Termiticide Report 2005

Termiticide testing in full swing; USDA–FS's Mississippi site hit hard by Hurricane Katrina.

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The USDA-FS wrote and administered 44 termiticide testing agreements with industry; Hurricane Katrina hit hard the oldest U.S. Forest Service test site; and the Termiticide Standards Committee of the Association of Structural Pest Control Regulatory Officials proposed a revision of the EPA's Product Performance Test Guideline, OPPTS 810.3600.

Five termiticides were evaluated in the laboratory, and 26 termiticides and five impregnated barriers were evaluated in the field. Four new termiticides were installed at sites in Florida (February), Arizona (April), Mississippi (June) and South Carolina (September).

One termiticide was installed at three sites (Arizona, Florida and Mississippi) and another at two sites (Arizona and Florida). These partial installations allowed registrants to get products in the ground early without having to wait for the next installation cycle beginning in February. Two additional generic termiticides were installed in Starkville, Miss., to satisfy Florida registration requirements. Overall, the USDA–FS wrote and administered 44 agreements with industry as part of its ongoing testing program.

The USDA–FS wrote and administered 44 termiticide testing agreements with the industry in 2005.

HIT BY HURRICANE

Hurricane Katrina slammed into the Mississippi gulf coast in August 2005, causing severe damage throughout the region. The Harrison Experimental Forest did not escape damage despite its location 20 miles inland. The forest contains the oldest Forest Service test site, dating back to the late 1930s. The storm damaged an estimated 30 to 70 percent of the trees depending on location, and damage was scattered throughout the test site. Some individual test plots were destroyed by fallen and uprooted trees (see photographs on page 61). A full inventory of losses and general clean-up of the site are scheduled for late winter/early spring.

The hope is that storm-related losses were spread more or less evenly over all tests and the newer tests involving unregistered candidate termiticides were spared the greatest

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Termiticide Efficacy Standards Debate Continues

The standards used to evaluate termiticide performance have been a topic of considerable discussion in recent years. Because this topic has a direct impact on the registration of new compounds, the 2003 Termiticide Report provided an overview of the debate in *Pest Control*'s February 2004 issue.

The debate continued during 2005 when the Termiticide Standards Committee

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Table 1 **Number of years that termiticides remained effective in concrete slab (CS) and ground board (GB) tests at four field sites applying the EPA guideline and Florida efficacy rule†. Fractions of years occurred when products were installed out of cycle. Control = percentage of all control plots attacked over the life of the study.**

		Arizona		Florida		Mississippi		South Carolina		FL SE
% A.I.	Test	EPA	FL	EPA	FL	EPA	FL	EPA	FL	States
Bifenthrin – Biflex TC (est. 1986)										
0.031	CS	0	9	4	11	2	5	2	4	4
0.062††	CS	16	16	19	19	7	7	10	16	10
0.125††	CS	10	15	9	19	2	7	19	19	9
0.25	CS	19	19	19	19	16	17	19	19	19
0.5	CS	6	19	19	19	18	19	19	19	19
0.031	GB	6	7	4	5	2	2	3	4	4
0.5	GB	10	11	14	19	12	15	8	11	14
Control	CS	53%		77%		58%		64%		-
Control	GB	66%		86%		79%		89%		-
Cypermethrin (est. 1982 – 2004)										
0.125	CS	1	4	0.5	1.5	1	3	2	2	2
0.25††	CS	4	4	10.5	12.5	3	5	4	4	4
0.5††	CS	4	5	4.5	9.5	7	14	12	12	11.5
1.0	CS	8	10	7.5	21.5	6	15	12	16	15
1.0	GB	3	6	4.5	4.5	5	5	5	6	5
Control	CS	63%		67%		56%		65%		-
Control	GB	75%		76%		87%		90%		-
Permethrin – Dragnet (est. 1978 – 2004)										
0.25	CS	8	10	2	2	1	2	0.5	0.5	1
0.5††	CS	13	19	4	4	5	6	4.5	4.5	4.5
1.0††	CS	15	15	15	25	5	8	10.5	11.5	10.5
1.0††	GB	9	11	6	6	2	3	0.5	3.5	3
Control	CS	50%		55%		60%		53%		-
Control	GB	43%		78%		86%		84%		-
Permethrin – Torpedo (est. 1980 – 2004. Controls same as cypermethrin)										
0.25	CS	9	9	3	7	2	2	0.5	0.5	1.5
0.5††	CS	11	13	6	9	3	5	1.5	4.5	5
1.0††	CS	19	24	24	24	3	7	6.5	7.5	7
0.5††	GB	4	4	4	4	1	1	1.5	1.5	1.5
1.0††	GB	8	9	5	5	2	2	1.5	1.5	1.5

† EPA: years with no soil penetration through treated soil in any plot.
FL: years with no damage worse than ASTM 9 to test blocks in 90 percent or more of the plots per site.
FL SE States: years with no damage worse than ASTM 9 to test blocks in 90 percent or more of the plots for all southeastern sites.

