 2003 WGFPMC Contact Meeting scheduled for Tuesday, August 5, 2003. The meeting will begin at 9:00 AM at the Texas Forest Service Training Building at the Cudlipp Forestry Center in Lufkin. Lunch will be provided. The meeting agenda is shown on page 8. RSVP by July 25 by contacting Martha Johnson at 936/639-8170.

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Summary of 2002 WGFPMC Research Projects

In 2002, two research projects - leaf-cutting ant control and systemic injection - were continued from 2001. Summaries of the results from these studies were presented in the last PEST newsletter (March 2003). Results of three additional studies - tip moth impact, hazard rating and control – are presented below.

The WGFPMC established a three-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, 2) identify abiotic factors that influence the occurrence and severity of pine tip moth infestations, and 3) 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 2002.

Pine Tip Moth Impact

In 2001, 16 study plots, in 8 plantations, were established in Texas, Louisiana and Arkansas. Treatments on these plots were continued in 2002 (the second year). Seven additional (first year) study plots were established on 4 more sites in 2002. In each plantation, one or two areas were 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.
2) Check (untreated)

For all 23 plots, pesticides were applied by backpack sprayer to all trees within the plot (treatment area). Application dates were based on trap catches in each area and degree-day model calculations.

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Tip Moth Projects (Continued from Page 1)

Table 1. Mean percent of loblolly pine shoots (in top whorl) and terminals infested by Nantucket pine tip moth on one- and two-year old loblolly pine trees following treatment with Mimic® after 5 generations; Arkansas, Louisiana and Texas sites - 2001 & 2002.

	Shoots Infested			Terminals Infested		
	Planted 2001 (N=16)		Planted 2002 (N=7)	Planted 2001 (N=16)		Planted 2002 (N=7)
Treatment	Year 1	Year 2	Year 1	Year 1	Year 2	Year 1
Mimic	1.7	3.8	1.5	3.3	6.2	3.2
Check	22.4	21.9	7.5	34.0	31.1	14.7
% Reduction	92	83	80	90	80	78

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 including: 1) tree identified as infested or not, 2) if infested, the proportion of tips infested on the top whorl was calculated, and 3) separately, the terminal was identified as infested or not. Trees also were surveyed a final time in November, 2002. At this time, data also were collected on tree height and diameter.

Tip moth infestation levels were markedly lower overall (7% of shoots and 14% terminals infested) on first year trees in 2002 compared to first year trees in 2001 (22% and 34%, respectively) (Table 1). Also, the expected increase in year two damage compared to year one did not occur. All of this indicates that tip moth populations had declined in 2002 compared to 2001.

The Mimic® treatments again provided excellent protection against tip moth in 2002 - reducing infestation levels by >80%. Nearly all second year Mimic®-treated plots continued to show significantly greater tree height and diameter growth compared to the neighboring untreated trees (Table 2). Overall, the exclusion of tip moth on treated trees for two years has improved tree height, diameter and volume index by 11%, 12% and 38%, respectively, compared to untreated trees. However, due to low tip moth population levels in first year plantations, growth parameters were not improved with the application of Mimic® in 2002. The study will be continued in 2003.

Table 2. Mean tree height, diameter and volume and percent growth gain of one- and two-year old loblolly pine following treatment with Mimic®; Arkansas, Louisiana and Texas sites - 2001 & 2002.

		Height (cm)		Diameter (cm)		Volume (cm^3)	
Age	N Plots	Mean	% Gain	Mean	% Gain	Mean	% Gain
2001							
Year 1 (planted 2001)							
Mimic	16	62.19	**27.8**	1.30	**12.1**	200.6	**45.6**
			P < 0.0001		P < 0.0001		P < 0.0001
Check	16	48.65		1.16		137.7	
2002							
Year 1 (planted 2002)							
Mimic	7	58.03	**-1.9**	1.27	**-1.6**	131.4	**-12.2**
			P > 0.05		P > 0.05		P > 0.05
Check	7	59.18		1.29		149.7	
Year 2 (planted 2001)							
Mimic	16	157.04	**10.7**	3.27	**12.0**	2824.1	**37.5**
			P < 0.0001		P < 0.0001		P < 0.0001
Check	16	141.91		2.92		2053.5	

