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Termite testing continues

How will the US DA Forest Service test results affect future treatments?

BY DRS. TERRY WAGNER, JOE MULROONEY AND CHRIS PETERSON *Contributors*

The United States Department of Agriculture Forest Service's termiticide testing program provides unbiased efficacy data for product registration using standardized tests, sites and evaluation procedures. Virtually all termiticides undergo Forest Service tests prior to registration.

During 2001, the Forest Service maintained 26 agreements with industry involving laboratory screening of three termiticides and field evaluations of 20 termiticides and four impregnated barriers. We also collected data on five termiticides and two physical barriers from expired agreements. Test results are presented in Tables I and 2 for eight marketed termiticides and three candidate termiticides.

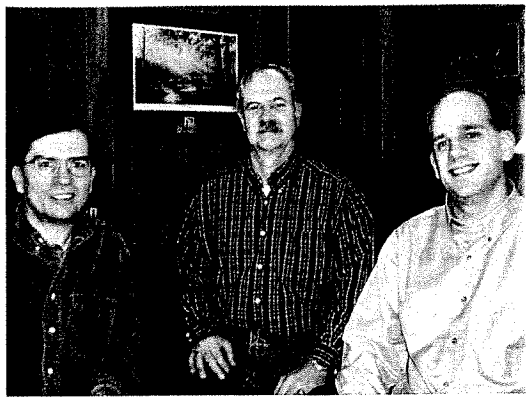
Tough test methods

The Forest Service has been testing chemicals as soil treatments for termite control since 1939. In 1943, research for the U.S. military led to the development of the ground board test, which consists of a sapwood board centered in a 17-by- 17-inch plot of exposed treated soil, replicated 10 times at sites in Arizona, Florida, Mississippi and South Carolina. This test was the principal method for evaluating chlorinated hydrocarbons until 1967, when it took on a secondary role because the emerging organophosphates, pyrethroids and carbamates were prone to degradation and leaching in these exposed plots.

The concrete slab test was introduced at this time to simulate a preconstruction treatment. It consists of a 17-by-17-inch plot of treated soil covered by a 2 1 -by-2 1 -inch concrete slab. A covered four-inch pipe extends through its center and contains a wooden test block in contact with the treated soil. Plots are inspected annually.

Termiticides are considered effective at the lowest concentrations that prevent termites from penetrating the treated soil in 100% of the plots for at least five years on the four test sites.

The emergence of nonrepellent, delayed action termiticides in the early 1990s again challenged researchers to devise effective methods for evaluating product performance. These termiticides affect termites differently than traditional chemistries. For example, instead of killing outright, they may initially disorient, confuse or simply cause little or no termite response. Forest Service tests have shown that some termites may reach the wooden blocks before the termiticide takes effect. Not all penetrated plots have active termites at the time of annual inspection, and termite activity in plots may not reoccur in successive years.



From left, Dr. Terry Wagner, Dr. Joe Mulrooney and Dr. Chris Peterson offer insights into the Forest Service's findings.

In addition, some compounds may be passed among colony members, ultimately diminishing colony size. These observations have caused the Forest Service to reassess its testing procedures on the new compounds. Unlike standard termiticide tests in which the wooden blocks are discarded after first attack and future readings discontinued, the blocks in the nonrepellent delayed action plots are read each year and replaced if attacked. Plots also may be arranged differently than in standard tests — each concentration isolated from others and other compounds to minimize interactions. Because termites occasionally penetrate nonrepellent delayed action plots, damage to test blocks (instead of penetration through treated soil) may also be a suitable criterion for product evaluation.

Latest results

Premise — Imidacloprid was registered in the U.S. in 1995 at 0.05 and 0.1% AI using foreign test data, and it has since become a widely used termiticide. The Forest Service installed the compound in the field in 1992, and it has been 100% effective in preventing termite penetration through treated soil in concrete slab tests in Arizona and Florida for at least five years at all eight test concentrations (Table 2).