†† Registered rates.

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Table 2 Number of years that termiticides remained effective in concrete slab (CS) and ground board (GB) tests at four field sites applying the EPA guideline and Florida efficacy rule†. Fractions of years occurred when products were installed out of cycle. Control = percentage of all control plots attacked over the life of the study.

		Arizona		Florida		Mississippi		South Carolina		FL SE
% A.I.	Test	EPA	FL	EPA	FL	EPA	FL	EPA	FL	States
Imidacloprid – Premise 75 WSP (est. 1992)										
0.025	CS	13	13	13	13	1	1	3	4	2
0.05††	CS	13	13	6	12	2	2	10	10	6
0.1††	CS	13	13	13	13	2	4	5	13	8
0.15	CS	13	13	13	13	3	4	5	13	5
0.2	CS	13	13	13	13	2	5	5	5	5
0.25	CS	13	13	12	13	2	2	8	9	8
0.3	CS	13	13	13	13	5	5	5	11	13
0.4	CS	13	13	12	13	5	9	5	13	13
0.1††	GB	3	7	2	2	1	1	2	2	2
0.2	GB	8	13	2	2	2	2	2	2	2
0.3	GB	5	6	2	2	2	2	1	2	2
0.4	GB	5	7	2	3	2	2	4	5	2
Control	CS	33%		78%		79%		41%		-
Control	GB	40%		96%		98%		75%		-
Fipronil – Termidor 80 WG (est. 1994)										
0.0625††	CS	11	11	11	11	11	11	11	11	11
0.125††	CS	11	11	11	11	11	11	11	11	11
0.25	CS & GB	11	11	11	11	11	11	11	11	11
0.5	CS & GB	11	11	11	11	11	11	11	11	11
1.0	CS & GB	11	11	11	11	11	11	11	11	11
Control	CS	14%		22%		3%		4%		-
Control	GB	9%		6%		13%		11%		-
Fipronil – Termidor SC (est. 1999)										
0.06††	CS	6	6	5.5	5.5	6	6	6	6	5.5+
0.125††	CS	6	6	5.5	5.5	6	6	6	6	5.5+
0.25	CS	6	6	5.5	5.5	6	6	6	6	5.5+
0.06††	GB	6	6	5.5	5.5	6	6	5	6	5.5+
0.125††	GB	6	6	5.5	5.5	6	6	6	6	5.5+
0.25	GB	0	6	2.5	4.5	2	2	6	6	5.5+
Control	CS	1%		47%		72%		61%		-
Control	GB	40%		96%		81%		89%		-
Chlorfenapyr – Phantom (est. 1996)										
0.125††	CS	9	9	1	7	1	1	6	7	1
0.25††	CS	9	9	9	9	2	5	5	9	6
0.5	CS	9	9	9	9	4	4	9	9	9
0.75	CS	9	9	1	1	5	5	9	9	9
1.0	CS	9	9	9	9	5	7	9	9	7
2.0	CS	9	9	9	9	1	9	8	9	9
0.25††	GB	9	9	0	0	2	6	5	9	6
0.5	GB	5	9	1	8	4	4	9	9	5
0.75	GB	9	9	4	7	5	9	9	9	8
1.0	GB	8	9	9	9	5	9	9	9	9
2.0	GB	6	8	9	9	9	9	8	9	9
Control	CS	23%		50%		92%		52%		-
Control	GB	43%		86%		98%		99%		-

† EPA: years with no soil penetration through treated soil in any plot.
FL: years with no damage worse than ASTM 9 to test blocks in 90 percent or more of the plots per site.
FL SE States: years with no damage worse than ASTM 9 to test blocks in 90 percent or more of the plots for all southeastern sites.

†† Registered rates.

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impact. Critical to the registration process are concrete slab plots containing termiticide concentrations targeted for registration.

TEST SITE EXPANSION

Elsewhere, work continued on expanding the U.S. Forest Service's test site located on the Calhoun Experimental Forest near Union, S.C. An area adjacent to the existing site has been chosen for the expansion, and archaeological and wildlife assessments are being made.