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Tip Moth Projects (continued from page 2)

Pine Tip Moth Hazard Rating

WGFPMC members selected from 1 to 11 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 126 trees (9 rows X 14 trees). The 41 Western Gulf sites (24-1st year & 17-2nd year plots) were used to collect site characteristic data which 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 1st, 2nd, and last generation, 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. Tree height and diameter at 6 inches data were collected in November on 2nd year sites.

Most data has been collected from each of the 41 plots established in 2001 and 2002. The data set is being sent to Dr. Roy Hedden, Clemson University, who is developing a regression model to identify the most important abiotic factors influencing tip moth occurrence and severity. An initial analysis of the 2001 data suggests that stand history and base cation concentration are important factors. So far, the data indicates that the plantations that were planted on sites that were originally mixed pine/hardwood had higher infestation levels compared to sites that were originally pine plantations. Also, sites with higher levels of base cations tended to have higher tip moth levels regardless of stand origin. Hopefully additional analyses and inclusion of 2002+ data will help to explain these relationships.

The initial 17 plots were be evaluated through 2002 and have now been phased out. The new 24 plots will be monitored through 2003. Additional plots will be established yearly through 2004.

Pine Tip Moth Control

A study initiated in 2001 evaluated the potential of loading seedlings with a possible systemic chemical, emamectin benzoate (EB), prior to planting for control of tip moth for one or more years. The results showed that EB did reduce tip moth damage for the first two generation, but the effects faded thereafter. A second trial was initiated in 2002 to further evaluate the potential of EB and four other reported systemic chemicals (imidacloprid, thiamethoxam, azadirachtin, and fipronil).

Two sites within a second-year plantation were selected in the Fairchild State Forest, Cherokee Co., TX. A plot was established at each site. Each plot contained 350 trees (5 rows X 70 trees). A randomized complete block design was used at each site with beds or site areas serving as blocks, i.e., each treatment was randomly selected for placement along a bed. Ten seedlings from each treatment were planted on each of five beds. The treatments included:

1) Emamectin benzoate (0.12% ai) - root soak of bare root seedlings for 2 hours prior to planting
2) Fipronil (0.157% ai)- root soak for 2 hours
3) Imidacloprid (0.53% ai)- root soak for 2 hours
4) Thiamethoxam (0.17% ai) - root soak for 2 hours
5) Azadirachtin (0.145% ai) - root soak for 2 hours
6) Tebufenozide (Mimic®) – foliar spray 5X at 0.8oz/gal
7) Check - Bare root seedling (lift and plant)

Loblolly pine bare root seedlings from the Texas Forest Service nursery at Alto, TX were used in this study. For bare root applications, 100 seedlings were lifted for each treatment. The seedlings were culled of small caliper (< 3 mm dia.) seedlings. The seedlings' roots were soaked in insecticide solution for 2 hours. After immersion, the seedlings were bagged and placed in cold storage until the following day. Fifty seedlings from each treatment were planted (6 X 10 ft spacing) on each of the two sites.

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

Continued on Page 4

Tip Moth Projects (continued from page 3)

Table 3. Mean percent of loblolly pine shoots (in top whorl) infested by pine tip moth after the each of 5 generations - 2002.