In South Carolina, Premise remained 100% effective during five or more years at all but the lowest rate, 0.025% AI, where it failed after the third year. The product had difficulty in Mississippi — noted for its high termite populations -where termites penetrated the soil after the first year at 0.025%, after the second year at 0.05, 0.1, 0.2, and 0.25%, the third year at 0.15%, and the fifth year at 0.3 and

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Table 1. Years termiticides remained 100% effective in concrete slab (CS) and ground board (GB) tests at four field sites (* = registered rates)

Test % A.I.	Method	Site AZ	FL	MS	SC
Bifenthrin = Biflex TC (1986 - present)					
0.031	cs	0	4	2	2
0.062*	cs	15	15	7	10
0.125*	CS	10	9	2	15
0.25	cs	15	15	15	15
0.5	cs	6	15	15	15
0.031	GB	6	4	2	3
0.5	GB	10	14	12	8
Chlorpyrifos (1971 - 2000)					
0.1	**cs**	2	2	1	4
0.25	cs	2	3	4	6
0.5*	cs	4	7	3	7
1.0	CS	6	9	11	12
2.0	cs	11	19	15	21
0.5*	GB	3	3	2	*b*
1.0	GB	2	7	4	8
Cyfluthrin -Tempo TC (1987 - present)†					
0.125	cs	4	9	2	4
0.25	CS	10	12	*b*	14
0.5	cs	11	14	14	14
1.0	cs	14	14	14	14
0.5	GB		6	5	*b*
1.0	GB	5	7	4	7
Cypermethrin (1982 - present)					
0.125	cs	1	1	1	2
0.25*	cs	4	11	3	4
0.5*	cs	4	5	7	12
1.0	CS	8	8	6	12
1.0	GB	5	5	5	5
Deltamethrin (1988 - present)†					
0.05	cs	1	3	3	2
0.125	cs	5	13	4	7
0.5	cs	9	13	13	13
1.0	cs	13	13	13	13
0.5	GB	2	13	2	12
1.0	GB	9	13	2	13
Fenvalerate (1978 -present)					
0.25	cs	8	1	2	3
0.5*	cs	12	3	7	4
1.0*	cs	12	6	10	6
1.0*	GB	7	4	4	6
Permethrin = Dragnet (1978 -present)					
0.25	cs	8	2	1	0
0.5*	cs	13	4	5	5
1.0*	cs	15	15	5	10
1.0*	GB	9	6	2	1
Permethrin -Torpedo (1980 -present)					
0.25	cs	9	3	2	0
0.5*	cs	11	6	4	1
1.0*	cs	20	21	3	6
0.5*	GB	4	4	1	1
1.0*	GB	8	5	2	1

† Not *currently* registered *for* pre- or post-construction use.

Table 2. Years termiticides remained 100% effective in preventing penetration through treated soil and, if different, damage to wooden blocks greater than ASTM 9 (parenthetic) in concrete slab (CS) and ground board (GB) tests at four field sites (* = registered rates)

