Termites are among the most economically important insects in the world. They eat wood and wood-based cellulosic materials. They play an important role in ecological systems by recycling back to soil cellulose-containing materials, such as fallen trees. Unfortunately, termites cannot tell the difference between a pine log in nature and a pine board that is part of your house. They are best known as structural and plant pests that compete with people for shelter and food. Termites cause more destruction to wood and paper products in Alabama than any other insect. They are the most difficult and expensive to control. Methods for control of different types of termites differ greatly. Therefore, homeowners must understand termites and how they can be controlled.

**Integrated Pest Management**

Using an Integrated Pest Management (IPM) approach is the best way to control termites. IPM combines the use of multiple available control methods into a pest management program. Control methods include sanitation, exclusion, structural modification, and chemical techniques. IPM focuses on optimization of termite control in an ecologically and economically sound manner. The integration in pest management practices for termites usually involves multiple parties and often requires more effort, information, and management attention than simple application of termiticide. However, once homeowners work through the transition period, IPM methods are often more cost effective and reliable than chemical-intensive systems, and they are safer for home residents, pest control personnel, and the surrounding environment. All chemical treatments should only be done by a professional pest control operator (PCO) who is specially licensed to do termite work. Improper and unauthorized treatments will lead to recurring problems that will cost more in the long run. If termite treatments cannot be documented as having been done properly, expect difficulties with mortgage lending companies during sale or resale.

**Types of Termites**

In Alabama, there are two types of termites: the subterranean termite and the drywood or powderpost termite. This publication will concentrate on the subterranean termites. A summary of their differences is presented in Table 1.

**Table 1. Characteristics of Subterranean and Drywood/Powderpost Termite Colonies and Damage**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Subterranean</th>
<th>Drywood or Powderpost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where found</td>
<td>In the wood and in the soil. The wood can be both in the ground and above the ground</td>
<td>Only within wood members at and above ground level; ground contact not necessary</td>
</tr>
<tr>
<td>Distribution</td>
<td>All counties</td>
<td>More common in south</td>
</tr>
<tr>
<td>Moisture requirement</td>
<td>High</td>
<td>Very low</td>
</tr>
<tr>
<td>Colony size</td>
<td>Few thousand to millions</td>
<td>Few hundred to a few thousand</td>
</tr>
<tr>
<td>Area covered</td>
<td>Maximum: about 1 acre</td>
<td>Confined to wooden member</td>
</tr>
<tr>
<td>Evidence of infestation</td>
<td>Mud tubes to access aboveground wood</td>
<td>Six-sided pellets about the size of sand kicked out of wood</td>
</tr>
<tr>
<td>Infested wood</td>
<td>Galleries with soil, usually along the grain</td>
<td>Galleries without soil, both across and within the grain</td>
</tr>
<tr>
<td>Time to severe damage</td>
<td>Weeks to months</td>
<td>Months to years</td>
</tr>
</tbody>
</table>
The Termite Colony

The termite life cycle is complicated, including eggs and immatures that develop into either workers, soldiers, or reproductives (Figure 1). Reproductives (alates) are also known as swarmers because they have wings and fly in swarms. Alates are the primary reproductive form. They will become the primary queen and king in a colony if mating is successful.

Myth #1
Subterranean termites require a ground connection to survive.

In fact, Su & Scheffrahn (1988) estimated that 20% of all infestations in South Florida were aerial infestations, without a ground connection.
Myth #2
Subterranean termites “melt” concrete.

In fact, this myth probably arose after a researcher hypothesized in a 1910 publication that perhaps termites had this ability. We now realize that the soft-bodied termites are simply adept at squeezing through tiny cracks.

How to Submit a Sample
Alates (swarmers) with wings and/or soldiers should be preserved in rubbing alcohol when submitted for identification. Submit at least 10 to 15 insects. Alates without wings and workers are usually not useful in identification.

Native and Formosan Subterranean Termites
The most common subterranean termites in Alabama are the native subterranean termites. These termites are a complex of termites belonging to the genus *Reticulitermes*. The winged reproductives are day swarmers. Swarming begins around late February and continues through May or June.

