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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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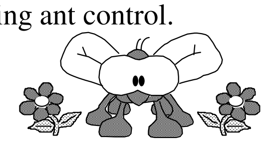
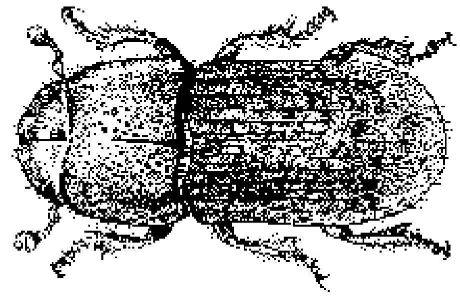
Announcement:

1999 WGFPMC Contact Meeting. Mark your calendars! All WGFPMC executive and contact representatives, industry, and TFS foresters are invited to attend the 1999 WGFPMC Contact Meeting scheduled for August 17, 1999. The meeting will be held at the Texas Forest Service Fire Control Training Room in Lufkin, TX and will begin at 9:00 AM. Drs. Wayne Berisford, U. of Georgia, and Charles Barr, TAMU Agric. Ext. Serv., have been invited to talk on tip moth research and fire ant control, respectively. Also, recent WGFPMC research will be discussed and applications of sulfluramid bait will be demonstrated for leaf-cutting ant control.



Western Gulf Forest Pest Management Cooperati



Southern Pine Beetle, *Dendroctonus frontalis* Zimmermann

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

Outlook for Southern Pine Beetle Activity in 1999

(by Ron Billings & Bill Upton, Texas Forest Service)

Results of the annual pheromone trapping survey to forecast trends for southern pine beetle (SPB) activity in 1999 indicate an unprecedented low level of SPB activity in the western Gulf states. The attached summary of the southwide trapping program provides trap catch data for 1998 and 1999 (Table 1).

Based on the early season pheromone survey, SPB activity in 1999 is expected to exhibit a moderate increase in Maryland, North Carolina, South Carolina, Alabama, and Tennessee. On the other hand, very low levels (none?) of SPB activity are expected in Texas, Louisiana, Arkansas, and Oklahoma. Out of 41 trapping locations in Texas, Louisiana, and Oklahoma, only two adult SPB were collected -- one from Texas and one from Louisiana. Only 26 adult SPB were collected in Arkansas. In both Texas and Louisiana, this is the lowest SPB trap catch recorded since trapping was first used to predict SPB infestation trends in 1986. In general, SPB infestations in the southern and southeastern states are expected to be static/low in the West and increasing/moderate in the East.

Each spring, traps baited with the SPB attractant, frontalin, and southern pine turpentine are set out in pine forests when dogwoods begin to bloom. The traps are monitored weekly for a 4-6 week period by federal and state cooperators. Dogwood blooms mark the primary dispersal season for populations of the destructive SPB as well as certain beneficial insects. 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 forecast.

This survey system, developed by the Texas Forest Service, has been in

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SPB Prediction (continued from page 1)

use across the South since 1986. 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.

Of the 164 specific counties, parishes, or ranger districts surveyed in 1998, predictions proved correct for both trend and level of SPB activity in 122 cases (75%). The correct trend (decline, static, increase) was predicted in 83% of the cases and the correct level (low, moderate, high, outbreak) in 79%. In relatively few cases (13%) were prediction errors made in both infestation trend and level for a given locality.

Results of the SPB survey, including trend predictions for 1999 for over 150 locations within thirteen southern states, are posted on the Internet at http://www.fs.fed.us/research/4501/. For additional information, contact Bill Upton or Dr. Ron Billings, Texas Forest Service at (409) 639-8170 or e-mail at tfs.pcs@inu.net.

