80 years of termiticide testing

The USDA Forest Service testing program has provided standardized test data on soil-applied termiticides for eight decades — and counting.

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Contributors

Pest Management Professional (*PMP*) Hall of Famer Dr. T.E. "Tommie Termite" Snyder joined the U.S. Department of Agriculture's (USDA's) Bureau of Entomology soon after receiving his master's degree from Yale in 1909. In 1934, he was transferred to New Orleans to establish the Forest Entomology Laboratory at the Southern Forest Experiment Station, considered to be the first such lab in the South. As his industry nickname suggests, the-then 49-year-old Dr. Snyder was keenly interested in forest insects — subterranean termites in particular.

It was Dr. Snyder who hired Dr. Harmon "Johnny" Johnston in 1938, appointing him as a research entomologist on the Harrison Experimental Forest, near Gulfport, Miss. During his tenure, Dr. Johnston developed the groundboard test and began studies using this method. Data from these tests provided the U.S. military with a means of controlling termite infestations in wooden storage containers and (semi) temporary buildings built during World War II. Because of increased termite pressure and different species compared with North America, this information was of great importance in the Pacific theater.

The USDA Forest Service's (FS') termite unit continued this work after the war, providing efficacy data for various candidate termiticides. This effort continues today, although the methods have evolved to incorporate the concrete slab test, in addition to the original groundboard test. What follows is the formal summary of the FS' annually collected termiticide field efficacy data for 2017.

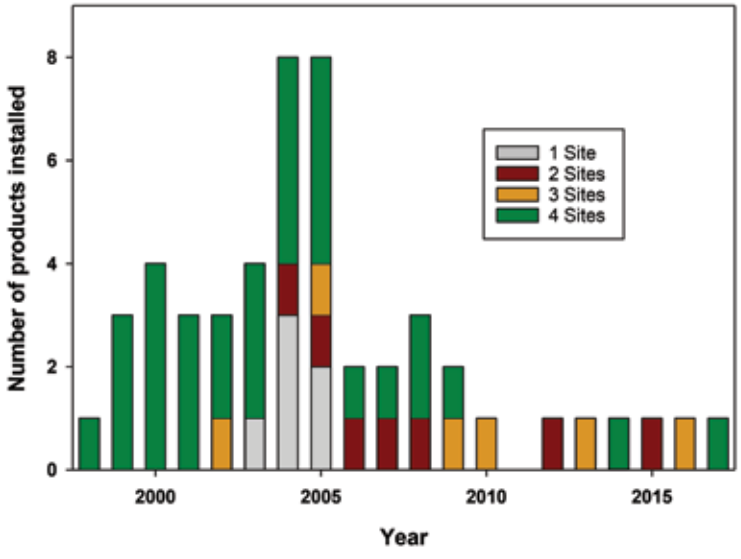

Fig. 1. Number of candidate termiticides installed each year by the USDA FS termiticide testing program.

PROGRAM STATUS

Fig. 1 illustrates the number of products installed by the FS testing program each year, separated into products installed per site, which is necessary to accommodate mid-year installations. The report also includes two tables that provide data for the currently federally labeled termiticides on the U.S. market today.

Occasionally, a candidate termiticide manufacturer will decide to withdraw a product from testing. Our policy has been to not report on any products that do not obtain federal registration; due either to withdrawal or a product's failure to meet the U.S. Environmental Protection Agency's (EPA's) performance standards. This prevents confusion and possible off-label use

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of agricultural products that share the same active ingredient as a candidate termiticide that did not obtain federal registration. As a result, the numbers in Fig. 1 will likely always be greater than or equal to the actual number of reported products in the report tables.

While originally providing potential termiticide product efficacy data to the military at its inception 80 years ago, the program now works with cooperators from the chemical industry — seeking efficacy data to satisfy federal registration requirements for potential new products. We offer installation and reading of plots using the groundboard, concrete slab and stake methods, as well as pesticide residual soil samples as an unbiased third party.

The EPA requires efficacy data for candidate products for five years. The studies take six years to complete, from product installation to completion. Each year, we provide product manufacturers with updates on their respective products' performance.