Treatment †	Gen 1	Gen 2	Gen 3	Gen 4	Gen 5	Mean % Red.
EB Soak	2.5 ***	14.7 ***	26.2	49.4	62.8 **	34
FIP Soak	1.3 ***	0.0 ***	6.8 ***	0.9 ***	13.4 ***	90
IMID Soak	1.3 ***	5.1 ***	27.9	47.6	71.7	40
THIA Soak	0.0 ***	5.0 ***	18.3 **	36.0 ***	55.8 ***	56
Mimic® Foliar	1.8 ***	0.3 ***	7.6 ***	1.1 ***	1.5 ***	92
Check	15.4	28.6	31.1	52.8	74.5	

† EB = emamectin benzoate; FIP = fipronil; IMID = imidacloprid; THIA = thiamethoxam

Treatment significantly different compared to check: * = P < 0.05; ** = P <0.001; *** = P < 0.0001 (Fisher's Protected LSD)

Seedlings treated with azadirachtin exhibited phytotoxic symptoms within two weeks after planting and >80% mortality by the end of the year (Table 4). As a result the azdirachtin treatment was not included in the final analysis. All other chemical treatments showed significantly lower tip moth damage levels after the first two tip moth generation compared to check trees (Table 3). However, only the fipronil soak and Mimic® foliar spray treatments essentially eliminated tip moth damage through the 5th generation. The thiamethoxam soak did significantly reduced tip moth damage levels through the 5th generation, but the percent reduction in damage was markedly lower than that of fipronil and Mimic® (Table 4). Only the Mimic® treatment significantly improved tree height, diameter and volume growth compared to check trees.

New trials were initiated in 2003 to further evaluate the potential of fipronil for extended protection of pine seedlings against tip moth.

Table 4. Mean height, diameter, volume index and survival of first year loblolly pine seedlings after the 5th tip moth generation - 2002.

Treatment †	Height (cm)	Diameter (cm)	Volume Index ($H*D^2$)	Survival (%)
EB Soak	47.1	0.69	27.3	95
FIP Soak	56.3 *	0.82	47.6	98
IMID Soak	55.2	0.85	47.6	99
THIA Soak	55.1	0.84	47.4	100
AZA Soak	-----	-----	-----	19 ***
Mimic® Foliar	59.9 ***	0.91 ***	60.6 ***	99
Check	51.7	0.75	37.5	98

† EB = emamectin benzoate; FIP = fipronil; IMID = imidacloprid; THIA = thiamethoxam; AZA = azadirachtin

Treatment significantly different compared to check: * = P < 0.05; ** = P < 0.001; *** = P < 0.0001 (Fisher's Protected LSD)

SPB Predictions for 2003: Good News for Most Areas!

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; in 2001, almost 63,000; and in 2002, a record setting 93,000+ 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. The Texas Forest Service (TFS) has developed a reliable trap survey 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.

The results of the Southwide southern pine beetle survey for 2003 are now available. The survey indicates that SPB activity is declining across the South with the exception of Mississippi and eastern Louisiana, which should have a slight increase but remain at low levels. Activity in South Carolina for 2003 is predicted to decline to moderate, from the record setting 2002 levels. All other southern states are predicted to be at low levels. Very few or no SPB infestations are expected again this year in Texas, Arkansas, Oklahoma, western Louisiana, Delaware, or Maryland. A state-by- state summary of trap catches for SPB and clerids for 2002 and 2003, is listed in Table 5.

The South-wide SPB survey results and trend predictions will also be posted on the Internet at http://www.fs.fed.us/research/4501/. Appreciation is expressed to the many state and federal cooperators who provide the data for this annual survey.

Bill Upton and Ron Billings, TFS

Table 5. Summary of Southwide Southern Pine Beetle Trend Predictions for 2003.