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Table 1. Summary of Southwide Southern Pine Beetle Trend Predictions for 1999

State	No. of Infestations in 1998	No. of Locations Trapped	1998 % SPB	1998 SPB/trap/day	1998 Clerids trap/day	1999 % SPB	1999 SPB/trap/day	1999 Clerids trap/day	1999 Prediction Trend/Level	Most Likely Locations of SPB Activity
Oklahoma	0	1	28%	1.7	4.4	0%	0.0	4.0	Static/Low	-----------
Arkansas	50	8	14%	1.3	9.6	0.5%	0.04	4.6	Declining/Low	-----------
Texas	30	19	8%	2.5	21.8	0%	0.0	2.7	Declining/Low	-----------
Louisiana	248	21	23%	4.5	17.1	0%	0.0	2.2	Declining/Low	-----------
Mississippi	1,030	10	17%	6.8	39.5	21%	6.1	20.1	Declining/Low	Winston Co.
Alabama	5,300	6	37%	28.0	43.9	61%	71.8	27.0	Increasing/High	Tallapoosa, Lowndes Co., Talladega R. D., Oakmulgee R. D.
Georgia	189	21	34%	6.1	8.2	28%	4.8	7.1	Static/Low	Talluah R. D.
Tennessee	198	4	35%	1.0	1.9	65%	12.3	3.9	Increasing/Moderate	Rhea Co., Nolichucky R. D.
Virginia	54	4	23%	0.7	3.6	39%	4.1	3.8	Increasing/Low	New Castle R. D.
Florida	34	20	59%	7.2	4.1	38%	1.4	0.7	Static/Low	-----------
South Carolina	2,250	30	27%	1.5	7.0	37%	8.9	6.4	Increasing/Low-Moderate	Cherokee, Chester, Edgefield, Newberry, York Co., Long Cane R.D., Enoree R.D.
North Carolina	726	7	28%	2.0	11.3	60%	9.9	6.0	Increasing/Moderate	Cleveland, Davidson Co., Tusquittee R.D., Uwharrie R. D.
Maryland	0	3	30%	1.1	1.5	62%	9.1	4.7	Increasing/Moderate	Somerset Co.
Southern States	10,109	154	28%	5.0	13.4	32%	9.9	7.2	Increasing/Moderate (East) or Static/Low (West)	Alabama, North Carolina, South Carolina, Tennessee, Maryland

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Summary of 1998 WGFPMC Research Projects

In 1998, three primary research projects - the leaf-cutting ant control study, systemic injection study, and reproduction weevil impact study - were continued from 1997. A fourth project, an intensive forestry survey, was initiated in the fall of 1998. A summary of the results from the leaf-cutting ant and systemic injection studies, as well as from the Pounce® trials for reproduction weevils and leaf-cutting ants, was presented in the last PEST issue (March, 1999). Results from the reproduction weevil study and intensive forestry survey are presented herein.

Reproduction Weevil Impact Study

In 1996 and 1997, studies were conducted to determine the impact of pales weevil, *Hylobius pales* (Herbst), and pitch-eating weevil, *Pachylobius picivorus* (Germar), on first-year pine seedling survival and to identify factors which influence weevil populations in the Western Gulf region. Overall, weevil-caused pine seedling mortality in 1996 was quite low, presumably due to the severe drought, so few conclusions could be made. In 1997, reproduction weevils were found to have a significant impact on pine seedling survival. On 36 sites, mortality due to weevils alone averaged 9.5%. One-fourth of the plantations had over 20% mortality (range: 22 - 45%). By far the greatest weevil-caused damage occurred on sites harvested 3 - 5 months (November - January) prior to April 1 of the replanting year and those with little or no site preparation.

In 1998, 26 loblolly pine plantations treated with one of four site preparation intensity treatments (none - no site preparation; low - rake and/or windrow; medium - burn and/or shear; or high - shear and/or burn plus subsoil and/or bed) were selected in Texas and Arkansas. Most sites had been harvested between June and December of 1997 and were replanted in the winter or early spring of 1998. Ten monitoring plots, containing a total of 100 seedlings, were set up on all sites and were checked in May, July, and November to determine the percent seedling mortality attributable to weevil feeding and other factors. Data also were collected on 16 site parameters including: acres harvested, volume of pine removed, pine species composition, pine and hardwood basal area, site index, soil type, harvest date, site preparation method(s) and date applied, volume of slash left after harvest, seed source, seedling lifting, storage, and planting dates, stocking level, and acres thinned or harvested within one mile of the site.

