

Subterranean Termites¹

P. G. Koehler and C. L. Tucker²

The three principal types of termites in Florida are subterranean (nest in the soil), dampwood (infest damp wood), and drywood termites (infest dry wood). Subterranean termites (Figure 1) are the most destructive and frequently encountered kind of termite found throughout the state. Although they nest in soil, subterranean termites can attack structures by building tubes that connect their nest to wood in structures. Aerial nests can occur without a ground connection if all castes of the colony are present and moisture is available.

Biology

Subterranean termites are social insects that live in colonies consisting of many individuals. The colonies are composed of workers, soldiers and reproductives (Figure 2). The workers, which are about 1/8 inch long, have no wings, are white to cream colored and very numerous. Soldiers defend the colony against insects, like ants, that can attack the colony. Soldiers are wingless and white in color with large brown heads and mandibles (jaws). King and queen termites perform the reproductive functions of the colony. They are dark brown to black



Figure 1. Eastern subterranean termite. Credits: James Castner, University of Florida

in color and have two pairs of wings about twice the length of their body. See Figure 3 for the termite life cycle.

Subterranean termites feed on wood or other items that contain cellulose, such as paper, fiberboard, and some fabrics derived from cotton or plant fibers. Termites have protozoa in their digestive tracts that can convert cellulose into usable food.

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2. P. G. Koehler, professor/extension entomologist, and C. L. Tucker, graduate research assistant, Entomology and Nematology Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611 and T. J. Weissling, assistant professor, Entomology and Nematology Department, REC, Ft. Lauderdale, FL 33314.

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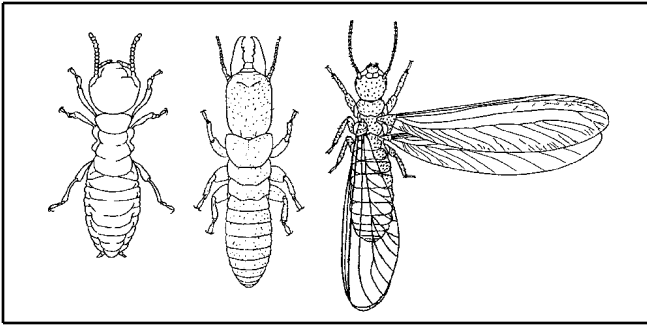


Figure 2. Castes of termite from top left, right and bottom; worker, soldier, and winged reproductive. Credits: University of Florida

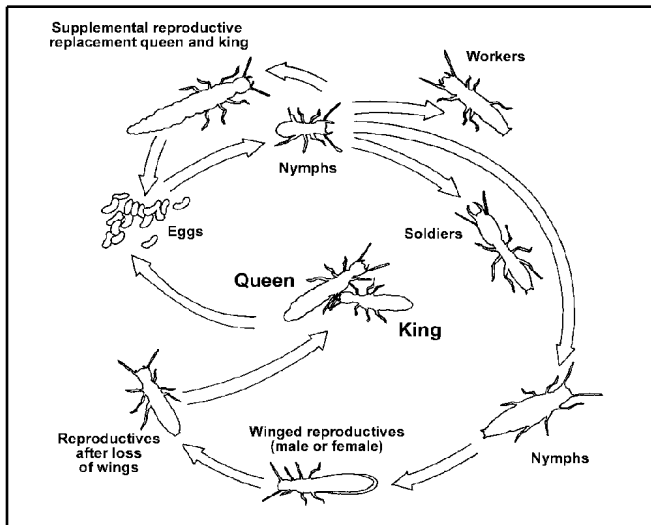


Figure 3. Termite life cycle. Credits: University of Florida

Subterranean termites nest in the soil to obtain moisture, but they also nest in wood that is often wet. They easily attack any wood in contact with the ground. If the wood does not contact the soil, they can build mud tunnels or tubes to reach wood several feet above the ground. These tunnels can extend for 50-60 feet to reach wood and often enter a structure through expansion joints in concrete slabs or where utilities enter the house.

Detection of Termites

Termites remain hidden within wood and are often difficult to detect. However, subterranean termites may be detected by the presence of winged reproductives, mud tubes, and wood damage.

