

USDA – Forest Service Termiticide Report for 2013

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In the United States, termiticides are considered for federal registration by the Environmental Protection Agency (EPA) based, in part, on the results of five-year, small-plot field efficacy tests performed by the U.S. Department of Agriculture Forest Service (USDA-FS). This work is done by the Insects, Diseases and Invasive Plants (IDIP) Research Work Unit (RWU; SRS-4552) on four national field sites in Arizona, Florida, Mississippi and South Carolina. The termite portion of the IDIP RWU was initiated by Thomas E. Snyder during the late 1930s. Dr. Snyder was honored posthumously with induction into the *Pest Management Professional* Hall of Fame this past year (*PMP*, Oct. 2013). For more than 75 years, the USDA-FS has evaluated termiticides in its ongoing termiticide testing program. Currently it's managing



five continuing agreements with **Native subterranean termites** product manufacturers in 2013.

The number of products installed on USDA-FS field sites since 1985 is illustrated in **Fig. 1**. The number of new products installed during the past few years has diminished. For example, in 2013, one candidate product was installed on two field sites. This reduction will be seen in the termiticide market during the next few years as fewer new products will be available to compete with older products. This situation was discussed previously in the 2011 Termiticide Report (*PMP*, Feb. 2012). Five field testing agreements were still active in 2013, representing four candidate products.

Test Methods

Two test protocols are designated for efficacy evaluations of soil-applied termiticides: the ground board and concrete slab field tests are specified by EPA's Product Performance Test Guideline – OPPTS 810.3600. At each of the four national locations, each test type is replicated 10 times for each termiticide concentration tested.

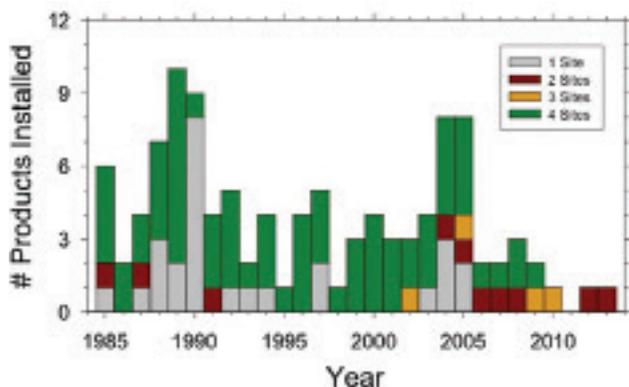


Figure 1. Number of candidate termiticides installed at USDA-FS test sites.

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For the ground board test, a 6-inch-square pine board is centered on 17-inch-square plot of exposed, termiticide-treated soil (**Fig. 2**). The board is held in place with a brick.

In the concrete slab test, the treated plot area is also 17 inches square. Treated soil is covered by a polyethylene vapor barrier before a 21-inch-square concrete slab is poured around a 4-inch diameter PVC pipe placed at the center (**Fig. 3**). After the concrete sets, the vapor barrier is cut out and removed from the bottom of the pipe and a 3.5-by-2.5-by-1.5-inch rectangular pine block is placed on the treated soil at the bottom of the pipe. Finally, a PVC cap is placed on the pipe to prevent weathering of the treated soil (**Fig. 4**).

Termiticides are applied to the soil at an equivalent preconstruction volume of 1 gallon per 10 square feet in both test types. Data are collected annually about the extent of damage done by termites to each block and board, as well as the presence or absence of live termites infesting test blocks or boards.



Figure 2. A newly treated ground board plot



Figure 3. A study in Florida after treatment, but before concrete pouring



Figure 4. A completed concrete slab plot

Damage data are collected using the Gulfport scale: 0 = no damage, 1 = nibbles-to-surface etching, 2 = light damage with penetration, 3 = moderate damage, 4 = heavy damage, and 5 = board or block destroyed.

Performance Standards

For the purposes of termiticide registration, there are two standards for efficacy. The first standard is EPA's Test Guideline (OPPTS 810.3600) used in the federal registration of candidate products. The other standard used is the state of Florida Termiticide Efficacy Rule (5e-2.0311, FAC). These standards apply to different termiticide uses. The Florida rule applies to preventive applications for new construction, whereas the federal guideline applies to directions for pre- and postconstruction applications of the product.