In 1998, overall pine seedling mortality was 70%, with an average of 19% due to weevils, 36% due to drought, and 15% due to other factors (i.e., improper planting, disease, flood, animal or mechanical damage, or unknown). Distribution of mortality factors by site preparation intensity is shown in Figure 1.

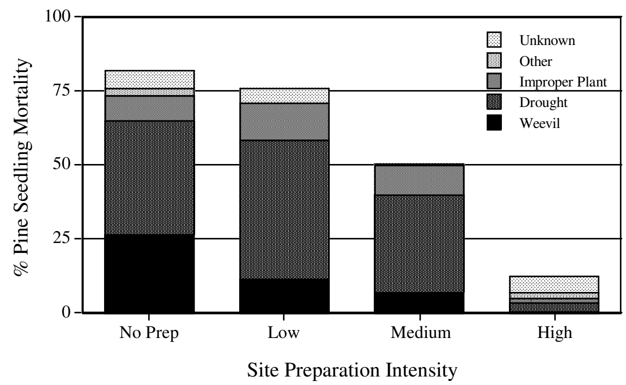

Figure 1. Causes and amount of first-year mortality of loblolly pine seedlings by site preparation intensity in 1998.

No site preparation sites had the highest mean percentage of total mortality (82%) and weevil-caused mortality (27%) compared to the other site preparation intensity categories.

Regression analysis was used to evaluate the relationship between site parameters and percentage of weevil-caused pine seedling mortality. As in 1997, harvest to April 1 interval (r^2 = 0.186) and site preparation intensity (r^2 = 0.218) were the most important factors. Figure 2 shows the regression curve for harvest to April 1 interval by weevil-caused pine seedling mortality with 1997 and 1998 data combined (62 sites).

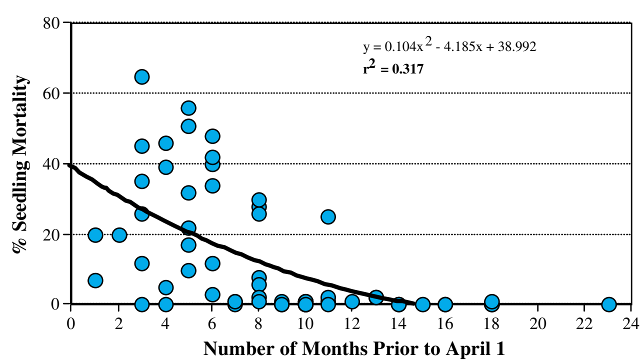

Figure 2. Relationship between harvest to April 1 interval and weevil-caused pine seedling mortality (1997 & 1998 data combined).

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The curve for site preparation intensity by weevil-caused mortality (1997 & 1998 data combined) is shown in Figure 3.

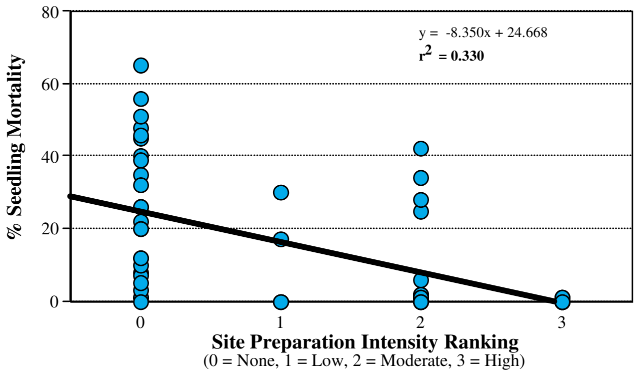

Figure 3. Relationship between site preparation intensity and weevil-caused pine seedling mortality (1997 & 1998 data combined).

Conclusions

As in 1997, reproduction weevils were found to have a significant impact on pine seedling survival in 1998. Mortality due to weevils alone was over 20% (range: 22 - 65%) in nearly one-third of the plantations monitored in 1998. Again, as in 1997, the greatest weevil-caused damage occurred on sites harvested 3 - 5 months (November - January) prior to April 1 of the replanting year and on those that had little or no site preparation.

