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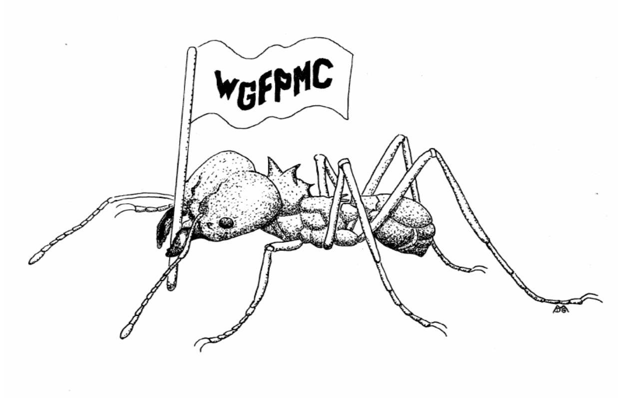
Quarterly Newsletter on Western Gulf Forest Pest Management Issues

Western Gulf Forest Pest Management Cooperative



Texas Forest Service, Forest Pest Management,
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 fall session of the East Texas Forest Entomology Seminar scheduled for November 1 & 2, 2007. 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. Results from systemic injection studies were presented in the April 2007 PEST newsletter and results from the leaf-cutting ant and tip moth control studies were presented in the most recent PEST newsletter (June 2007). Summaries of the results from the tip moth impact and hazard-rating projects 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 2006.

Pine Tip Moth Impact

From 2001 to 2005, 48 study plots, in 32 plantations, were established in Texas, Louisiana and Arkansas. Treatments were continued on 6 second-year sites established in 2005. Twenty-nine additional (first-year) study plots were established on 21 more sites in 2006. 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 35 plots established in 2005 and 2006, pesticides were applied by backpack sprayer to all trees within the plot (treatment area). Application dates were based on the optimal spray periods predicted by Fettig et al, 2003. Plots established in 2001 - 2004 were not protected in 2006. 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 2006. At this time, data also were collected on tree height and diameter.

Continued on Page 2

Pine Tip Moth Impact (continued from Page 1)

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 tip moth generations; Arkansas, Lousiana and Texas sites, 2001 - 2006.

Treatment	Planted 2001 (N =16)		Planted 2002 (N = 7)		Planted 2003 (N= 10)		Planted 2004 (N= 7) (N= 6)		Planted 2005 (N= 6)		Planted 2006 (N= 29)		Mean Year 1 (N= 75)	Mean Year 2 (N= 45)
	Yr 1	Yr 2	Yr 1	Yr 2	Yr 1	Yr 2	Yr 1	Yr 2	Yr 1	Yr 2	Yr 1	Yr 2		
Mimic®	1.8	3.8	1.5	3.8	1.2	1.2	1.4	1.8	3.0	7.2	5.0		3.0	3.4
Check	23.0	21.9	7.5	15.5	12.2	12.0	10.3	15.6	13.2	15.7	14.0		14.7	16.7
% Reduction	92	83	80	75	90	90	87	88	78	54	65		80	80

Tip moth infestation levels increased a little in 2006. They were somewhat higher overall (14% of shoots) on first-year check trees in 2005 compared to first-year check trees in 2004 (13%) (Table 1). Tip moth damage was the same (16% of shoots) on two-year old check plots in 2006 compared to 2nd-year sites in 2004 (16%). The Mimic® treatments provided good protection against tip moth on most first and second-year sites in 2006, but poor protection on two groups of sites. Thus, spray applications reduced overall infestation levels by only 65% and 54%, respectively. Overall, Mimic spray applications have reduced tip moth damage on protected trees by 80% during both the first and second growing seasons.

The good protection provide by Mimic sprays have resulted in significantly greater tree growth compared to the neighboring untreated trees on the majority (10) of 15 sites planted in 2001 or 2002 and monitored for at least five years (Table 2). The mean difference in growth between protected and unprotected trees continues to expand even when protection was discontinued at the end of the second year. Overall, the exclusion of tip moth damage on treated trees for the first two years improved tree height, diameter and volume index by 6%, 7% and 22%, 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, 3 of 5 sites had significant gains in tree growth on Mimic® plots compared to untreated trees. Overall, tree height, diameter and volume growth have been improved through the third year by 10%, 19% and 26%, respectively, compared to untreated trees.