Most of these termites tend to nest in soil that provides a constant source of moisture for the founding colony. Since moisture is the most important factor contributing to the survival of subterranean termites, these termites can also nest in areas such as leaky roofs. This results in a colony, called an aerial infestation, with no connection to the ground. Leaky pipes and condensation from air conditioning units also create conditions conducive to termite survival.

Another termite that is of great concern is the imported Formosan subterranean termite, *Coptotermes formosanus* Shiraki. The winged reproductives of this species are night swarmers. This termite is known to occur widely in Mobile and Baldwin Counties, and sporadically in Lee and Calhoun Counties. See Extension publication ANR-1035, “The Formosan Subterranean Termite,” for more information on this species.

Colony Size and Territory
Native subterranean termite colonies commonly contain between 10,000 and 250,000 individuals. However, the native subterranean termite is known to have colonies as large as 5 million individuals, covering more than one-half acre of land. If a native subterranean termite worker weighs 2.5 mg, the total biomass of a colony of 5 million is about 16.5 pounds, about the size of a small dog.
A Formosan subterranean termite colony can range from fewer than 1 million to more than 10 million termites, covering more than 6 acres of land. A colony of about 10 million individuals weighing 4.0 mg each would result in a total colony biomass of about 88.1 pounds, about the size of a family of beavers (2 adults and 2 juveniles). Ten million individuals is a worst-case scenario.

**Identifying the Native Termites and the Formosan Subterranean Termite**

Identification of the two groups of termites is simple. Native subterranean termite soldiers have a rectangular head, while the Formosan subterranean termite has a teardrop-shaped head (Figure 8). Also, when breaking open a piece of infested wood, if only a few soldiers appear (less than 5 percent of termites present), you are probably dealing with the native subterranean termites. Whereas, if many soldiers appear (more than 15 percent of termites present), you are probably dealing with the Formosan subterranean termite.

**Management of Subterranean Termites**

Too many homeowners wait until the damage is obvious before taking necessary actions. If houses are constructed and maintained properly and are pretreated correctly, termite pressure and the risk of termite attack can be reduced or eliminated.

**Preventive Measures**

**Pretreatment**

Pretreatment during construction typically requires treatment of soil, under and around the home, at least two separate applications of registered termicidies (an insecticide for termite control) at the labeled rate by a reputable professional pest control operator. The purpose of a pretreatment is to create a continuous chemical barrier around the structure that requires protection. The termicidies available today do not provide the same long-term control as did Chlordane, the last effective organochlorine used as a termicide. It was banned in 1988. Most currently labeled soil termicidies will protect a structure for approximately 5 years.

**Pressure-Treated Construction Timber or Add-On Treatment**

Recently, researchers and PCOs released data showing that both Borate-treated construction wood and borate application as an add-on treatment resulted in at least 8 years efficacy against termite attack. Add-on treatment means to apply a two-foot-wide barrier of Borate to all exposed wood on the lower portions of a structure. Once again, this job must be done by certified professional pest control operators.


Homeowners must be aware that there is no termite-proof house as long as there are wood, moisture, and wood-soil connection. Keep this in mind during the design and the construction of a home. Don’t give subterranean termites easy access to the three things they need to thrive: food, moisture, and shelter.

**Sanitation**

Sanitation is critical to maintaining an environment inhospitable to termites and, thus, remains a high priority. Before and during home construction, remove any wood debris in or near the structure. This includes stumps, roots, or other construction materials such as form boards or grade stakes put in place before concrete is poured. There should be no contact between wood and soil or fill.

**Structural Modification**

- Vapor barriers (vapor retarder) should cover 75 percent of the area under a structure to help keep moisture levels down.
- Crawl spaces should be well ventilated to keep the ground dry.
- Woodwork should be a minimum of 6 inches above ground in slab construction and a minimum of 18 inches above ground in crawl-space construction (to allow space for future inspections).
- Exterior insulation and finishing systems (EIFS) or synthetic stucco, stucco, or any other siding material should not run below grade (below the soil surface). Other common building methods
that are a problem when foam is below grade include insulation foam between which foundation and wall are poured, rigid board insulation (RBI) that extends below grade, and chambers of foams within concrete blocks. When these materials are installed at or below grade, moisture can wick into the walls of a house creating conditions conducive to termite infestation and wood rot. Termites can use foam as a pathway into the structure by tunneling through the foam. These same conditions make termite inspection, prevention, and control extremely difficult if not impossible. If your house has any of these materials going below grade, get it cut at least 4 inches above the soil. Otherwise, do not expect even a professional pest control operator to take care of the problem.

