



Subterranean Termite Treatment Options

*Dini M. Miller**

Introduction

Subterranean termite treatment has changed dramatically over the last decade. The number of systems, application techniques and products available for termite control has tripled in the last few years. Today, if you experience a subterranean termite swarm, you may call four different pest control companies and receive four completely different treatment recommendations. In most cases the Pest Control Operator (PCO) is only familiar with the treatment used by his or her company. So how can you make an informed decision? This fact sheet gives an overview of all the currently available subterranean termite treatment methods. It includes general descriptions of treatment products, brand names, application techniques, and their unique features.

Prevention

Subterranean termites feed exclusively on wood materials and have strict moisture requirements. With these characteristics in mind, a lot can be done to prevent an infestation by eliminating the food and moisture resources in their environment. Listed below are a few practical ways to prevent termite infestation by modifying their habitat.



Subterranean termite workers

- Repair structural and plumbing leaks.
- Pull all mulch and landscaping back at least 6 inches from the foundation.
- Remove piles of trash and debris from around the home.
- Keep firewood stacked away from the structure.
- Make sure downspouts are long enough to direct water away from the foundation.
- Keep gutters clean.
- Avoid direct wood to ground contact when building porches or decks.

Subterranean Termite Treatment

Subterranean termites are widespread throughout the United States. Because they are so abundant, prevention alone may not always protect a structure from infestation. If a structure has become infested, additional action must be taken. Over the past few years, the number of subterranean termite treatment methods has increased dramatically. Below is a description of the most commonly sold methods of termite treatment in Virginia.

Liquid Termiticide Applications

Liquid termiticides are usually applied completely around and underneath a structure covering all areas where termites might gain access. For new construction, this is accomplished by treating the graded soil before the slab is poured. For an existing building, the



Liquid Barrier application

*Assistant Professor, Entomology, Virginia Tech



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perimeter of the foundation is trenched and drilled then treated with termiticide. The goal of the treatment is to put a chemical barrier between the termites in the soil and the structure above. The chemical barrier can also affect those termites inside a building by preventing their return to the soil. In many cases these termites will die of dehydration.

Repellent Termiticides

There are several repellent termiticides on the market. These termiticides are all pyrethroids. Pyrethroids are fast acting nerve poisons that are highly toxic to termites but have low toxicity to mammals. Some of the pyrethroid termite products include **Dragnet FT**, **Cynoff**, and **Talstar** (FMC Corporation, Philadelphia, PA) and **Demon and Prelude** (Syngenta, Inc., Greensboro, NC). The pyrethroids are also highly repellent to termites. In most cases, they are so repellent that termites foraging under the soil will avoid coming into contact with the termiticide and forage elsewhere.

There are advantages and disadvantages to repellent termiticides. One advantage is that a complete barrier will effectively keep termites from coming into the structure. Also, the pyrethroids used for these barriers are relatively inexpensive and last for several years. The disadvantage is that termites are able to detect these termiticide barrier in the soil and avoid lethal contact with them. This is important because applying a perfect barrier under a fully constructed house is very difficult. Construction features, plumbing lines, and landscaping are just a few of the obstacles that hinder liquid termiticide application. Because of these difficulties, there are often gaps in the treatment where the termiticide was not applied completely. Eventually, foraging termites may locate these gaps and gain access into the structure. If these termites find the structural wood, they will tunnel back through the untreated gap and recruit other termites into the building.

Non-Repellent Termiticides

At the time of this writing there are two non-repellent termiticide treatments available on the commercial market. Both are nerve poisons like the pyrethroids, but they attack different sites on the nerve. These chemicals are not repellent and termites cannot detect them in the soil. Therefore, the termites tunnel into the termiticide while foraging, contact the chemical, and die.

Premise (Bayer Corporation, Kansas City, MO.) contains the active ingredient imidocloprid. Imidocloprid is unique because it not only kills termites that contact a lethal dose, but it also kills them at doses too small to

cause immediate death. If a termite contacts even a very small amount of imidocloprid it will become lethargic and forget to eat and feed other termites. It will also forget to groom itself so it soon becomes infested with soil fungi. The termite eventually dies as a result of these indirect symptoms of imidocloprid exposure. A disadvantage to Premise is that it is somewhat more expensive than the pyrethroid termiticides and in some cases may not last as long in the soil.

Termidor (Aventis Environmental Science, Montvale, NJ) is the newest termiticide on the market. Termidor became available in February 2000 for use as a non-repellent termiticide. The active ingredient is fipronil. Fipronil is unique in that it can be transferred from one termite to another through contact and trophallaxis (communal feeding). This allows it to affect more termites than those that contact the chemical directly. The advantage of this product is its long-term effectiveness in the soil. Test data indicate that fipronil may be effective longer after the initial application than other liquid termiticide products. A disadvantage is that Termidor is more expensive than other liquid termiticides.