Tip moth damage levels tended to be higher on unprotected trees planted in 2005 compared to previous years. Although protection with Mimic® was not quite as good as we had seen in the past, 4 of 6 sites still had significantly greater volume growth on protected trees after the second growing season.

Tip moth damage levels tended to be slightly higher on unprotected trees in 2006 compared to the previous year. Protection with Mimic® was good on some sites but, unfortunately, not on others. This resulted in only 12 of 27 sites having significantly greater volume growth on protected trees. The study is being continued in 2007.

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). One hundred and thirty-eight (138) Western Gulf sites have been used to collect site characteristic data that included:

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.

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Pine Tip Moth Impact (continued from Page 2)

Table 2: Mean tree height, diameter and volume index and percent growth gain and actual difference in growth of one-, two-, three- and five-year old loblolly pine following treatment with Mimic® after each generation in Years 1 and 2; 15 sites in Arkansas, Lousiana and Texas.

Treatment	Year 1	Year 2	Year 3	Year 5	
		Height (cm)		(cm)	(ft)
Mimic® spayed (protected)	60.4	158	308	593	19.4
Check (unprotected)	50.5	140	275	557	18.3
Actual Diff. In Growth (cm)	10	18	33	36	1.2
Pct. Gain Compared to Check	**20**	**13**	**12**	**6**	**6**
		Diameter (cm)			
	at 6"	at 6"	at DBH	DBH (cm)	DBH (in)
Mimic® spayed (protected)	1.27	3.62	4.10	8.95	3.53
Check (unprotected)	1.18	3.16	3.55	8.34	3.29
Actual Diff. In Growth (cm)	0.10	0.46	0.55	0.61	0.24
Pct. Gain Compared to Check	**8**	**15**	**16**	**7**	**7**
		Volume Index (cm^3)		(cm^3)	(ft^3)
Mimic® spayed (protected)	168	3103	7188	54937	1.94
Check (unprotected)	126	2220	5152	45091	1.59
Actual Diff. In Growth (cm)	42	883	2036	9846	0.35
Pct. Gain Compared to Check	**34**	**40**	**40**	**22**	**22**

Volume Index = Height X Diameter^2

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.

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).

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 138 plots established from 2001 through 2006. Mr. Andy Burrow, now with Potlatch, has used the data set to develop a model that indicates that depth to B horizon, texture of B horizon and soil drainage class are the most important abiotic factors influencing tip moth occurrence and severity. In the Western Gulf Region, sites having deep B horizons (greater than 60 inches) and excessively or somewhat poorly drained soils are at high risk for tip moth damage (Fig. 1).

Figure 2 shows the relationship between hazard-ranking classification and mean actual damage (percent shoots infested) during the first two years after planting on 39 sites. The models accurately predicted damage levels 67% (26 of 39) of the time and 33% (13 of 39) the predictions were within one level of the actual.

The model needs to be validated. Additional plots have/will be established in 2007 and 2008.

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Pine Tip Moth Hazard-Rating (continued from Page 3)