Winged Reproductives

Winged reproductives (Figure 4) emerge from colonies in great numbers usually in the spring and during the daylight hours. Usually termites are first

noticed by the presence of winged reproductives. Mating occurs during these flights, and males and females form new colonies. Winged termites can be distinguished from flying ants by their thick-waist, straight antennae and wings of equal size. See Figure 5.



Figure 4. Winged reproductive subterranean termite. Credits: James Castner, University of Florida

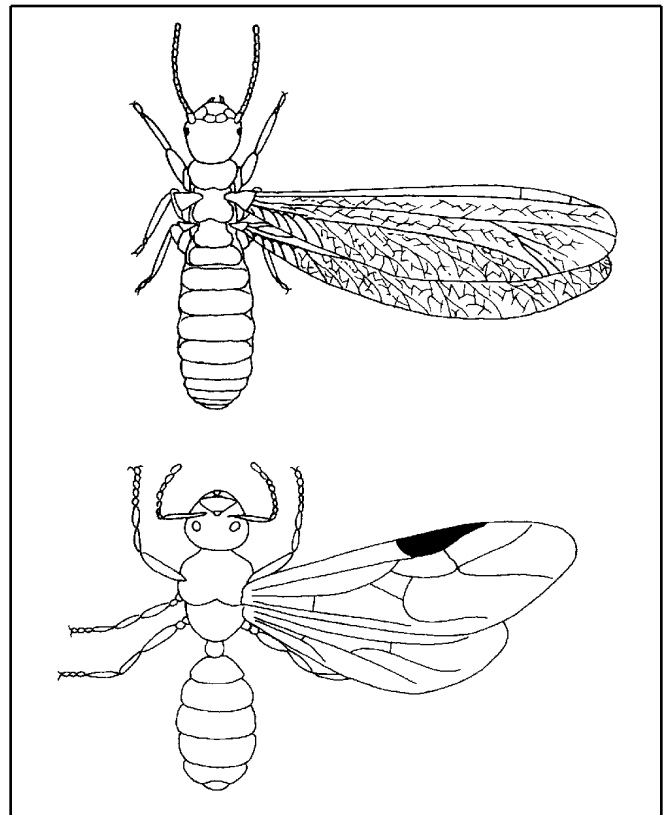


Figure 5. Subterranean termite (top) and winged ant (bottom) reproductive. Termites have thick waists, straight antennae, and wings of equal size. Credits: University of Florida

Large numbers of winged termites in a house are an indication of probable infestation. Termite wings break off shortly after their flight, and even though the actual swarming is not observed, the presence of discarded wings indicate that a colony is nearby. Because termites are attracted to light, their broken-off wings are often near doors or windows where the termites have been attracted to the light.

Winged termites emerging from the ground out-of-doors near the house does not necessarily mean the house is infested, but it is a good reason to check further. Termites in the wood of homes or other buildings usually come from colonies already established in the soil.

Peak swarming periods for subterranean termites are from January through May in Florida. They may also swarm to a lesser extent during the other months.

Mud Tubes

Subterranean termites build earthen, shelter tubes to protect them from low humidity and predation (Figure 6). These tubes are usually 1/4 to 1 inch wide. Houses should be inspected at least once a year for evidence of tubes. If the house has a crawl space, the inside and outside of foundations should be inspected for tubes. If the house has a concrete slab floor, cracks in concrete floors and places where pipes and utilities go through the slab should be closely examined. Cracks in concrete foundations and open voids in concrete block foundations are also hidden avenues of entry.

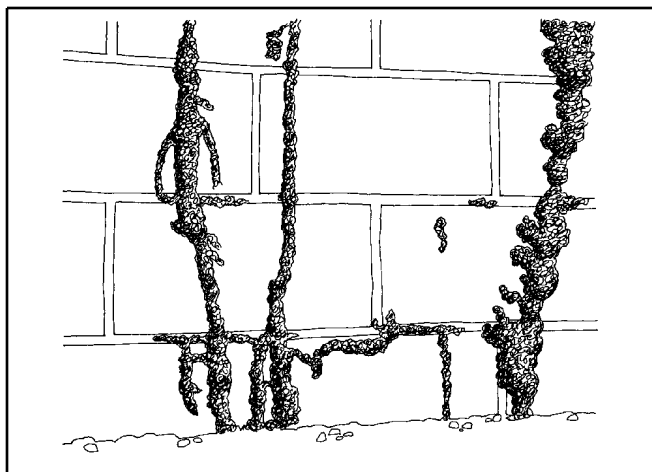


Figure 6. Mud tubes connect the colony in soil with wood in structure. Credits: University of Florida

Wood Damage

Wood damaged by subterranean termites is often not noticed because the exterior surface usually must be removed to see the damage. However, galleries can be detected by tapping the wood every few inches with the handle of a screwdriver. Damaged wood sounds hollow, and the screwdriver may even break through into the galleries.