**House Maintenance**

After home construction, homeowners can do many things to enhance termite protection:

- Do not disturb the chemical barrier after soil treatment.
- Slope the grade so that the surface water drains away from the house.
- Keep plants, mulch, mulched beds, and gardens for landscaping at least 12 inches away from foundation.
- Keep any wood-based items, such as firewood, scrap lumber, fencing, and planter boxes, from coming in contact with exterior siding.
- Divert sprinkler water, air conditioner condensation, and washing machine water away from exterior walls and foundation.
- Promptly repair any water leaks and moisture problems in the roof, attic, walls, bathroom, and kitchen.
- Clean gutters and downspouts and keep splash blocks in place.

**Inspection and Monitoring**

Have a thorough inspection done at least annually to detect possible termite activity, such as mud tubes, swarmer wings broken off by swarmer termites, or live termites in an active infestation. Infested wood has a dull, hollow sound when tapped. Monitor stations installed in the ground are another way of monitoring termite activity around your house.

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**Myth #3**

Subterranean termites are attracted to electrical cables.

In fact, they are simply chewing through these cables in an attempt to get to a food source. Subterranean termites are not attracted to electrical cables nor do they use the cables for a food source.

**Methods for Treating Existing Houses**

The technique used for treatment depends on whether your house is on a slab or has a crawl space. Make sure your house meets the structural maintenance requirements above, then ask your pest control operator for a copy of the label or MSDS of the liquid insecticide or bait with which they plan to treat your house. The label will contain more detailed information on treatment directions. New nonrepellent liquid termiticides, such as Termidor and Premise, are generating termite control professionals’ interest because of the bold marketing programs made by manufacturers promising compensation if companies do not achieve at least 5 years of effectiveness with their products. Liquid termiticides provide a quick knockout of termite activity. The drawback is that they must be applied in the way termiticides have been applied for decades. Often the floors and walls have to be drilled and a large amount of pesticide applied. Termiticides can kill a broad variety of plant and animal life if applied incorrectly.

In general, application methods for liquid termiticides are as follows:

- Trenching and rodding slab construction around the structure and treating the trench and the backfill with the amount of termiticide specified on the label (Figure 9).

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**Figure 9. Trenching around a house**
• Trenching crawl space construction around the inside and outside of the foundation; treating all sides of the interior supports and plumbing.

• Drilling a series of vertical holes (about ½ inch in diameter) through the slab at intervals of 6 to 12 inches (Figure 10) or in every void of hollow blocks (Figure 11), especially where termites may be entering. Termitecides may then be “short-rodded” through the drill holes.

Improper construction practices, such as leaving tree stumps under slabs or burying form boards and grade stakes under the slab, will hamper termite control. There is little that the pest control operator can do to rectify a construction error. However, he or she may attempt to use termitecides suspended in foam in an attempt to obtain a better distribution of the chemical. Foaming machines are not available to the general public.

**Baiting**

Baiting systems are a relatively new tool for termite control. They have been successful in most cases. Baits are available as in-ground and above-ground products. These systems use wood blocks to monitor for the presence of termites. When termites are found, the wood is switched with toxic bait that the termites eat and take back to share with their nestmates, thus killing many termites or even the entire colony. Successful baiting requires pest control operators to have extensive knowledge of termite behavior. The toxicants used in baiting systems are insect growth regulators or slow-acting, nonrepellent toxicants, which are safer than most of the soil termite killers.

Successful baiting relies heavily on an intensive monitoring schedule. In-ground bait stations are installed around a house at set distances and around critical areas, according to the bait label. Stations are monitored as often as monthly to quarterly. This rate of monitoring the bait stations is in contrast to the traditional yearly inspection of the structure.

Baiting has many advantages. The system is nonintrusive, consumer-friendly, and dramatically reduces the amount of chemical needed to protect a structure. With a bait, termites can be controlled with milligram quantities of active ingredient. Baits specifically target termites. The drawback is that it may take weeks or months to knock out termite populations. While baits have been successful in eliminating termites from existing structures, it is still being researched if termites can be prevented from entering a structure that does not have an infestation. Researchers are also investigating new baits that will provide rapid colony elimination over a broad range of termite species, geography, and application timings.