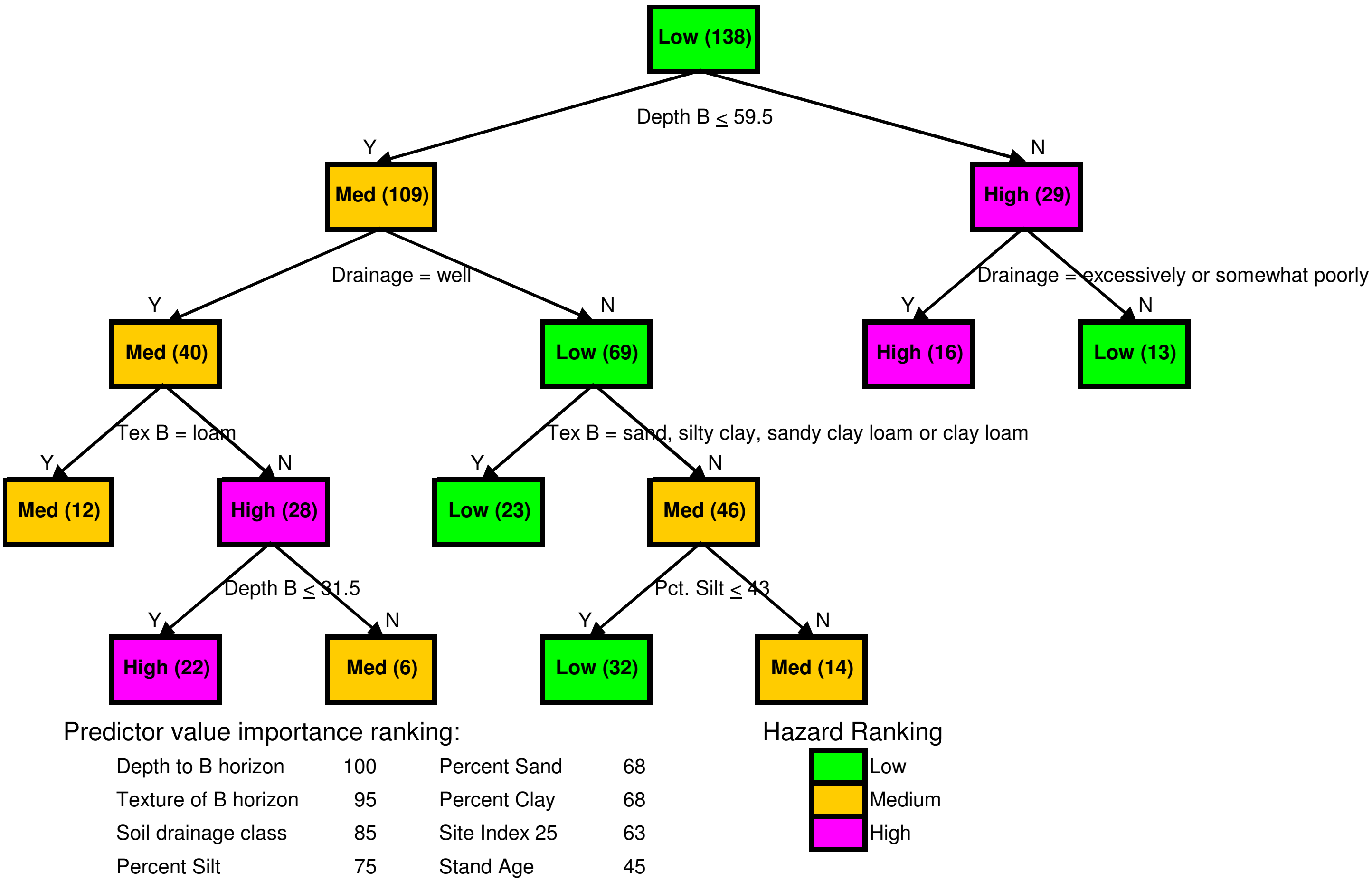

Figure 1. Tip moth hazard-rating classification tree for 138 Western Gulf Region sites.

Hazard-Rating Classification

Actual Damage Class (mean % shoots infested)	Low	Med	High
21+	% Shoots 0.0 # of sites = 0	% Shoots 24.0 # of sites = 3	% Shoots 32.0 # of sites = 6
11-20	% Shoots 15.0 # of sites = 4	% Shoots 14.7 # of sites = 10	% Shoots 15.0 # of sites = 2
0 - 10	% Shoots 5.7 # of sites = 10	% Shoots 7.2 # of sites = 4	% Shoots 0.0 # of sites = 0

Figure 2. Predicted hazard-rating versus actual tip moth damage (first 2 years) for 39 Western Gulf Region sites.