Test % A.I.	Method	Site A2	FL	MS	SC
Imidacloprid = Premise 75 WSP (1992 = present)					
0.025	cs	9	9	1	3
0.05*	CS	9	6	2	9
0.1*	cs	9	9	2(4)	5
0.15	cs	9	9	3(4)	5
0.2	cs	9	9	2	5
0.25	cs	9	9	2	8
0.3	cs	9	9	5(9)	5
0.4	cs	9	9	5(9)	5
0.1*	GB	3	2	1	2
0.2	GB	8 (9)	2	2	2
0.3	GB	5	2	2	1
0.4	GB	7	2	2	4
Fipronil -Termidor 80 WG (1994 = present)					
0.0625*	cs	7	7	7	7
0.125*	cs	7	7	7	7
0.25	CS & GB	7	7	7	7
0.5	CS & GB	7	7	7	7
1.0	CS & GB	7	7	7	7
Fipronil -Termidor MEM (1995 = present)					
0.0625*	cs	*b*	*b*	6	6
0.125*	CS & GB	6	6	6	6
0.25	CS & GB	6	6	6	*b*
0.5	CS & GB	6	b	6	*b*
1.0	CS & GB	6	6	6	*b*
Fipronil -Termidor MEC (1998 -present)					
0.06*	CS & GB	3	3	3	3
0.125*	CS & GB	3	3	3	3
0.25	CS & GB	3	3	3	3
Fipronil -Termidor SC (1999 -present)					
0.06*	CS & GB	2	2	2	2
0.125*	CS & GB	2	2	2	2
0.25	cs	2	2	2	2
0.25	GB	0	2	2	2
Chlorfenapyr = Phantom (1996 -present)					
0.125*	cs	5	1	1	5
0.25*	cs	5	5	2 (5)	5
0.5	CS	5	5	4	5
0.75	cs	5	1	5	5
1.0	CS & GB	5	5	5	5
2.0	cs	5	5	1	5
0.25*	GB	5	0	2	5
0.5	GB	5	1	4 (5)	5
0.75	GB	5	4	5	5
2.0	GB	5	5	5	5

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0.4%. These results changed somewhat using damage as the criterion for failure instead of soil penetration (that is, damage greater than ASTM 9 [light]). Using this criterion, the product remained 100% effective for four years at 0. I and 0. 15%, and for nine years at 0.3 and 0.4%.

Termidor — Fipronil tests were installed in 1994 using a water dispersible granule (80 WG) formularion and in 1995 using a micro-emulsion (MEM) formulation. No failures have been observed in either of these tests (Table 2). Termidor 80 WG was registered for pre- and post-construction use in September 1999 at 0.062 and 0.125% Al, and the product- became available in spring 2000. Because treated and control plots in these tests *were* grouped together (a standard practice in Forest Service tests), and termite activity decreased dramatically in control plots compared to surrounding control plots for other products (suggesting an effect on colonies), additional tests were installed with a micro-encapsulated concentrate (5 MEC) in 1998.

Fipronil concentrations were separated from each other to prevent overlapping effects among rates and to further evaluate changes in termite activity. A fourth segregated test was installed in 1999 using Termidor SC (registered in 1999 for post-construction use only). No failures have been observed in concrete slabs at or above the registered rates in these two tests.

Phantom — Chlorfenapyr was installed in the field at six rates in concrete slab tests in 1996 using a suspension concentrate formulation. The product has remained 100% effective in preventing termites from penetrating the treated soil through five years in Arizona and South Carolina at all concentrations (Table 2). In Florida, the product provided 100% control through five years at 0.25, 0.5, 1 .O and 2.0% AI, but failed after the first year at 0.125 and 0.75%. Chlorfenapyr provided complete control in Mississippi through five years at 0.75 and 1 .0%, but failed after the first year at the lowest and highest rates (0.125 and 2.0%), the second year at 0.25% and the fourth year at 0.5%. The only change from these results using damage (ASTM > 9) as the criterion for failure (instead of soil penetration) occurred at 0.25% in Mississippi, where the product remained effective through five years. Phantom has just received federal registration for post-construction use, and is in the process of getting registered in individual states. PC

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Take it from the (roof)top

Don't forget that roofing can be a source of termite infestation and damage

BY GREG BAUMANN *Contributor*

The pest management industry has learned much about subterranean termite behavior recently, including that we must look up. Evaluating the roofline, and where possible, inspecting the living space directly beneath the roofing, are vital tasks in performing a good inspection — as well as reducing company liability.

Roofing technology has improved in the last 10 years. Today's materials last longer than ever before, and roofing design today seeks to reduce weight, add life and improve ventilation. Even so, watch for roofing failures that lead to aerial infestation. These failures generally can be attributed to poor specifica-

Top: ***First*** *floor beneath bookcases.*
Bottom: ***With*** *tbe bookcases removed, the mold on the walls gave an indication that moisture meter readings were correct in that moisture was pooling around the* **valley area.**

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