Liquid Termiticides

Advantages

- Intended to provide immediate protection for the structure
- Relatively inexpensive compared to baiting systems
- Lasts multiple years in the soil
- Non-repellent termiticides eliminate the problem of termites locating "gaps" in the treatment

Disadvantages

- Even the most conscientious pest control operator will have difficulty putting down a chemical barrier that is free of "gaps." Gaps in repellent termiticide applications may later provide access to termites.
- Liquid termiticides applied within 50 feet of a body of water, well or cistern are a water contamination risk. However, it is not illegal to use liquid termiticide near these areas. A treatment method where the soil around a structure is removed, treated, dried and replaced is frequently used where water contamination is a concern. However, this treatment method does not eliminate the risk of the chemical leaching into a water source over time. In areas of potential water contamination, termite baiting is a better option.

Subterranean Termite Baits

Termite baiting takes a very different approach to subterranean termite control than liquid termiticide

application. Instead of attempting to protect a structure by creating a barrier between it and the termites, baiting targets the termites themselves. Termite baits are designed to suppress or eliminate the termite colony living in the soil.

Commercial termite bait systems are a relatively new technology. The most widely used bait products are applied very similarly. The initial installation of any baiting system involves plastic stations being inserted into the ground around the periphery of the structure approximately every 10 feet. Inside these stations are untreated wood monitors. The stations are usually inspected every month for termite activity. If live termites are found in the station, a toxic bait will be placed inside and the infested monitor may or may not be removed. The idea is to get the termites that have been recruited to the wood monitor to now pick up the bait instead. Certain bait products are intended to be used by themselves, while others can be used in combination with a spot applications of liquid termiticide (applied only to areas where termites are active) or a complete liquid treatment.

Because the in-ground bait stations are placed outside the structure, they do not directly affect termites that are already foraging inside. To address these inside infestations certain manufacturers provide above ground stations. Above ground stations are basically plastic boxes that contain a paper matrix (bait) laced with the active ingredient (toxicant). The boxes can be attached over a termite mud tube or directly onto infested wood. The termites forage inside the box and consume the paper bait.

The following is a description of the most widely used baiting systems available on the commercial market.

Sentricon System - The Sentricon system was the first termite baiting system commercially available. It is now the most widely used bait system within the United States and internationally. It was developed in 1990 by Dow AgroSciences (Indianapolis, IN) and the University of Florida. Sentricon is a stand-alone system and is not intended for use in combination with liquid termiticide.

The bait system consists of in-ground stations that contain 2 pieces of untreated wood ("monitors"). The stations are checked on a monthly schedule to see if termites have invaded or "hit" the monitors. If so, the termites are collected from the monitors and placed inside a tube of bait. The bait then replaces the monitors in the station and the termites must then eat their way out of the bait tube.



Sentricon System

The Sentricon system is marketed as a termite colony elimination system. In order for a colony elimination system to work, the bait must affect every termite in the colony. Worker termites do all of the foraging, so how does the bait get from the worker termites to the rest of the colony? Remember that the worker termites are responsible for feeding all of their nestmates. They do this by consuming food themselves then regurgitating part of it into the mouths of the other colony members. This same natural behavior is exploited by the Sentricon system to disperse the bait toxicant throughout the termite nest. It is important to note that the bait cannot work too fast. If the active ingredient killed the termites too rapidly, the worker termites would die before they could pass the bait to other colony members.

The active ingredient in the Sentricon bait is **hexaflumuron**, a slow acting toxicant. Hexaflumuron is an insect growth regulator (IGR). IGRs interfere with the insect's physical development. This particular IGR interferes with the insect's ability to molt. Insects have their skeleton on the outside of their bodies, an exoskeleton. In order to grow larger they must periodically shed this exoskeleton in a process called molting. Hexaflumuron does not allow the termite to molt properly so it dies in the process. When hexaflumuron is passed from one termite to another the affected termites die during their next molt. In time, there are too few termites left to take care of the colony and feed the queen. When the queen dies the colony is eliminated.

The Sentricon system also supplies above ground stations that the pest control operator (PCO) can place

directly on termite mud tubes or infested wood. Hexaflumuron is the active ingredient in the above ground stations as well.

Exterra System - This system was developed by Ensystex (Fayetteville, NC) and can be used either as a stand-alone bait or in combination with a liquid termiticide. The Exterra bait station is lined with strips of untreated wood, called "interceptors". The center of the station is left empty until termites hit the station. When the station is hit, bait is placed in the center of the station but the interceptors are left in place so that termite feeding is not disturbed.

The Exterra stations are larger than other commercial bait products so the inspection interval for the large stations can be as long as 90 days. The longer interval between inspections makes the Exterra system less expensive to maintain than Sentricon. However, it may be possible for termites to completely consume the interceptors and abandon the station before the hit is discovered and baited. Baited stations with termite activity are usually checked at one month intervals.

The active ingredient in the Exterra bait is diflubenzuron (dimilin). Like hexaflumuron, diflubenzuron is a slow acting insect growth regulator that is passed from termite to termite by trophallaxis. Diflubenzuron also interferes with termite development killing them during the molting process. Thus like Sentricon, Exterra is a colony elimination system. As of this writing, Ensystex does not offer above ground bait stations.