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Wounds and Wood Decay of Trees

By John Hartman, Ph.D., Extension Plant Pathologist, University of Kentucky
Source: Kentucky Pest News No. 1138, University of Kentucky College of Agriculture, July 30, 2007
via. Plant and Pest Advisory, Aug. 9, 2007

Windstorms, snow loads, and layers of ice can occasionally result in many broken tree limbs and downed trees in the landscape. Much of the fallen wood comes down because the interior of the branch or tree was decayed, but branches with no decay also break and fall. Wood decay in trees almost always begins with an injury to the tree.

Wounds of many types can occur on landscape trees. Weather-related broken branches are significant, but bark injuries, pruning stubs, "too flush" pruning cuts, and cut or damaged roots are also associated with decay problems. One of the most frequent causes of damage to trees in the landscape comes from lawn equipment. Mowers and string trimmers can damage the bark, and if continued, will result in visible wounds at the base of the trunk. Besides restricting the movement of water and nutrients, these wounds become points of entry for insects and wood decay microorganisms.

When an injury or break in the bark exposes the underlying wood, bacteria and fungi in the air, in nearby soil, and on the bark contaminate the wound surface. At the same time, the tree responds to the wound by producing chemical and physical barriers in an attempt to block the invasion of microorganisms and to seal off the damaged area. Organisms which are able to overcome these protective barriers can then colonize and invade the wounded tissues. Among these organisms are the wood decay fungi.

Not all wounds result in extensive decay since trees are frequently able to successfully "compartmentalize" or "wall-off" the decayed area. In many cases, the formation of internal barriers to fungal movement and infection can prevent the decay fungi from spreading. The ability of a tree to internally compartmentalize decay differs from one individual tree to another, although it is also influenced to some extent by tree vigor. Wound-wood provides an external barrier to decay once the wound has completely closed over. The formation of wound-wood may be an indicator of relative tree vigor but it is not necessarily indicative of the tree's resistance to the internal spread of decay. Extensive internal decay may exist behind a well-sealed wound.

The severity of the wound, the tree's vigor and the tree's inherent ability to compartmentalize are important factors in determining the rate the tree is able to seal off the wounded area. Other factors such as time of the year, type of organisms present, and position of the wound also play a role. A healthy tree will normally respond more quickly than one that is stressed. Small wounds may take a growing season to close, while larger wounds may require several growing seasons to close.

The presence of mushrooms at the base of the tree, or conks (bracket or shelf-like fungal structures) on the trunk or branches are the most certain indicators of decay. The absence of these obvious fungal structures (also referred to as "fruiting bodies"), however, does not mean the tree is free of decay; fruiting bodies of some decay organisms do not appear until decay is well advanced while others may go unnoticed because they are small, short-lived, hidden or produced infrequently. Other indicators of decay include old wounds, hollowed out areas, and abnormal swellings or bulges. Decayed wood is usually soft, white, spongy, stringy, and friable; or brown and brittle. Since decay structurally weakens the wood, affected trees become susceptible to wind or other storm damage.

Control. There are no controls or cures once wood decay has begun. Decaying trees should be removed when they become potentially hazardous.

Preventive measures.

• Protect trees and shrubs from injuries due to human activities: Choose a planting site that is away from potential causes of wounds (i.e., away from walkways, driveways, roads). Give the tree plenty of space for growth to maturity. Protect the tree from lawn equipment by controlling the grass and weed growth at the base of the tree. Hand weeding is good, but labor intensive; applying a layer of mulch around, but not against the trunk is most helpful. A plastic tree guard will also protect the trunk, but it should be removed when the trunk diameter approaches that of the tree guard.

• Use proper pruning techniques: Prune out injured and diseased branches as soon as they are found.

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Wounds & Wood Decay (Continued from page 5)

• Prune as close as possible to the connecting branch or trunk without cutting into the branch collar. Never leave pruning stubs because these will seldom close over. Do not top trees.
• Practice sanitation: Remove prunings from the tree and do not leave dead wood nearby.