Based on the regression curves for harvest to April 1 interval (Fig. 2) and site preparation intensity (Fig. 3), graphs illustrating potential risk of weevil damage were developed (Fig. 4 & 5). Moderate to high seedling mortality (10 - 65%) due to weevils alone can be expected on sites harvested November through January (Fig. 4). Low to moderate mortality (0 - 35%) can be expected on sites harvested between August and October of the previous year and February or March of the replanting year. Sites harvested between April and July of the previous year are

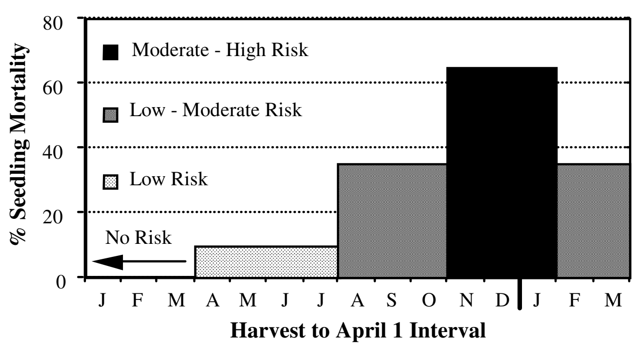

Figure 4. Risk of weevil-caused pine seedling mortality based on harvest to April 1 interval (1997 & 1998 data combined).

at low risk (0 - 10%) to weevil damage. No damage is expected on sites harvested prior to April of the previous year. However, caution needs to be taken when assessing the risk on sites harvested in February and March of the replanting year as only three sites were monitored in 1997 and 1998. The risk may actually be quite high as indicated by a previous study (Cade et al. 1981).

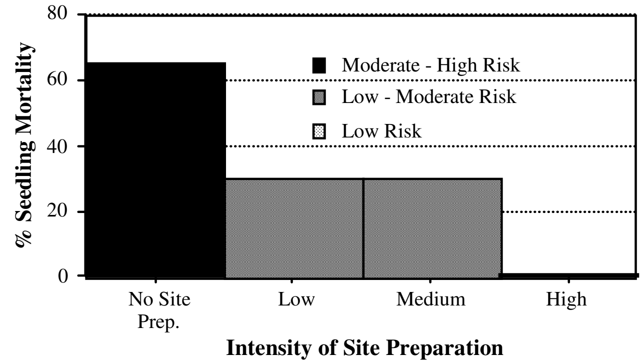

Figure 5. Risk of weevil-caused pine seedling mortality based on site preparation intensity (1997 & 1998 data combined).

Moderate to high weevil-caused mortality also can be expected on sites having no site preparation (Fig. 5). Low to moderate mortality can be expected on sites prepared by raking and/or windrowing (low intensity) or shearing and/or burning (moderate intensity) methods. Very little, if any, mortality can be expected when sites are prepared with high intensity methods (shear and/or burn plus subsoil and/or bedding)

As mentioned in the last PEST newsletter (Mar. 1999), Pounce®, applied to seedlings prior to lifting from the nursery, can significantly reduce first-year seedling losses caused by pine reproduction weevils. In particular, Pounce®-treated seedlings should be considered on Western Gulf plantation sites when the tracts have been harvested late (November - January) and received little or no site preparation. Call your local pine seedling nursery about the availability of Pounce®-treated seedlings.

Intensive Forestry Survey

It is now common knowledge that tree growth and yield can be increased and rotations shorted through the use of more intensive site preparation methods and applications of herbicides and fertilizers. However the question has arisen - Do these more intensive silvicultural practices influence the occurrence and impact of insects and diseases in

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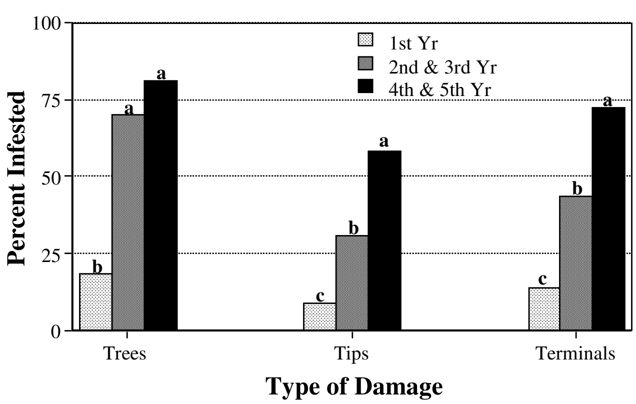
Research Projects (Continued from Page 3)

treated plantations? A survey was initiated in the fall of 1998 to answer this question.