TEST METHODS

The USDA-FS uses two standard field methods to test soil-applied liquid termiticides — ground boards and concrete slabs. These methods are specified in EPA's Product Performance Test Guideline, OPPTS 810.3600.

The ground board test consists of a pine board centered in a 17-by-17-inch plot of exposed treated soil, replicated 10 times at each test site.

The U.S. Forest Service collects data annually on the amount of damage to the wooden blocks and the presence of termites and mud tubes in the attacked plots.

The concrete slab test consists of a 17-by-17-inch plot of treated soil covered by a 21-by-21-inch concrete slab. A covered four-inch pipe extends through the center of the slab and contains a pine block placed on the treated soil.

Both tests apply termiticides to the soil at an equivalent pre-construction volume of 1 gallon per 10 square feet. The U.S. Forest Service collects data annually on the amount of damage to the wooden blocks and the presence of termites and mud tubes in the attacked plots.

Damage is read using the Gulfport scale, where 0 = no damage, 1 = nibbles to surface etching, 2 = light damage with penetration, 3 =

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The USDA-FS's test site in Mississippi was hit hard by Hurricane Katrina last August. The Harrison Experimental Forest, located 20 miles inland, contains the oldest USDA-FS test site and dates from the late 1930s. The storm damaged an estimated 30 to 70 percent of the trees, depending on location.

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(TSC) of the Association of Structural Pest Control Regulatory Officials (ASPCRO) proposed a revision of EPA's Product Performance Test Guideline, OPPTS 810.3600. The TSC is comprised of four state regulators, a member from National Pest Management Association (NPMA), and a member from the organization representing termiticide manufacturers,Responsible Industry for a Sound Environment (RISE).

The TSC-proposed revision of the federal guideline differs from the existing guideline in several significant ways.

First, the primary criterion used to evaluate product performance in small-scale field tests was changed from soil penetration to wood damage. Under the existing guideline, termites must penetrate through the treated soil for an individual plot (e.g., concrete slab) to "fail." Under the TSC proposed guideline, termites must cause damage to the wooden test block worse than ASTM 9 (e.g., nibbles to 3-percent loss) for a plot to fail.

Second, the percentage of failed plots constituting a product failure at a given concentration was changed. For example, under the existing guideline, no plots can fail at any site for at least five years; whereas under the proposed guideline, up to 10 percent of the plots can fail without constituting a product failure. Thus, the proposed revision is very similar to the Florida Termiticide Efficacy Rule — with one significant difference: Once a plot fails under the proposed guideline, it is considered a failure thereafter (in subsequent years). Under the Florida rule, all plots are evaluated each year regardless of their prior status.

The proposed guideline also eliminates all references to "toxic barriers." Soil penetration is the logical criterion for evaluating termiticides that repel and/or kill termites quickly and, in so doing, form an effective toxic barrier under and around structures. Termiticides that are relatively slow acting and non-repellent may not act as barriers, and thus the soil penetration criterion has been replaced with damage. The use of a damage criterion recognizes that termites may penetrate through the treated zone and ultimately get into the structure.

The proposed guideline also includes building tests (under Experimental Use Permits) as a supplement to small-scale field tests.

If adopted, the TSC proposed guideline would influence the registration of termiticides by changing product performance durations (e.g., the number of years the product is considered successful). Like the existing standards, termiticides under the proposed guideline must be judged successful for at least five years. The number of years a product would remain successful under the proposed guideline is generally equal to or greater than the existing guideline and equal to or less than the Florida rule. Thus, the proposed guideline is less demanding than the existing guideline but more demanding than the Florida rule.

Results comparing the existing EPA guideline (Table 2), the TSC proposed guideline, and the Florida rule (Table 2) for imidacloprid under concrete slabs are: 2 vs. 4 vs. 6 years of success at 0.05 percent AI, 2 vs. 5 vs. 8 years of success at 0.1 percent, 3 vs. 4 vs. 5 years at 0.15 percent, 2 vs. 5 vs. 5 years at 0.2 percent, 2 vs. 4 vs. 8 years at 0.25 percent, 5 vs. 9 vs. 13 years at 0.3 percent, and 5 vs. 8 vs. 13 years at 0.4 percent.

The same comparisons for chlorfenapyr are: 1 versus 1 versus 1 year at 0.125 percent AI, 2 vs. 5 vs. 6 years at 0.25 percent, 4 vs. 9 vs. 9 years at 0.5 percent, 1 vs. 5 vs. 9 years at 0.75 percent, 5 vs. 7 vs. 7 years at 1 percent, and 1 vs. 9 vs. 9 years at 2 percent.