Treat wounds properly and immediately. Treating recent incidental wounds:
• If immediately after the wounding event, the bark and cambium are still moist, carefully press the bark back onto the trunk, making sure the pieces are fitted into their original positions on the tree. If possible, cover the wound with plastic and shade it from the sun to keep it from drying. Secure the bark piece(s) in place using soft cloth strips tied around the tree.
• Carefully break away any dry, loose, injured bark. Using a sharp knife, cut back to healthy bark. Make a clean edge between the vigorous bark and exposed wood; even if the wound shape is irregular, avoid cutting into healthy bark.

Treating pruning wounds:
• Wound dressings are primarily cosmetic and do not stop decay. A product called Lac Balsam is used by some arborists and may stimulate callus formation. Otherwise, painting over wounds is generally not recommended (except for oaks in Central Texas to prevent oak wilt! In this case, any wound dressing or Latex paint applied immediately after pruning is recommended as an oak wilt prevention measure).

Treating old wounds:
• If callus (wound-wood) has begun to form, carefully remove the old bark until the wound-wood zone is found. Do not cut into the fresh growth or shape the wound.
• If wound-wood is absent, treat the wound as if it were a recent injury.

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A Little Humor Goes a Long Way

Stirring Up the Wasp Nest

(Source: Darwin Awards.com)

This is story about James, a very smart person, who works in a geology lab and who can tell you the petrogenetic peculiarities of low-alkali tholeiitic basalt after hydrothermal alteration. But our hero James recently demonstrated that there is a significant difference between intelligence and common sense.

While casting about for ways to rid himself of a pesky wasp nest, his eye fell upon his trusty Dirt Devil vacuum cleaner. Armed with this fearsome weapon, James attacked the wasp nest. He sucked up all the wasps, who buzzed angrily as they struggled in vain against the wind-tunnel. The dustbag was soon alive with their buzzing.

James now found that he had a new problem: to wit, a vacuum cleaner bag full of live, disgruntled wasps. He had to find a way to kill them before he could safely turn off the vacuum. And while his previous idea was merely ill-considered, his next was a masterpiece of moronity.

He held the vacuum tube in one hand, a can of RAID in the other, and proceeded to spray the insecticide into the vacuum. What our smart young scientist failed to remember is that aerosols are flammable, and vacuum cleaner motors generate heat. The resulting explosion removed his facial hair, and scattered the dusty, angry contents of the Dirt Devil all over the vicinity.

Adding insult to injury, James was not the only one to survive with minor injuries. The wasps proceeded to vent their spleen upon the exposed (and slightly scorched) skin of the scientist, who referred to the episode as "an unfortunate lapse in calculation of consequences."

Pest Spotlight:
Armored Scales (Homoptera: Diaspididae)

Scales are small, generally inconspicuous, immobile, insects with sucking mouthparts that attach firmly to the host (twigs, branches, leaves, buds, under bark scales, fruit, etc.) and do not move. There are two general groups of scale insects -- soft scales and armored scales. The armored scales secrete a protective, waxy, shield-like covering (or armor) over their body once the crawler stage has settled on the host and molted (losing its legs and mobility).

Description: The armored-scale insects are very small, usually microscopic, insects with sucking mouthparts. The first or crawler nymphal stage is oval and flattened, and has legs. All other stages, except the clear-winged minute males, are legless and immobile. The nymphal and adult female stages are soft bodied, varying from off-white or pale yellow to orange-red and red-purple, depending upon species. The eggs also vary from off whitish to purple in color and are oval in shape (like miniature footballs).

Life History: Eggs are laid under the waxy, protective, armor covering of the stationary female scale as she lives and feeds. As the eggs hatch, the crawlers (first instar), which have legs, spread to newer growth on the host plant. During the crawler stage, the scale is most susceptible to dispersal by wind or on the feet and body of birds, larger insects, small mammals, etc. Once the crawler has settled down, inserted its beak into the host tissues, molted its first skin, and started to produce the waxy armor typical of the species, it no longer moves (except for the winged adult males). The females never move. The winged males, where present, emerge, fly to and mate with the females, and die. In the northern states, there is typically only one generation per year. Further south there may be two to five generations per year.