Sentricon, Exterra, and FirstLine are examples of trade names for bait products. Bait products are also on the market for homeowner use. However, seldom is it possible for homeowners to correctly monitor and treat their own houses without the proper equipment, training, and knowledge of termite behavior and habitats as well as effective termiticides.
Other Control Methods

Particle-Sized Barriers

A physical barrier consisting of particle-sized rocks, such as basaltic rock or granite, can be used to prevent termite entry. The rocks are ground into a specific size (16 grit sand) that is large enough so that termite mandibles cannot grasp it, yet small enough so that the termite body cannot maneuver between the spaces. These particle-sized barriers are used under slabs, around foundations, and around plumbing to create a physical barrier against termites. It is being used in Hawaii during construction. It can be costly, adding several thousands of dollars to the cost of a house. The roots of landscape shrubs can compromise the barrier. Particle-sized barriers are not readily available on the East Coast. Basaltic Termite Barrier and Graniteguard are examples of trade names for these products.

Stainless Steel Mesh

TermiMesh is another physical barrier. TermiMesh is a flexible, corrosion-resistant, high-grade stainless steel mesh that termites do not eat and cannot penetrate or destroy. It is applied beneath and around the critical areas, such as pipes, footers, and foundations, to physically exclude termites, protecting the structure from feeding damage. It is best installed during new construction but can be used as post-construction installation by specially trained technicians. It has been successfully used in Hawaii and Australia for several years. The marketing of this product in the continental United States is underway. It can be expensive.

Insecticide-Impregnated Vapor Barriers

This new technology is currently in field tests. Commercial vapor barriers are impregnated with termiticide and placed under the concrete slab or wrapped around the bottom half of concrete blocks in the same manner as the stainless steel mesh, thus doubling its function as both an insecticidal barrier to termites and a vapor barrier.

Borates for Wood Treatment

At least four products that contain the active ingredient disodium octaborate tetrahydrate are available to pest control operators. Borate products can be used as a supplemental treatment against termites but not as a stand-alone treatment.

Borates can be sprayed, painted, or pressure injected into indoor wood or wood shielded from the elements. The borates diffuse into the wood over a long period of time and provide long-lasting supplemental protection. Termites die after ingesting borate-treated wood. Borates also protect wood against wood decay fungi and have long been used in wood preservation. Borate-treated wood is also more fire retardant than wood that is not treated with borates.

The use of borates, however, is limited indoors because of their proleaching properties under wet conditions. Borates are nonselective herbicides, so even a small amount of borate accidentally sprayed on landscape plantings will kill or damage.

Treatment of Infested Trees

Old trees infested by subterranean termites may be the source of a house infestation. Drill holes into the tree above the soil line and inject or foam termiticides into the void created by the termites to eliminate this threat. Once again, this should be done by a certified pest control professional.
Choosing a Pest Control Company

Call at least three pest control companies and ask for price quotes, how the company plans to treat your house, and what chemical or bait system will be used. Be wary of prices that seem out of line, especially those that are too low. Professional termite control requires specialized equipment and training. A low price may mean low quality. Even when dealing with the Formosan subterranean termite, you can take 2 weeks to make an educated decision.

Call the Better Business Bureau in your area for any outstanding complaints against a potential company.

A good pest control operator will do an inspection of your property, map areas of termite infestation for future reference, and note any areas not inspected (inaccessible) and structural problems that need repair. Ask for a copy of the report and map. Keep this information on record.

Be aware that there are many different types of contracts for termite control. Some will offer a “re-treatment only” statement; others may include a “damage replacement” clause. Some will cover all kinds of subterranean termites; others may exclude Formosan subterranean termites. The contracts will vary from company to company and will also vary with the type of construction treated. In all cases, read both sides of the contract and know what you are getting.

For a fee most pest control companies will offer you an annual renewal service to inspect your house for future termite attack. Unless you feel you know all the potential signs and locations common to termite infestations, it is generally a good idea to contract for this service. Remember, your home is probably the most expensive purchase you will make in your lifetime. With a little time and a little knowledge, termite damage can be avoided (Figure 13).

Figure 13. Termite damage