For federal registration of a candidate termiticide, the product should prevent termites from penetrating treated soil in all test plots for at least five years using the concrete slab test method at the lowest label rate that will be registered. For this reason, the data in the EPA sections of Tables 1 and 2 of this report are given in years of 100-percent control.

Success for a candidate termiticide under the Florida rule is defined differently than success under the federal guideline. The Florida rule considers only data collected in Southeastern states. Under this rule, success for a candidate termiticide occurs when it prevents damage more severe than ASTM 9 (equivalent to a Gulfport rating of 1) to greater than 90 percent of all test blocks (or boards) for five years in one or more of the Southeastern sites. A minimum of 10 concrete slab plots is required. All test plots are evaluated annually, and each year is considered independently for the 90-percent threshold. Previous or cumulative infestations of plots aren't considered.

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Table 1. Number of years repellent termiticides remained effective in concrete-slab (CS) and ground-board (GB) tests on 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 untreated plots attacked throughout the life of the study.

| % A.I. | Test | Arizona | | Florida | | Mississippi | | South Carolina | | FL SE States |
|---|------|---------|----|---------|------|-------------|----|----------------|------|--------------|
| | | EPA | FL | EPA | FL | EPA | FL | EPA | FL | |
| Bifenthrin – Biflex TC (study established 1986 and closed 2011) | | | | | | | | | | |
| 0.031 | CS | 0 | 9 | 4 | 11 | 2 | 5 | 2 | 4 | 4 |
| 0.062 ^{††} | CS | 16 | 16 | 22 | 22 | 7 | 7 | 10 | 16 | 10 |
| 0.125 ^{††} | CS | 10 | 15 | 9 | 25 | 2 | 7 | 24 | 25 | 9 |
| 0.25 | CS | 25 | 25 | 25 | 25 | 16 | 17 | 25 | 25 | 25 |
| 0.5 | CS | 6 | 23 | 25 | 25 | 18 | 24 | 25 | 25 | 25 |
| 0.031 | GB | 6 | 7 | 4 | 5 | 2 | 2 | 3 | 4 | 4 |
| 0.5 | GB | 10 | 11 | 14 | 21 | 12 | 15 | 8 | 11 | 14 |
| Control | CS | 52% | | 68% | | 51% | | 59% | | - |
| Control | GB | 68% | | 86% | | 74% | | 84% | | - |
| Cypermethrin (study established 1982 and closed 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 | 62% | | 66% | | 50% | | 60% | | - |
| Control | GB | 73% | | 75% | | 85% | | 88% | | - |
| Permethrin – Dragnet (study established 1978 and closed 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 (study established 1980 and closed 2011). 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 | 31 | 25 | 27 | 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 penetration through treated soil in any plot.

FL: years with no annual damage more severe than ASTM 9 to blocks or boards on 90 percent or more of the plots per site. Each annual evaluation stands alone; they're not cumulative.

FL SE States: years with no annual damage more severe than ASTM 9 to blocks or boards on 90 percent or more of the plots throughout the Southeastern sites.

Damage ratings are annual, not cumulative.

^{††} Registered label rates.

Latest Test Results

Tables 1 and 2 provide the results for repellent and nonrepellent termiticide evaluations collected through 2013. Similar to last year (*PMP*, Feb. 2013), Altriset (Chlorantraniliprole) is the only product for which new data can be reported. For Altriset, no efficacy losses were noted for any rate (including the registered application rate of 0.05 percent A.I.) compared with the 2012 report (*PMP*, Feb. 2013) for the concrete slab test plots. However, for the ground board plots, there was a loss of efficacy under the Florida rule standard for the 0.25 percent A.I. rate, having passed that standard for eight years. All Altriset plots will continue to be read annually.

The federal efficacy guideline delineates a valuable standard for evaluating termiticide performance. Guidelines are open to interpretation and aren't required to be taken literally, whereas rules require compliance. EPA's primary mission is to protect human health and the environment, so registration of new termiticides is based more on the product's toxicological and environmental impact than on efficacy. Therefore, EPA sometimes registers products that don't strictly adhere to its guideline. While less stringent than the federal guideline, the Florida rule is followed by regulators in Florida.