The efficacy testing requirements for termiticides are provided by the EPA in two documents: OPPTS 810.3600 and the Pesticide Registration Notice 96-7. In those documents, the methods required by the agency are the same as those developed and currently used by the FS, as described above. Over the past 80 years, the FS termite unit has used a variety of national sites and one international location. Currently, the following sites are in use:

- Chipola Experimental Forest in northwestern Florida.
- Harrison Experimental Forest in southern Mississippi.
- Calhoun Experimental Forest in western South Carolina.

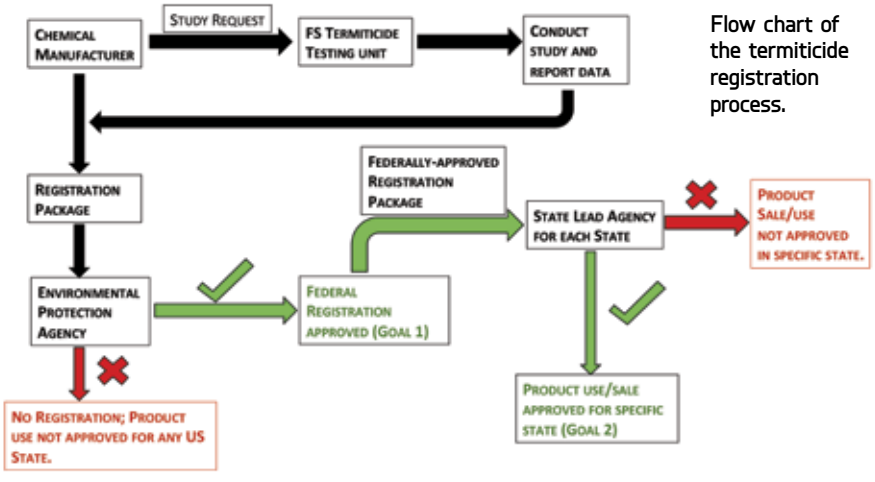
Native subterranean termite species belonging to the genus *Reticulitermes* occur at these sites; thus, our test data only applies to members of this genus. For a discussion of the loss of our fourth site in southern Arizona, please refer to our report from last year, online at **Bit.ly/2HdWb5s**.

Considering the number of available soil-applied termiticide products in the market each year, the data from Fig. 1 represent an early look at cycles of product availability. In other words, since we start working with new products six years before market availability, the number of products we install each year provides an estimate of how the termiticide market may look in roughly five to six years. Of course, not all products will gain registration, and others may be removed from the market because of business or other considerations. From that standpoint, it is always good to see new candidates entering the study process, as it indicates more options for termite control down the road.

In 2017, the FS Termiticide Testing Program installed one new product at three sites. Currently, four candidate termiticides are being evaluated in the testing program.

A termiticide regulation primer

In 1910, the U.S. Congress passed the Federal Insecticide Act, which regulated pesticide use in the United States. In 1947, the regulation of insecticides, fungicides and rodenticides (warfarin, etc.) was revised under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA gave the U.S. Department of Agriculture (USDA) the authority to regulate commercial pesticides. This continued until 1972, when Congress revisited pesticide regulation, moving the regulation of commercial pesticides to the U.S. Environmental Protection Agency (EPA). Part of the new agency's responsibilities included regulation of commercial pesticides and their proper application (*see chart at right*).



Flow chart of the termiticide registration process.

Currently, pesticides are regulated by the EPA at the federal level, and by state lead agencies at the individual state level. State lead agencies are often state departments of agriculture, but not always, hence the name. These agencies use the same data used by the EPA to determine efficacy of those pesticides that require such data (termiticides and public health pesticides), and decide whether a new federally approved pesticide can be sold or used within a particular state's borders. Many states work together on regulatory issues as part of the Association of Structural Pest Control Regulatory Officials (ASPCRO).

Where are the Tables?

Tables 1 and 2 provide repellent and non-repellent termiticide evaluation results collected through 2017. All currently available soil-applied termiticide products have had their studies closed at the request of their respective manufacturers. No new products have entered the market in 2017. Thus, there are no new products whose data can be revealed in this year's report. The tables and data in this report are exactly the same as the previous report (visit **Bit.ly/2HdWb5s**), as all of our newly collected data are for as-yet-unregistered products.

the pipe, and a 3.5x2.5x1.5-inch rectangular pine sapwood block is placed on the treated soil at the bottom of the pipe. To prevent weathering of the treated soil, a PVC cap is placed on the pipe. Completed plots form a grid in the forest (*see Fig. 4*).