Thirty-four sites (13 research, 10 progeny tests, and 11 plantations) containing 1 - 5 and 16 year old loblolly pine in East Texas and Arkansas were surveyed in the fall of 1998. Research and progeny test sites contained 2 - 9 plots. Thirty-five to 50 trees were randomly selected within each treated area. Each tree was evaluated for occurrence and ranked on the extent of any biotic or abiotic-caused damage and form (presence or absence of forks). Each site was ranked based on the intensity of site preparation, weed control, fertilization, and other practices applied by mid-summer 1998.

Nantucket pine tip moth, *Rhyacionia frustrana*, was, by far, the most common biotic factor damaging loblolly pine grown on the sites visited during the fall of 1998. Of the 70 plots/sites visited containing pine 5 years old and younger, 94% had some level of tip moth infestation. Surveyed plots in southern Arkansas (all in the first growing season) were the hardest hit with 95% of the trees infested, 79.4% of all evaluated tips infested, and 85.6% of all terminals infested (Table 2). Comparable one-year old plots in Texas were impacted significantly less (18.6% of trees, 9.1% of tips, and 14.0% of terminals). However, the levels of infestation in Texas increased significantly as stand age increased, particularly for percent tips infested and terminals infested (Fig. 6).



Bars, within each damage type, with the same letters are not significantly different at the 5% level based on Fisher's Protected LSD.

Figure 6. Nantucket pine tip moth damage levels on three age groups of loblolly pine in East Texas in fall 1998.

Only two other biotic factors (pine webworm and fusiform rust) were observed at levels that warrant mentioning. Webworm was most prevalent (23.6%) on one-year old seedlings in Texas sites (Table 2). On rare occasions they completely defoliated seedlings, but, for the most part, damage was slight.

The incidence of fusiform rust varied markedly with age (Table 2). Fusiform rust was most common in 2 year old plots/stands, occurring most frequently as a single branch gall. However, in older stands (5 year old), stem galls were most common.

Data analysis indicates that there is a significant relationship between silvicultural intensity and infestation levels of Nantucket pine tip moth, but only in one year old plots/plantations (Fig. 7). The primary influence during the first year in Texas appears to be the intensity of site preparation. However, both site preparation and

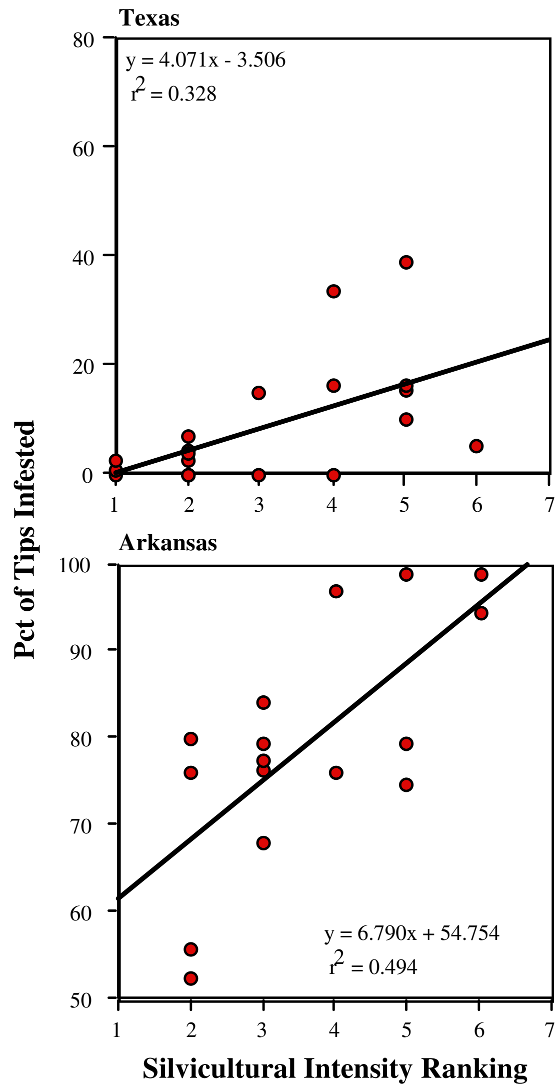


Figure 7. Relationship between silvicultural intensity and level of Nantucket pine tip moth damage on one year old loblolly pine in Texas and Arkansas in fall 1998 (see Table 2 for definitions of rankings).