Subterranean termite feeding follows the grain of the wood and only the soft springwood is attacked (Figure 7). Unlike drywood termites or other wood-boring insects, subterranean termites do not push wood particles or pellets (fecal material) to the outside, but rather use it in the construction of their tunnels. This debris, along with sand and soil particles, is used as a form of plaster.

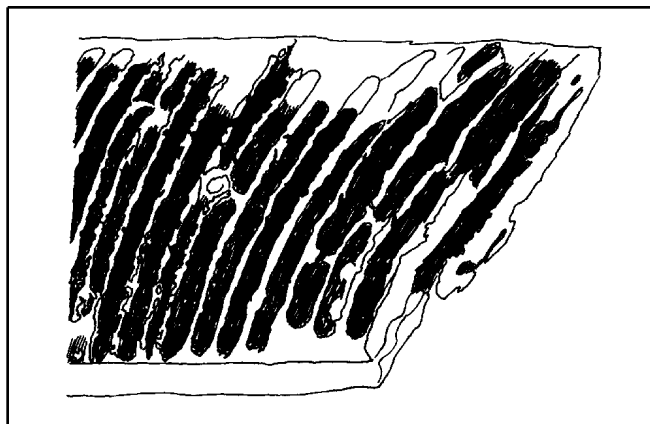


Figure 7. Wood damage by subterranean termites. Usually damage is with the grain and is covered with muddy material. Credits: University of Florida

Identification

Subterranean and drywood termites require completely different control methods; therefore, the termites must be correctly identified. Soldiers, winged specimens or wings can be identified at your county extension office. Workers and immatures are virtually impossible to identify. When services of an experienced pest control operator are needed, contact at least two or three reputable firms in your area for inspections and estimates for treatment.

Subterranean Termite Prevention and Control

The best control of subterranean termites is prevention. The best time to provide protection against termites is during the planning and construction of a building. Prevention should include:

- Removal of all stumps, roots, wood, and similar materials from the building site before construction is begun.
- Removal of all form boards and grade stakes used in construction.
- There should be no contact between the building woodwork and the soil or fill. Exterior woodwork should be located a minimum of 6 inches above ground and beams in crawl spaces at least 18 inches above ground to provide ample space to make future inspections.
- Ventilation openings in foundations should be designed to prevent dead air pockets and of sufficient size to assure frequent changes of air -- at least 2 sq. ft. to 25 running feet of outside foundation wall. This helps keep the ground dry and unfavorable for termites.
- Landscape plants and irrigation should not be placed within two feet of the foundation wall.
- Thorough annual inspections should be conducted to discover evidence of wood damage or termite activity such as shelter tubes on foundation surfaces, discarded wings or adult termites.
- Any wood that contacts the soil, such as fence posts, poles and general foundation structures, should be commercially pressure treated, and should not be attached to house.

Preconstruction Soil Treatment of Structures

Control subterranean termites by preventing the termite colony in the soil from entering the structure. It is impossible to build structures so termites can not cause damage. Therefore, a thorough preconstruction treatment should be applied to protect the structure

for at least 5 years. ouses treated prior to 1988 with chlorinated hydrocarbons, such as chlordane or heptachlor, should be protected from termites for 30-40 years.

There are two general categories of termiticides (Table 1) that are differentiated by how termite tunneling is affected when they encounter an effective soil treatment. The first category is referred to as a, "Repellent Termiticide." All of the synthetic chemicals classified as "Repellent Termiticides" are pyrethroids. The name "Repellent Termiticide," is ambiguous; the chemical properties of the soil treatment only repel termites from the structure. "Repellent Termiticides" do not kill termites because they are able to detect the soil treatment. Since the termites are able to detect the treated soil they do not tunnel into the treated soil barrier.