For both methods, solutions of candidate termiticides are applied to the soil at the pre-construction rate of 1 gallon per 10 square feet in both test types. For each plot, the wood is evaluated for termite damage annually using a simple scale called the Gulfport scale, and the presence or absence of live termites infesting test blocks or boards is noted.

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.

SOIL SAMPLING

Since 1998, the testing program has included extra groundboard and concrete slab plots for pesticide residue analysis at each concentration level of a newly installed product. Soil sample cores are 1 inch in diameter and 4 inches in length, collected both after installation and on each subsequent year of the study. The groundboard and concrete slab plots designated for soil samples, however, have no wood blocks in the plots, so they are not read for termite damage.

The soil samples are then given to the respective product manufacturers for residue analysis of their products. These results can provide a timeline of product longevity and soil penetration depth at each time period for the product manufacturers.

PERFORMANCE STANDARDS

As has been reported in previous annual termiticide reports by the USDA FS (*PMP,* 2016 and earlier), there is a single standard for federal registration under the EPA, and each state has the opportunity to create its own standard. As mentioned in the primer section on p. 71, the lead agency for structural pest control in each state makes decisions regarding the use or sale of a product, via either a state-

specific regulatory standard — such as the Florida Termiticide Efficacy Rule, 5e-2.0311, FAC — or its own judgment of the FS efficacy data on the product. State lead agencies may also choose to make these decisions collectively through the Association of Structural Pest Control Regulatory Officials (ASPCRO).

For the FS annual termiticide reports, the data in Tables 1 and 2 are presented for each site individually, as evaluated using the EPA guideline, and as an example of a state standard, the Florida Rule — individually by site and collectively across all southeastern sites. Discussions of the differences between the two standards have been covered in many of the past annual reports (*PMP,* April 2016 and earlier). For an explanation about the Table data, see "Where are the Tables?" p. 73.

CLEANUP AT THE HARRISON EXPERIMENTAL FOREST

The Harrison Experimental Forest has been in use by the FS termiticide testing program since its inception in 1938. For 80 years, our unit has been performing efficacy testing for soil-applied termiticides, termiticide impregnated barriers, physical barriers, and even some of the early attempts at area-wide termite control using Mirex baits in the 1970s. As has been discussed in previous reports, this work takes up many acres of land, which, depending on the nature of the product tested, may not be reused for testing purposes.

In 2017, our unit began a process of dismantling older studies that are no longer being evaluated (*see Fig. 5*). These studies consisted of older physical barrier tests that were not impregnated with termiticides. Concrete blocks and barriers were removed from the study areas and hauled out of the forest in dumpsters. Some of the concrete blocks could be reused for future studies of this type and were saved, but the rest were sent to the landfill. In total, an estimated 8 tons of concrete and debris were removed from the forest over the course of a week in April 2017 (*see Figs. 6 and 7*). Clearing will continue in June 2018.

Fig. 5. From left are Dr. Juliet Tang, Dr. Thomas Shelton, Blossie Boyd and Tina Ciaramitaro.

As we reported in the 2005 report (*PMP,* Feb. 2006), Hurricane Katrina damaged much of the forest canopy cover through treefall at the Harrison Experimental Forest. While this only affected a few plots of our studies, it encouraged a larger problem: undergrowth (*see Fig. 8*). In the years that followed, undergrowth grew quickly in areas where sunlight shone through the partial canopy. These areas became thickly overgrown, and often required days of clearing to install new plots and examine old ones. It will be many years before new trees will reach canopy height and slow the process down.

This experimental forest is home to research on many fronts, both within the FS — the Forest Genetics and Ecosystem Biology work unit (SRS-4160) since 1954, and wood preservative studies conducted by the Forest Products Laboratory in Madison, Wis., since 1938 — and with outside cooperators such as Mississippi State University. Now that the termite unit in Starkville has merged with Durability and Wood Protection Research of the Forest Products Laboratory, we have an increased need for clearing undergrowth on the Harrison Experimental Forest for new studies — and collecting data on old studies.

Why did we remove the concrete? The concrete prevents any type of mechanical clearing of

Fig. 6. Team members load debris onto the tractor.

Fig. 7. Each dumpster contained 4 tons of concrete debris for disposal.

PHOTOS: USDA FS