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Table 2 - Occurrence and impact of biotic (insects and diseases) and abiotic (other) factors in 70 loblolly pine plot/sites in Arkansas and Texas in fall 1998.

	State and Age						
	Arkansas	Texas					
	Yr 1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 15-17
Sites/Plots Surveyed	4/16	6/19	4/12	3/6	9/11	3/6	5/5
Average Ranking of Silvi. Intensity [a]	3.63	3.11	6.83	5.17	3.36	3.50	5.20
Insects:							
Tip moth-caused:							
trees infested	95.0%	18.6%	76.3%	57.8%	81.6%	80.8%	
tips infested	79.4%	9.1%	34.7%	23.2%	56.6%	64.1%	
terminals infested	85.6%	14.0%	49.7%	32.4%	69.2%	82.1%	
Weevils-caused:							
damage	2.5%	3.7%					
mortality	0.8%	1.6%					
Cerambycid:				1.2%	7.0%	4.5%	
Pine coneworm:				0.3%		0.8%	
Pine webworm:	1.5%	23.6%	2.3%	1.2%	0.3%	2.3%	
Pitch twig moth:	0.1%			1.3%	5.2%	2.0%	
Bark beetles:							0.4%
Diseases:							
Fusiform rust:							
trees infested			28.3%	0.5%	1.3%	15.2%	12.1%
Average ranking [b]			0.84	0.33	0.67	3.16	3.23
Pitch canker:			0.3%				
Needlecast:			0.2%				
Other:							
Trunk Resinosis:		0.1%	5.3%	33.5%	4.2%	1.5%	
Necrotic:	1.5%	6.3%	5.8%		2.4%		
Drought-caused							
tip dieback:	4.0%	8.0%		4.9%	0.5%		
mortality:	5.3%	19.2%				0.8%	
Herbicide Damage:		10.2%	0.3%	52.5%	8.8%	6.6%	
Storm:				27.0%	0.3%	6.8%	
Improper plant:	1.1%	3.5%					
Vine:						2.3%	5.4%
Rodent:			0.3%				
Unknown mortality:	2.0%	5.8%					
Overall Mortality:	8.0%	28.3%				0.8%	0.4%
Form (Avg Rank [c])	1.61	1.22	1.29	1.78	1.66	1.60	1.12
Height (average)	1.81	1.33	4.13	11.52	9.93	18.10	51.00

[a] Silvicultural Intensity Ranking: each site was ranked based on intensity of site preparation + weed control + fertilization + other practices applied by mid-summer 1998.

Site Preparation	Weed Control	Fertilization	Other Practices
0 - None	0 - None	0 -None	1 - pest control as needed
1 - chop, burn, or shear	1 - 1 appl. (herb or woody)	1 - 1 appl. of DAP, KCl, urea or micro	1 - pruning
2 - chemical, bed, rip, or tillage	2 - 1 appl ea. of herb & woody	2 - 1 appl. of any two forms	2 - irrigation
3 - any 2 of chem., bed, rip, or tillage	3 - 1 appll/yr of herb. & woody	3 - 1 appl/yr of any one form	2 - thinning
4 - 3-N-1 plow	4 - mult appl/yr of herb & woody	4 - mult appl/yr of two or more forms	

[b] Fusiform Rust Ranking: 1 = no galls; 2 = one branch gall; 3 = two or more branch galls; 4 = one or more stem galls

[c] Tree Form Ranking: 1 = no forks; 2 = one fork; 3 = two to four forks; 4 = five or more forks

Research Projects (Continued from Page 5)

weed control significantly influenced the extent of tip moth damage on trees in Arkansas. These two silvicultural practices also influenced the occurrence of pine webworm in Texas.