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Table 2. Number of years nonrepellent termiticides remained effective in concrete-slab (CS) and ground-board (GB) tests on 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 untreated plots attacked throughout the life of the study.

| % A.I. | Test | Arizona | | Florida | | Mississippi | | South Carolina | | FL SE States |
|--|------|---------|----|---------|------|-------------|----|----------------|----|--------------|
| | | EPA | FL | EPA | FL | EPA | FL | EPA | FL | |
| Imidacloprid – Premise 75 WSP (study established 1992 and closed 2007) | | | | | | | | | | |
| 0.025 | CS | 15 | 15 | 15 | 15 | 1 | 1 | 3 | 4 | 2 |
| 0.05 ^{††} | CS | 15 | 15 | 6 | 12 | 2 | 2 | 10 | 10 | 6 |
| 0.1 ^{††} | CS | 15 | 15 | 15 | 15 | 2 | 4 | 5 | 15 | 8 |
| 0.15 | CS | 15 | 15 | 15 | 15 | 3 | 4 | 5 | 15 | 5 |
| 0.2 | CS | 15 | 15 | 15 | 15 | 2 | 5 | 5 | 5 | 5 |
| 0.25 | CS | 15 | 15 | 12 | 15 | 2 | 2 | 8 | 9 | 8 |
| 0.3 | CS | 15 | 15 | 15 | 15 | 5 | 5 | 5 | 11 | 14 |
| 0.4 | CS | 15 | 15 | 12 | 15 | 5 | 9 | 5 | 14 | 15 |
| 0.1 ^{††} | GB | 3 | 7 | 2 | 2 | 1 | 1 | 2 | 2 | 2 |
| 0.2 | GB | 8 | 14 | 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% | | 77% | | 75% | | 36% | | - |
| Control | GB | 40% | | 95% | | 96% | | 70% | | - |
| Fipronil – Termidor 80 WG (study established 1994 and closed 2010) | | | | | | | | | | |
| Only five treated GB plots were attacked during the life of the study, but because of the low attacks at untreated control plots and multiple products in the test site, it was impossible to evaluate treatment effects. For additional information, refer to the 2006 Termiticide Report (PC, February 2007, page 66). | | | | | | | | | | |
| Control | CS | 14% | | 18% | | 2% | | 3% | | - |
| Control | GB | 9% | | 8% | | 16% | | 11% | | - |
| Fipronil – Termidor SC (study established 1999 and closed 2011) | | | | | | | | | | |
| 0.06 ^{††} | CS | 12 | 12 | 11.5 | 11.5 | 8 | 12 | 8 | 8 | 11.5+ |
| 0.125 ^{††} | CS | 12 | 12 | 11.5 | 11.5 | 8 | 12 | 12 | 12 | 11.5+ |
| 0.25 | CS | 12 | 12 | 11.5 | 11.5 | 12 | 12 | 12 | 12 | 11.5+ |
| 0.06 ^{††} | GB | 10 | 12 | 9.5 | 11.5 | 9 | 10 | 5 | 11 | 10.5+ |
| 0.125 ^{††} | GB | 12 | 12 | 11.5 | 11.5 | 8 | 11 | 10 | 10 | 11.5+ |
| 0.25 | GB | 0 | 9 | 2.5 | 11.5 | 2 | 2 | 12 | 12 | 11.5+ |
| Control | CS | 1% | | 67% | | 85% | | 50% | | - |
| Control | GB | 50% | | 97% | | 86% | | 88% | | - |
| Chlorfenapyr – Phantom (study established 1996 and closed 2011) | | | | | | | | | | |
| 0.125 ^{††} | CS | 15 | 15 | 1 | 7 | 1 | 1 | 6 | 7 | 1 |
| 0.25 ^{††} | CS | 15 | 15 | 11 | 11 | 2 | 5 | 5 | 15 | 6 |
| 0.5 | CS | 15 | 15 | 15 | 15 | 4 | 4 | 15 | 15 | 15 |
| 0.75 | CS | 15 | 15 | 1 | 1 | 5 | 5 | 15 | 15 | 15 |
| 1.0 | CS | 15 | 15 | 15 | 15 | 5 | 7 | 8 | 8 | 7 |
| 2.0 | CS | 15 | 15 | 15 | 15 | 1 | 9 | 15 | 15 | 15 |
| 0.25 ^{††} | GB | 9 | 11 | 0 | 0 | 2 | 6 | 5 | 8 | 6 |
| 0.5 | GB | 5 | 10 | 1 | 8 | 4 | 4 | 12 | 15 | 5 |
| 0.75 | GB | 15 | 15 | 4 | 7 | 5 | 12 | 11 | 15 | 8 |
| 1.0 | GB | 8 | 15 | 9 | 11 | 5 | 11 | 11 | 11 | 11 |
| 2.0 | GB | 6 | 11 | 15 | 15 | 12 | 12 | 8 | 14 | 12 |
| Control | CS | 19% | | 66% | | 79% | | 44% | | - |
| Control | GB | 54% | | 87% | | 99% | | 95% | | - |
| Chlorantraniliprole – Altriset (study established 2004) | | | | | | | | | | |
| 0.025 | CS | 3 | 5 | 1 | 7 | 2 | 5 | 9 | 9 | 7 |
| 0.05 ^{††} | CS | 5 | 6 | 3 | 9 | 9 | 9 | 4 | 4 | 9 |
| 0.1 | CS | 2 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| 0.25 | CS | 4 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| 0.025 | GB | 2 | 5 | 0 | 1 | 1 | 2 | 1 | 2 | 1 |
| 0.05 ^{††} | GB | 2 | 2 | 0 | 2 | 2 | 4 | 1 | 2 | 2 |
| 0.1 | GB | 4 | 7 | 1 | 6 | 4 | 6 | 2 | 4 | 4 |
| 0.25 | GB | 2 | 4 | 2 | 9 | 2 | 8 | 4 | 8 | 8 |
| Control | CS | 5% | | 69% | | 88% | | 51% | | - |
| Control | GB | 13% | | 84% | | 87% | | 88% | | - |