State	No. of Infestations in 2002	No. of Locations Trapped	2002 % SPB	2002 SPB/ trap/day	2002 Clerids/ trap/day	2003 % SPB	2003 SPB/ trap/day	2003 Clerids/ trap/day	2003 Prediction Trend/Level	Most Likely Locations of SPB Activity
Oklahoma	0	2	1%	0.1	72.9	0%	0.0	17.3	Static/Low	-----------
Arkansas	0	7	0%	0.0	27.2	0%	0.0	11.6	Static/Low	-----------
Texas	0	17	0%	0.0	10.8	0%	0.0	5.0	Static/Low	-----------
Louisiana	0	23	1%	0.1	6.4	4%	0.2	3.4	Static/Low	Calcasieu R.D. and E. Feliciana and St. Helena parishes
Mississippi	689	10	24%	13.0	47.1	30%	9.2	20.2	Increasing/Low	Choctaw Indian Reservation and Oktibbeha and Winston counties
Alabama	4,991	6	41%	38.8	54.4	28%	5.2	16.5	Declining/Low	Talladega R.D. and Tallapoosa County
Kentucky	NA	1	29%	16.4	25.2	14%	12.8	67.2	Declining/Low	McCreary County
Georgia	9,070	7	54%	48.0	28.6	17%	10.6	39.9	Declining/Low	Armuchee R.D. and Habersham County
Tennessee	6,394	6	31%	16.1	26.4	11%	1.6	17.4	Declining/Low	-----------
Virginia	274	4	49%	16.8	11.8	29%	14.7	25.3	Declining/Low	Cumberland Co.
Florida	650	28	81%	24.6	5.5	49%	1.9	2.4	Declining/Low	Okaloosa and Suwannee counties
South Carolina	67,127	34	69%	45.8	14.9	38%	11.4	15.0	Declining/Low-Moderate	Abbeyville, Cherokee, Edgefield, Fairfield, Lancaster, Lexington, McCormick, Newberry, Oconee, Pickens, Richland, Saluda, Spartanburg, and York counties
North Carolina	4,028	14	47%	18.5	17.4	32%	5.0	13.1	Declining/Low	Uwharrie R.D. and Davidson County
Maryland	0	3	14%	0.1	0.5	15%	0.2	1.3	Static/Low	-----------
New Jersey	221	6	52%	4.7	7.1	5%	0.9	32.0	Declining/Low	-----------
Delaware	3	4	14%	0.1	0.5	24%	1.1	3.4	Static/Low	-----------
Southern States	93,447	172	32%	15.2	22.3	19%	4.7	18.2	Static/Moderate (East) with localized High/Outbreak areas and Static/Low (West)	Mississippi and South Carolina

Need Incentives for SPB Prevention? The Check may be in the Mail.

Ronald Billings, Texas Forest Service, College Station

Private landowners reluctant to apply preventive treatments for the destructive southern pine beetle (SPB) due to high costs and low financial returns are about to get a boost. The Texas Forest Service has recently received a federal grant ($500,000) from the USDA Forest Service to be used for promoting SPB prevention activities. This grant includes $225,000 for cost-sharing approved prevention treatments on private lands.

Up to 50% reimbursement is available to landowners for implementation of specified SPB prevention practices, such as thinning overly-dense pine stands and planting longleaf pine on suitable sites. In the short term, these incentives should offset some of the costs private landowners must bear to install prevention measures. The long-term goal is to reduce the susceptibility of East Texas forests to future SPB outbreaks.

Foresters and many landowners know that losses to SPB and other bark beetles can often be avoided through good forest management. Thinning of overly-dense, young pine stands insures improved growth and increases resistance to pine bark beetles. Unfortunately, low stumpage prices for pine pulpwood and increasing harvesting costs in recent years have discouraged many private landowners from investing in bark beetle prevention efforts. To make SPB prevention practices more appealing, the new program will offer federal cost-share incentives for timber stand improvements and other practices to prevent future SPB infestations on small private ownerships in East Texas.

The southern pine beetle, a bark beetle native to the southern U.S., is a major threat to pine forests. Unmanaged or overcrowded stands of loblolly or shortleaf pines are known to be prone to SPB infestation. Longleaf and slash pines are more resistant. Periodic outbreaks of this bark beetle occur every 6-10 years in Texas. Expanding infestations, if not controlled, may devastate entire forests. Currently, SPB populations are low. Now is the ideal time to prepare for the next outbreak by “beetle-proofing” your pine stands.

In general, a pine stand is considered overcrowded when basal areas are greater than 100 square feet per acre. Loblolly or shortleaf pine stands with basal areas exceeding 120 square feet per acre, particularly those on bottomland or flatwood sites (clay soils), are considered high hazard for SPB infestation.