An additional survey of these plus additional sites (total of 138 sites/plots) was recently completed this spring and another will be performed this fall. Observations made this spring indicate that tip moth populations have generally declined, but moderate damage was found in some areas of southern Arkansas and southeast Texas. Two other pests frequently found this spring, but absent last fall, were southern pine coneworm and pine aphids. Coneworm larvae were often observed boring into shoots (particularly terminals) and less frequently in the main stem.

Data analysis to determine the influence of different levels of stand management on the occurrence and impact of these and other observed pests is on-going.

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Thought You Might Be Interested to Know . . .

Pesticide Announcements

(from Chemically Speaking; April and May 1999)

EPA has published a list of registrants' requests to change certain pesticide uses. Users who desire continued use of these registrations need to contact the applicable registrant immediately. Registrants of these materials have requested the following uses be deleted or added to the label:

- Finale VM Herbicide (glufosinate-ammonium), AgrEvo, deleting applications in rights-of-way, industrial sites, and ornamental and <u>Christmas tree plantings</u>. (Federal Register; March 10, 1999)
- Use on <u>forest sites</u> has been added to Dow AgroScience's Transline (clopyralid) herbicide.
- FMC's Astro (permethrin) can now be used on poinsettia, azalea, <u>pines</u>, and freesia;
- FMC has announced a 30 percent price reduction for their Capture (bifenthrin) insecticide. The product is registered for use in pine seed orchards against coneworms and seedbugs.
- Uniroyal has added management of Botrytis, rust, and Fusarium, and changed the interval between applications from 3-4 weeks to 2-3 weeks on their Terraguard 50W (triflumizole) label. (Agricultural Chemical News; April 1999)
- Guthion's (azinphos-methyl) registrant, Bayer Corporation, has invested $2.5 million in additional residue and environmental studies to satisfy EPA's latest requests associated with FQPA regulations. These new expenses are forcing the price of Guthion to be increased by 10 percent this year. The company is taking this approach to FQPA in order to help insure the product will be available for purchase in upcoming growing seasons. (The Grower; April 1999)

Major Technology Venture Announced

(from The Forestry Source, May 1999)

Four major corporations have joined forces to improve their abilities to produce and market tree seedlings. New Zealand’s Fletcher Challenge Forests, International Paper, Monsanto Company, and Westvaco Corporation will form a forestry technology joint venture to produce and market tree seedlings worldwide. The four companies will contribute $60 million in total over five years to the joint venture.

The four sponsoring entities believe that as international demand for wood fiber increases, significant business opportunities will result from additional breakthroughs in forestry science. Each company possesses significant biotechnology capabilities and will share its individual strengths as an equal partner. The joint venture also plans to actively seek technological advances from independent laboratories, universities, and other companies to position itself to market new advances in forestry biotechnology to the world’s tree growers.

The companies have already announced their intent to contract with Genesis Research and Development Corporation Limited, an Auckland, New Zealand, biotechnology research company that will provide genomics research. The joint venture also will acquire forestry intellectual property from Genesis.

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Venture Announced (Continued from Page 7)

The joint venture will focus on tree species that represent a majority of the seedlings now planted by the forest products industry around the world. It will initially direct its efforts toward various eucalyptus and poplar species, Radiata pine, loblolly pine, and sweetgum. Targeted genetic improvements include: 1) herbicide-tolerant planting stock to enable more cost-effective control of competing vegetation; 2) higher growth rates to allow more wood to be grown on less land at lower cost; and 3) improved fiber quality and uniformity to increase efficacy in paper and wood products manufacturing processes.

New Attractant and Repellent to Target Pest Ants

(from The Label, June 1999; USDA news release, May 19, 1999)

A new attractant and repellent means double trouble for pest ants, including fire ants that infest southern states and are now showing up in California. Many commercially available baits have oil or sugar-based formulas that attract either oil-loving or sugar-loving ants--but not both. The new patent-pending attractant, developed by USDA Agricultural Research Service researchers, is attractive to multiple ant species. It can be used in combination with water-soluble toxicants to create a bait. This attractant degrades easily and has little environmental impact.