[†] EPA: years with no penetration through treated soil in any plot.

FL: years with no annual damage more severe than ASTM 9 to blocks or boards on 90 percent or more of the plots per site. Each annual evaluation stands alone. They're not cumulative.

FL SE States: years with no annual damage more severe than ASTM 9 to blocks or boards on 90 percent or more of the plots throughout the Southeastern sites.

Damage ratings are annual, not cumulative.

^{††} Registered label rates.

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FIFRA Scientific Advisory Panel

In March 2013, a three-day meeting of the Federal Insecticide, Fungicide, and Rodenticide Act Scientific Advisory Panel (FIFRA SAP) was conducted. Five FIFRA SAP members and nine Food Quality Protection Act Science Review Board members were present. Details of the panel's recommendations are beyond the scope

of this article, but this information is at www.regulations.gov by searching for docket EPA-HQ-OPP-2012-0574, where recommendations and comments by the public are available.

Conclusions

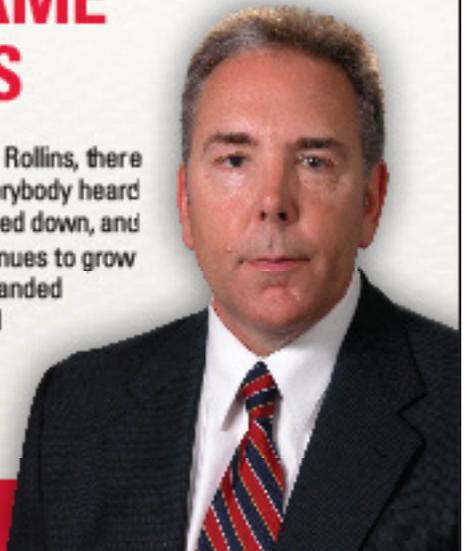
The USDA-FS Termiticide Testing Program has been evaluating termiticide performance since the 1930s. The program has provided baseline performance data for all termiticides currently registered in the U.S. Through this report and individual product reports, registered termiticide performance data has been provided to pesticide manufacturers, regulators, the pest management industry and the American public for decades. As new products are tested, the USDA-FS will continue to provide updated information. **PMP**

Thomas Shelton and Michael Ulyshen are entomologists. Donald Fye is a biologist with the USDA-FS' Wood Products Insect Research Team in Starkville, Miss.

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