Remember, good forest management is good SPB prevention. Recommended forestry practices to reduce susceptibility to SPB include:

- Hazard rating of existing pine stands, using available methods, to determine their susceptibility to SPB.
- Precommercial thinning of overcrowded 7- to 12-year old stands to reduce stand density to equal or less than approximately 400 trees per acre (optimal density will vary with site conditions).
- Commercial thinning of moderate or high hazard pine plantations or natural stands to reduce the basal area to equal or less than 80 square feet per acre.
- Harvesting pine stands at maturity and reforesting.
- Minimizing damage to residual trees during road building and thinning operations.
- Reforesting or planting containerized longleaf pine seedlings on suitable sites (see TFS circular entitled *Keys to Successfully Planting Longleaf Pine).*
- Favoring mixed stands of pines and hardwoods on suitable sites where management goals permit.
- Monitoring pine stands for SPB activity and promptly treating expanding SPB infestations when they occur.

Federal cost share funds, administered by the Texas Forest Service, will be allocated to qualified private landowners as reimbursement for installing approved SPB prevention practices. To qualify for these federal cost shares, the landowner must first have a forest management plan or Forest Stewardship Plan prepared by a TFS or consulting forester for his/her property.

Practices that qualify for these cost share funds are still being defined, but will probably include pre-commercial thinning of dense stands, consultant fees for conducting commercial thinning of high hazard stands, and planting longleaf pine on suitable sites. Other practices and/or restrictions may apply, to be defined as the program gets underway.

For more information on SPB prevention or to apply for SPB prevention cost shares, contact the Texas Forest Service office nearest you, your consulting forester, or Dr. Ronald Billings, Texas Forest Service, 301 Tarrow, Suite 364, College Station, TX 77840. (Phone: 937-458-6650).

Things You Might Be Interested to Know . . .

Needle Cast Disease Has Shown Up in 2003

I received several calls this spring from people inquiring about the cause of a sudden decline and/or "death" of loblolly pine trees in seed orchards and plantations in the Western Gulf Region. Based on the description of symptoms being shown by these "dying" trees, my colleague, Joe Pase, and I concluded that the problem was most likely needle cast disease.

Needle cast diseases are caused by various fungi that infect the new needles on pines, spruce, Douglas fir and true fir. Although the needles become infected in the summer, symptoms of disease often are not visible until the following winter or spring season. Infected needles may then turn yellow or brown and give the trees a "fire-scorched" appearance. These diseased interior needles usually are shed prematurely giving the tree a sparse thin appearance. Often the only needles remaining are the current season's new growth. The following is a brief description of some needle cast diseases that can occur on loblolly and slash pines.

The two most common needle cast fungi genera on pines are *Lophodermium*, and *Ploioderma*. *Lophodermium* needle cast causes the previous years needles to turn reddish brown in late winter before they fall from the tree. Infected needles on the ground below the tree develop fungal fruiting bodies that release infective spores by midsummer. Branches closest to the ground exhibit more severe symptoms than do needles higher up in the tree. Repeated infection leads to dieback of lower branches. *Ploioderma* needle cast causes previous years needles to turn reddish brown in late winter, however disease lesions on needles often girdle the needles causing the tips to turn brown while the needle bases remain green. Infected needles will remain attached to the tree for a period of time and produce fruiting bodies that spread infective spores. Repeated infection will lead to lower branch dieback.

In some years this disease develops to spectacular levels resulting in large numbers of trees giving the appearance of having been scorched by fire. Some degree of growth reduction due to premature loss (cast) of foliage is presumably the primary impact of this disease on infected trees. However, severe needle cast, in combination with other stresses such as drought or injury could well contribute to the vulnerability of trees to stress-related pests such as bark beetles. In most cases, the effects of needle cast on otherwise healthy trees are negligible. Individual trees of slash and loblolly pine vary markedly in apparent resistance to needle cast. Such differences are strongly heritable and not correlated with growth rate.