ARS entomologists (David F. Williams and David H. Oi, USDA ARS, University of Florida, Gainesville, FL) conducted studies showing that the bait attracted imported fire ants, Argentine ants, Pharaoh ants, little black ants, carpenter ants, ghost ants, big-headed ants, little fire ants, acrobat ants and crazy ants. Many of these pest ants are problems both indoors and outdoors, and cause either agricultural, structural or other damage.

ARS scientists are also using this attractant for routine monitoring of pest ants with Department of Defense and Integrated Pest Management researchers. The ant repellent, developed by ARS scientists, is a much-needed alternative to insecticides. Many regulations limit or ban insecticides for controlling insects, especially in populated areas. This repellent relies on chemical scents repugnant to ants, discouraging them from entering certain areas or forcing them to leave. It also reduces reliance on insecticides.

The patent-pending repellent should be useful against the red imported fire ant and several other pest ants in the United States. In addition, the repellent could potentially be effective against pest ants in other parts of the world such as leaf-cutting ant species that can defoliate an entire citrus tree overnight, which are problematic in central South America.

Can You Get Better Control from Your Pesticides?

(from Texas AgriNEWS, May 3, 1999)

Have you ever been disappointed with the results of a pesticide spray? There may be any number of reasons for what is perceived as a lack of control by a pesticide, but one that may be overlooked is high pH of the spray water. When the pH exceeds 7.0, the water is considered to be alkaline, or to have a high pH. Certain pesticides will undergo alkaline hydrolysis or chemical breakdown., and the higher the pH, the faster the rate of alkaline hydrolysis will occur.

Hydrolysis occurs when a compound is split by water in the presence of ions. Alkaline water has a greater concentration of hydroxide ions than water that that has a neutral pH (pH = 7.0). Thus, alkaline hydrolysis increase as the pH of the spray water increases. Much of the water in Texas has pH levels at or above 8.0.

Several pesticide products known to be adversely affected by alkaline spray solutions include: Benlate®, Captan®, Carzol®, Dimethoate®, Ethrel®, Imidan®, Kelthane®, and Mitac®. The half-life of Captan® at a pH of 8.0 is 10 minutes, and the half-life of Benlate® at a pH of 7.0 is one hour. If the spray water has higher pH levels than these, the half-life are even shorter. Products such these, that are seriously affected by alkaline hydrolysis, should be buffered or at the very least, sprayed immediately upon mixing if a buffering agent is not used.

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Better Control from Your Pesticides (Continued from Page 8)

The following are some guidelines to prevent or reduce problems with alkaline hydrolysis:

1. Determine the pH of the spray water. Check it more than once per spray season, since the pH of water from wells varies over time and rain fall events. You also should run pH tests on your most commonly used spray solutions after the pesticides have been mixed in the tank, as the chemicals added to the tank can change the pH of the spray solution.
2. Determine the optimum pH for the pesticide(s) being applied, and adjust the spray solution accordingly.
3. In general, consider using buffering agents to adjust the pH of spray solutions that exceed 8.0, or when mixing pesticides that are highly sensitive to alkaline hydrolysis. Add a buffering agent if you unexpectedly experience a long delay in spraying a tank load might be affected by high pH. Chemical products whose labels caution against mixing with alkaline materials would benefit from adjusting the pH to 6.0 or lower. However sprays containing fixed coppers, lime, or lime sulfur should not be acidified because of phytotoxicity at low pH levels.
4. Spray a tank of finished spray solution with as little delay as possible.

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More Announcements

Name Change: The Texas Forest Service Forest Pest Control Section, established in 1962, has officially changed its name to Forest Pest Management.

New WGFPMC Contact Reps:

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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)
- Scientists estimate that there are 30,000 times as many beneficial organisms on the earth as there are harmful ones.
- Imported fire ants were accidentally introduced into the United States in 1918 in Mobile, Ala., from South America. Today, some 300 million acres in the United States are infested with fire ants. The ants cause hundreds of millions of dollars in damage in the United States every year. Costs come from fumigating homes, crop damage, or via harm to the tourism industry. (from Reuters, Jan. 29, 1998 via Progressive Farmer, Feb. 2, 1998).