FirstLine System - (FMC Corporation, Philadelphia, PA) The FirstLine bait system was developed for use in combination with spot treatments of liquid termiticide. The bait system resembles the Sentricon system in that the stations are inspected monthly and the untreated wood monitors inside the stations are replaced with bait if there is a termite hit.

The active ingredient in the FirstLine system is sulfluramid. Sulfluramid is a stomach toxicant that interferes with the termite's ability to produce energy. Sulfluramid is faster acting than either hexaflumuron or diflubenzuron. However, in the FirstLine system the concentration of sulfluramid is so low that exposed termites survive for approximately 3 weeks. This allows them enough time to pass the toxicant to other members of the colony. However, the FirstLine system does not eliminate termite colonies but is a colony suppression system only. Therefore, remediation of an active infestation comes from the combined treatment of baiting the termite colony and applying liquid termiticide at the site of infestation. FMC also provides above ground bait stations as part of the FirstLine system.

Terminate - Terminate is a consumer termite bait product that is available at hardware and home stores. It is manufactured by United Industries Corp. (St. Louis, MO) and is a stand-alone system. Monitoring is not part of the Terminate baiting process. The active bait is inside of the stations at the time of purchase. The bait instructions direct the homeowner to place the stations in the soil near infested locations within the structure and in areas that retain moisture. Like the FirstLine system, the active ingredient in the Terminate is sulfluramid. Terminate is intended to suppress termite activity in a localized area. Although the Terminate product does kill termites, as of this writing, there is no research documenting that Terminate can prevent or eliminate subterranean termite infestation.

Professional Termite Baiting Systems

Advantages

- Baits are very environmentally friendly because there is considerably less active ingredient put into the environment compared to the hundreds of gallons of diluted insecticide used in liquid treatments.
- Termite baits are ideal for use around structures inhabited by persons with chemical sensitivity.
- In situations where the infested structure is within 50 feet of a well or 100 feet of a body of water, termite baits may be the only treatment option.

Disadvantages

- There are no means of coaxing termites into stations that are being monitored so it may take months before baiting can begin.
- Professional baiting systems are generally more expensive than barrier treatments because of the monthly inspections.
- Termite baiting systems when used alone do not protect the structure directly. Termites feeding within the structure will continue to do so until the colony is eliminated or they are controlled with an above ground station.

References:

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- Koehler, P. G., D. E. Short, and W. H. Kern. *Pests In and Around the Florida Home*. University of Florida Cooperative Extension Service, IFAS No. SP 134. Gainesville FL. 1998.

Subterranean Termite Treatment Cheat Sheet

| Control Method | Repellent Liquid Termiticide | Non-repellent Liquid Termiticide | Bait Systems |
|---|---|---|--|
| How it is supposed to control Subterranean Termites | The termiticide is injected into the soil around the foundation of the home. The slab is drilled and the soil treated underneath. Trenches are dug around the foundation outside and within crawl spaces and filled with termiticide. The termiticide repels the termites and ideally turns them away from the structure. | The structure is drilled, trenched and injected as with the repellent liquid, but the termiticide is not repellent to the termites. The termites cannot detect the non-repellent termiticide in the soil so they tunnel into it and are killed. | Wood monitoring stakes are inside stations that are placed in the ground around the structure. Monitors are inspected monthly or quarterly. If termites are found inside a station, the bait is put in. Termites consume the bait and are killed. Sentricon and Exterra baits are designed to kill the termite colony. |
| Termiticide Products used by Certified Pest Control Operators | Tribute, Demon TC, Dragnet, Prelude, Prevail, Talstar and Torpedo | Premise Termidor (NEW 2000) | Sentricon Exterra FirstLine (used in combination with liquid treatment) |
| Relative costs | Usually the least expensive of the 3 treatments. Preparing for the injection of the liquid is labor intensive and the greatest source of the cost. Many gallons of termiticide are used in the treatment (~ 4 gallons /10 linear feet). | Can be more expensive than the repellent treatment because the termiticide is more costly. The application is the same as the repellent treatment so labor costs are equivalent. | Sentricon is the most expensive treatment. The station installation and monthly monitoring are responsible for most of the cost. Other bait products vary, but are usually priced between barrier treatments and Sentricon. |
| Treatment longevity | Under optimal conditions repellent termiticides can last ~ 5 years | Premise < 5 years Termidor 5+ years | Continuous process of monitoring with baits applied as necessary. |
| Advantages | Provides immediate protection for the structure. Relatively low cost and long lasting. | Provides immediate protection for the structure. Most effective treatment because it kills foraging termites. | Environmentally friendly, extremely low toxicity to humans and pets. |
| Disadvantages | Termites are not killed, just turned away from the chemical. They often find tiny gaps in the treatment and tunnel through them to the structure. | Premise breaks down in water so it may dissipate more quickly in the soil than some repellent termiticides. | Structure not directly protected. With no means of attracting termites into the monitors, actual baiting may take a long time to begin. This leaves the structure at risk. |

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