Control is unnecessary in most situations. If control is desired for cosmetic reasons, protection of newly emerging needles through June with regular applications of an appropriate fungicide may be helpful.
Don Grosman

Pounce for Weevils in Florida

(Source: Chemically Speaking June 2003)

On May 20, 2003 the Florida Dept. Agric. & Cons. Serv. issued a Special Local Needs [24(c)] registration to Agrisolutions for use of Pounce® insecticide (permethrin) to control regeneration weevils in eight Florida conifer seedling nurseries. This is a me-too registration in addition to the SLN FL-990001. The product can not be aerially applied. The EPA registration number for product is 279-3014-1381.

A Change in Permethrin Labeling for Borer Control on Ornamentals

(Source: Christine Casey, North Carolina Pest News, May 30, 2003)

The federal Food Quality Protection Act continues to impact ornamental plant production. As you may know, the pyrethroid insecticides are scheduled for review this year. In an effort to avoid federal *restricted-use* labeling for Astro® (permethrin), the registrant has deleted references to **field- and container-grown nursery stock, nurseries**, **Christmas trees,** and **pine tree plantations/orchards** on its new label. It is still labeled for greenhouse use. There has been much discussion among the ornamentals entomologists as to what this means, since the label still includes *trees and shrubs* but nurseries have been removed from the site list. The feeling is that it is up to the interpretation of each state's regulatory agency.

So where do things stand now?

1. Any Astro® product with the old label can still be used in nurseries.

2. Permethrin is still available for homeowner purchase.

3. What are other borer control options? Pretty limited. For Asian ambrosia beetle, other tested products are not as effective. Talstar® will be a viable substitute in many cases. Merit® (imidacloprid) is not effective against many borers (including ambrosia beetles and clearwing borers). Use of Merit® is further complicated by the fact that the time required for uptake means it must be applied in advance of a problem.

4. There are new materials in development, but the registration dates and efficacy of these materials are unknown.

There is a need for more comprehensive borer management as pesticides become more restricted. While we do not have all the answers for all borers, we do know that maintaining tree vigor is important. Avoid or reduce mechanical and physical injury to trees and root systems. Also, control foliar insects and mites to ensure minimal impact on photosynthesis.

The High Price of Pesticide Development

(Source: CropLife America *Spotlight*, 5/16/03 via Chemically Speaking June 2003)

CropLife America and the European Crop Protection Association released results of a study which shows that the average discovery, development, and registration costs to bring a crop protection product to market have increased from $152 million in 1995 to $184 million in 2000, a cost eight times higher than 20 years ago. The consulting firm conducting the study attributed the increase primarily to the adoption of new technology, stricter regulatory standards instituted to ensure environmental and consumer protection, and a rise in the amount of data required by regulatory authorities. Also, the development period for a new product (from first synthesis to commercialization) has increased from 8.3 years in 1995 to 9.1 years in 2000 and the average number of molecules screened leading to the introduction of each new product increased from 52,500 to >139,000 for these same respective years.

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Western Gulf Forest Pest Management Cooperative 2003 Contact Meeting

August 5, 2003

Texas Forest Service, Cudlipp Forestry Center Training Building, Lufkin, TX

AGENDA

9:00 AM	Meeting called to order, introductions, opening comments
9:15 AM	WGFPMC Tip Moth Research Update (Dr. Don Grosman, WGFPMC)
10:00 AM	Field Trip to Tip Moth Fipronil Project Sites
12 Noon	Lunch (provided)
1:00 PM	Digital Sketch Map Demonstration (Mr. Allen Smith, TFS)
1:45 PM	Exotic Pests of Southern Forests (Dr. Steve Clarke, USFS)
2:15 PM	Break
2:30 PM	Host Resistance Against Southern Pine Beetle (Dr. Brian Strom, USFS)
3:00 PM	WGFPMC Research Update continued (Dr. Don Grosman, WGFPMC)
4:00 PM	Tree Injection System Demonstration (Dr. Don Grosman, WGFPMC)
5:00 PM	Meeting Adjourned