Some Armored Scales Likely to Occur on Pine or Hardwood Trees.

- Oystershell Scale -- *Lepidosaphes ulmi* (L.) Cover: Female: oystershell-shaped, dark brown to grey banded - varies with host; male: similar, smaller. Hosts: Many, especially apple, lilac, beech, ash; also elm, maple, poplar, pear, cherry and willow.

- Hemlock scale -- *Abgrallaspis ithacae* (Ferris) Cover: Female: slightly convex, circular to oval, gray-black, with white margins. Hosts: Hemlock, occasionally spruce & fir. Petioles & undersides of needles.

- Obscure Scale – *Melanaspis obscura* (Comstock) Cover: female: typically gray, sometimes with a small black cap evident near the center of the cover. male: similar, smaller, but with legs. Hosts: Primarily oaks, chestnuts, pecan and other hickories, but also several other ornamental trees.

- Pine Needle Scale (Figure 2) -- *Chionaspis pinifoliae* (Fitch) Cover: Female: white, oystershell-shaped; male: elongate white, 3 ridges. Hosts: Pines, spruces, occasionally firs, hemlock, Douglas-fir.

Figure 2. Pine needle scale with a twice stabbed lady bird beetle, a natural predator.

- Black Pineleaf Scale -- *Nuculaspis californica* (Coleman) Cover: Female: oval convex, black, light grey margins, yellow central area; male: similar, smaller, more elongate. Hosts: Ponderosa, Jeffery, sugar and lodgepole pines, Douglas-fir.

- Forbes Scale -- *Quadraspidiotus forbesi* (Johnson) Cover: Female: circular to oval, flat to convex, gray, orange subcentral shed skins; male: smaller and more slender. Hosts: Hickory, apple, cherries, and dogwood.

- Putnam Scale -- *Diaspidiotus ancylus* (Putnam) Cover: Female: circular, convex, grey or black, yellow-red subcentral shed skins; male: similar, smaller, subterminal shed skins. Hosts: Elm, maple, basswood.

Control: Successful scale control involves correct identification of the species, and knowledge of its host range and life cycle.

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Armored Scales (Continued from page 7)

- **Strategy 1: Biological Control** The twice-stabbed lady beetle (Coccinelidae), a jet black beetle with two red spots, and several parasitic wasps seem to control the pine needle scale in forest stands. However, these biological control agents are often killed by the pesticides used for the control of other insect pests. Careful monitoring of predators and parasites as well as using pesticides with little effect on beneficials can allow biological control to be successful.

- **Strategy 2: Dormant Oil Sprays** - Since these scales overwinter as eggs, dormant oil seems to have little effect.

- **Strategy 3: Horticultural Summer Oil Sprays** - The 1% to 1.5% summer horticultural oil sprays are often effective against freshly-settled crawlers and young nymphs. Horticultural oil sprays in combination with insecticidal soaps or insecticides are even more effective.

- **Strategy 4: Crawler Sprays** - This is the time honored technique. Sprays will be needed in a series of two or three sprays at seven day intervals during mid-May and mid-July. (see Note below)

- **Strategy 5: Systemic Insecticides** - Systemic insecticides are very effective against young settled nymphs. Sprays should be applied after the crawlers have settled, in June and August. (see Note below)

Many insecticides are effective at low doses when properly timed at the crawler stage. Treating the larger nymphs and females that are protected by their waxy armor often is ineffective even when emulsifiable concentrate (EC) formulations (which penetrate waxy surfaces better) are used. Systemic insecticides that move in the right tissues can provide control of feeding stages from within (See Note below). Few insecticides have ovicidal activity and the armor-protected eggs are usually very difficult to kill. Although dormant oil treatments are effective against overwintering stages, treated plants should be periodically checked as spring growth commences to determine the effectiveness of the oil treatment and the need for follow-up treatments against the crawlers. Remember: The armored scale covering does not drop off the host. It will wear away over time or, in the case of pine needle scale on conifers, disappear when the older needles normally drop.