Table 1. Types of Termiticides

Repellents	Non-Repellents (Kill)
Pyrethroids	Chloronicotinyls
Cypermethrin	Imidiclopid
Demon TC	Premise
Prevail	Phenylpyrazols
Permethrin	Fipronil
Dragnet FT	Termidor
Prelude	Pyrrols
Bifenthrin	Chlorophenapyr
Talstar /	Phantom
Biflex TC	
Fenvalerate	
Tribute	

The other category is referred to as a "Non-Repellent Termiticide." Termite tunneling is not affected by a "Non-Repellent Termiticide" soil treatment because the termites are unable to detect the treated soil. Since they continue to tunnel freely through the treated soil they become exposed to the "Non Repellent Termiticide" by contact or ingestion and will die. Both repellent and non-repellent termiticides have proven satisfactory for making effective barriers when applied properly.

The integrity of the soil treatment is a key factor in providing protection to the structure. A repellent termiticide properly applied to the soil will provide protection to the structure unless the barrier is

disturbed. A termiticide barrier composed of a non-repellent termiticide allows more flexibility and will provide protection even if the integrity of the barrier is disturbed.

Preconstruction Treatment of Foundation Walls and Piers

After the footings are poured and the foundation walls and/or piers have been constructed, apply the insecticide to a trench in the soil about 6-12 inches wide and 4-6 inches deep adjacent to the foundation. The insecticide must be applied to both the inside and outside of the foundation and also around piers, chimney bases, pipes, conduits and any other structures in contact with the soil. The trench should be as deep as the top of the footing. The insecticide should be mixed with water as recommended on the pesticide label and applied at the rate of 4 gallons per 10 linear feet of trench. The insecticide should be mixed with the soil as it is being replaced.

Preconstruction Treatment of Concrete Slabs

The most common type of construction in Florida is concrete slab resting on the soil. Often the slabs crack or shrink away from the foundation wall allowing termites to infest the wood above.

The soil underneath and around the concrete slab should be treated with insecticide before the concrete slab is poured. The chemical should be applied after all the subslab fill and reinforcement rods are in place. Apply diluted spray to the fill at the rate of 1 gal. per 10 sq. ft. Along both sides of foundation walls and interior foundation walls and plumbing (critical areas), apply diluted insecticide at the rate of 4 gal. per 10 linear feet. Treat all hollow masonry units of foundations with 4 gal. of diluted spray per 10 linear feet. Apply the insecticide to reach the footing.

Postconstruction Treatment of Structures

Crawl Space Treatment

Dig narrow trenches along both the inside and outside of foundation walls (Figure 8) and around piers and chimney bases, and apply diluted spray as described above. Also be sure to trench and treat around sewer pipes, conduits and all other structural members in contact with the soil. Apply the insecticide to the trenches. The insecticide must be applied to both the inside and outside of the foundation and also around piers, chimney bases, pipes, conduits and any other structures in contact with the soil. The trench should be as deep as the top of the footing. Mix the insecticide with water as recommended on the pesticide label. Apply the diluted spray at the rate of 4 gal. per 10 linear feet of trench. Mix the insecticide with the soil as it is being replaced.

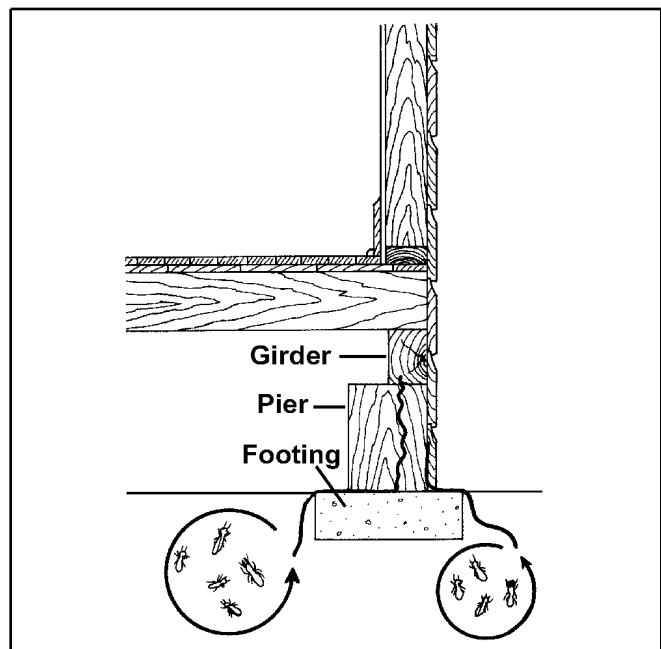


Figure 8. Infestation of crawl space construction. Credits: University of Florida

Concrete Slab Construction

It is possible to trench around the outside of a slab after it has been poured, as described above, but this alone usually will not give satisfactory control because the termite colony may be entering the structure from the soil under the slab.