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moderate damage, 4 = heavy damage, and 5 = block failure.

LATEST TEST RESULTS

The 2005 Termiticide Report evaluates termiticides using EPA's Product Performance Test Guideline (OPPTS 810.3600) and the Florida Termiticide Efficacy Rule (5E-2.0311, FAC). The EPA uses the OPPTS guideline to determine acceptability of both pre- and post-construction use directions for a product. The Florida Efficacy Rule specifically applies to preventative treatments for subterranean termites for new construction.

According to the federal guideline, termiticides remain effective during the period that they prevent termites from penetrating treated soils in all test plots (for example, 100-percent control). Under the Florida rule, termiticides remain effective during the time that they prevent damage worse than ASTM 9 (equivalent to Gulfport 1) to

Therein lies the difference between a guideline and a rule: The former may be subject to interpretation while the latter is not.

wooden blocks in at least 90 percent of the test plots. Termiticides must satisfy these criteria for at least five years to be fully successful for registration, and they must do so at the four national test sites using the concrete slab, ground board or stake tests (federal guideline), or at one or more of the southeastern sites containing a minimum of 10 concrete slab plots (Florida rule).

The 2005 test results for repellent and nonrepellent termiticides are presented in Tables 1 and 2, respectively (see pages 56 and 58). The Florida rule applied to individual sites yielded longer product performance periods than the EPA guideline in 68 percent of the cases, and identical durations in 32 percent of the cases (excluding paired comparisons of products that never failed either standard).

Florida, however, does not apply its rule on a site-by-site basis if data exists from multiple southeastern sites; instead, it combines the data from all sites. Combining the data for the three southeastern sites, the Florida rule yielded longer performance periods than the federal guideline in 93 percent of the cases and identical durations in 7 percent of the cases (Tables 1 and 2).

If applied as written, the federal guideline would clearly be more restrictive than the Florida rule in approving termiticides for registration. However, because EPA's primary mission is to protect human health and the

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Combining data ... the Florida rule yielded longer performance periods than the federal guideline in 93 percent of the cases.

environment, it places greater weight on toxicology and environmental data than efficacy and thus sometimes registers compounds that do not strictly adhere to the guideline. Therein lies the difference between a guideline and a rule: The former may be subject to interpretation while the latter is not.

Table 2 indicates that Termidor® 80 WG has remained effective at all test sites and concentrations in concrete slabs and ground boards since its establishment in 1994. This product was installed with another fipronil formulation and two repellent termiticides in the same test area — a standard practice used for decades. Within several years into the Termidor® 80 WG test, attacks at control plots virtually ceased (Table 2), raising questions about the nature of the test and the appropriate experimental design used to evaluate non-repellent termiticides. Control plots are used to evaluate the relative pressure of termites on treated plots. A lack of attack at control plots had never been observed with any U.S. Forest Service test, which ironically was both good news and bad.

It was good news because the treatments caused a dramatic decline in termite activity in the test area. With more than half of the treated plots containing fipronil (52 percent), some at very high concentrations, this compound played a significant role in the virtual elimination and subsequent suppression of termites at

Number of Installations

Following data depicts the recent surge in the total number of new termiticide products *installed* at USDA – Forest Service test sites:

1965	4
1975	2
1985	6
1995	1
2004	8
2005	8

Source: USDA – Forest Service

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the control plots.

The lack of attack at control plots in the Termidor® 80 WG test was bad news because it indicated little or no pressure on treated plots, making it impossible to evaluate individual treatments. To prevent a recurrence of this situation in field trials, the USDA–FS subsequently separated non-repellent termiticides from all other compounds. For example, Termidor® SC was installed in 1999 in an expanded field design that separated test concentrations and test methods. Attacks at control plots in this test indicate adequate termite pressures on treated plots (Table 2).

Termite attacks at control plots are generally lower in Arizona than other test sites (Tables 1 and 2). An extended drought (and perhaps other factors) continues to suppress termite populations in the region, especially in more recent tests. Low populations have reduced the pressure at test plots and prolonged termiticide performance durations in Arizona compared to other sites. This situation has caused legitimate concern over the validity of test results from Arizona in recent years.

All currently registered termiticides in the United States have been evaluated by the USDA-FS. Its testing program has provided product performance data to registrants, regulators, the pest management industry and the American public for decades. The U.S. Forest Service currently is testing numerous unregistered candidate termiticides, and some will surely be registered in the coming few years. These products will add to the choices PMPs and homeowners will have to make, challenging them to consider their options carefully. **PC**

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