Note: Pyrethroids are highly detrimental to parasitoids/ predators of scales and will eliminate them from the area for many weeks. Thus, outbreaks of scales frequently occur when pyrethroids are used exclusively to control other insect pests (i.e., coneworms and seed bugs in pine seed orchards). Recently there have been reports of a promising new armored scale control option. Unlike imidacloprid (Merit®), the new neonicotinoid insecticide dinotefuran (Safari®) is showing promise as an effective control against armored scales. Although both dinoteferan and imidacloprid have systemic capabilities with the same general mode of action, dinotefuran is significantly more water-soluble. The high water solubility is thought to be the reason for the increased control of armored scales. Armored scales primarily feed by inserting their piercing-sucking mouthparts into parenchyma cells containing chlorophyll. Since imidacloprid predominately moves through plants by vascular tissues (phloem and xylem), it does not readily enter into cells where armored scales feed. Consequently, imidacloprid has not shown good efficacy against pests that feed within plant cells (typically less than 30-40% control). Recent efficacy trials have shown dramatically improved results against armored scales with soil injection or drench applications of dinotephuran insecticide. Although this material continues to be translocated by vascular tissues, it also appears to have the ability to permeate through cell walls and membranes. Some early efficacy trials have shown controls exceeding 80%. Additional efficacy trials are needed to substantiate these early results.

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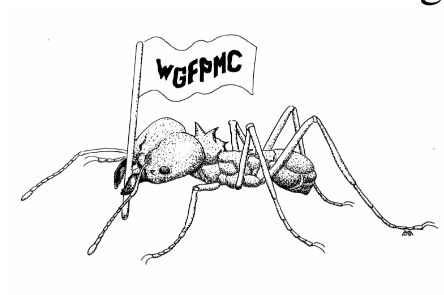
Announcements (continued from Page 1)

WGFPMC Contact Meeting - All WGFPMC executive and contact representatives, industry, and TFS foresters are invited to attend the 2007 WGFPMC Contact Meeting scheduled for December 5 & 6, 2007. See the agendabelow. The meeting will begin at 1:00 PM on Wednesday with field demonstrations and continue from 8:00 AM until ~3:00 PM on Thursday at the Ramada Inn (318/357-8281) in Natchitoches, LA. Lunch will be provided on Thursday. SAF and pesticide recertification credits are available for meeting participants. For additional meeting or hotel information, contact Don Grosman at 936/639-8170 or dgrosman@tfs.tamu.edu.

Western Gulf Forest Pest Management Cooperative
2007 Contact Meeting



December 5 - 6, 2007
Ramada Inn, Natchitoches, Louisiana

AGENDA

Wednesday, December 5th, 2007

1:00 PM Contact Meeting called to order in parking lot at Ramada Inn, introductions, opening comments

1:15 PM Travel to Weyerhaeuser tract near Many, LA for field demonstrations

2:00 PM Machine planter and hand applicator, tablet demo for tip moth control (Dr. Don Grosman and Jason Helvey, WGFPMC, Lane Day, inventor, Justin Penick, Acorn Outdoor Services)

3:30 PM Tree injection system demonstrations (Dr. Don Grosman and William Upton, WGFPMC)

4:30 PM Bait application demonstration for leaf-cutting ant control (Dr. Don Grosman and William Upton, WGFPMC)

5:00 PM Meeting adjourned for evening; Dinner on own.

Thursday, December 6th, 2007

8:00 AM Meeting called to order in University Room at Ramada Inn, opening comments

8:15 AM Loblolly decline (Dr. Roger Menard, USFS)

8:55 AM New and potential exotic pests of the South (Dr. Steve Clarke, USFS)

9:45 AM Southern pine bark beetle biology and control (Joe Pase, TFS)

10:30 PM Break

10:45 PM WGFPMC research update (Dr. Don Grosman, WGFPMC)

12:00 Noon Lunch provided

1:00 PM WGFPMC research update continued (Dr. Don Grosman, WGFPMC)

~3:00 PM Meeting adjourned