Homeowners are not equipped to treat under slabs after the slab foundation is completed. A professional pest control operator usually is needed to do subslab chemical injections (Figure 9).

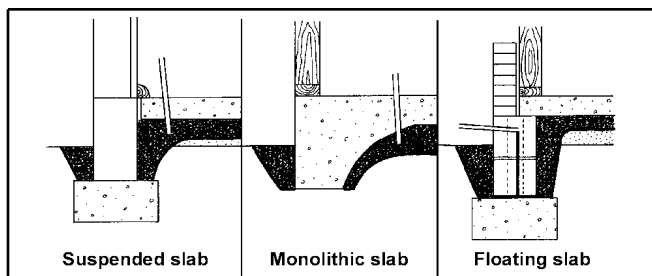


Figure 9. Treatment of suspended, monolithic and floating concrete slabs. Credits: University of Florida

Termite Baits

Termite baits use small amounts of insecticide to knock out populations of termites foraging in and around the structure. Some baits may even eradicate entire termite colonies. Termite baits consist of paper, cardboard, or other termite food, combined with a slow-acting substance lethal to termites. Regardless of which bait is used, the customer must be prepared and willing to accept the possibility of a lengthy baiting process.

Some bait products are inserted below ground out in the yard, whereas others are installed above ground level on the inside of the structure. Baits are applied below ground by enticing termites to feed on wooden stakes, cardboard, or some other cellulose-based material. The toxicant-laced bait can either be installed initially, or substituted after termites have been detected in an untreated monitoring device. The more below ground baits installed, the better the chances of locating termites. Planning, patience, and persistence are requisites for successfully using below-ground termite baits.

Termite baits may also be installed above ground in known areas of termite activity. Typically, the stations are installed directly in the path of active termite tunnels after the mud tubes have been broken. Effects tend to be more rapid with above-ground baiting because the procedure does not depend upon "chance" termite encounters with the stations.

Deciding on Baits or Termiticide Barriers

1. Buildings with hard-to-treat construction or chronic retreatment histories are logical candidates for termite baits. Some structures have construction features that interfere with conventional soil treatment methods, such as wells, cisterns, plenums, drainage systems, and inaccessible crawl spaces. With baits, gaining access for treatment is seldom a problem since foraging termites are as likely to encounter below-ground bait stations around the foundation exterior as well as beneath the structure.
2. Homeowners who do not want floors drilled and furniture/stored items/carpeting moved are good candidates for baits. Baiting requires fewer disruptions than does conventional barrier treatment. Installation and subsequent monitoring of bait stations generally does not even require the technician to come indoors. Noise, drill dust, and similar disruptions associated with conventional treatment are avoided.
3. Homeowners who are strongly opposed to the use of pesticides around their home are good candidates for baits. Although conventional liquid termiticides pose no significant hazard to humans, pets or the environment when applied according to label directions, some individuals are still apprehensive. Chemically-concerned homeowners may find the concept of baiting more attractive. With baits, the total amount of pesticide applied is small in comparison to the high gallonages needed to achieve a thorough and effective soil barrier treatment.
4. Property owners with a serious termite problem or those involved in a real estate transaction are good candidates for termiticide barriers. They may not be able to wait 2 to 6 months (sometimes longer) for baits to suppress or eliminate the infestation.
5. People living in attached housing (condos, attached residences) where the entire structure cannot be baited are good candidates for termiticide barriers.

6. In periods of economic instability, soil termiticide treatments may be preferred over baits. Baits typically require an annual maintenance fee for the regular inspections. If the fee is not paid, the bait system may be removed. With soil treatments, at least the termiticide remains in the soil, regardless of whether or not an annual inspection contract is retained.