

A Guide for Integrated Pest Management of Termites

...Maintaining and protecting your home from termite damage

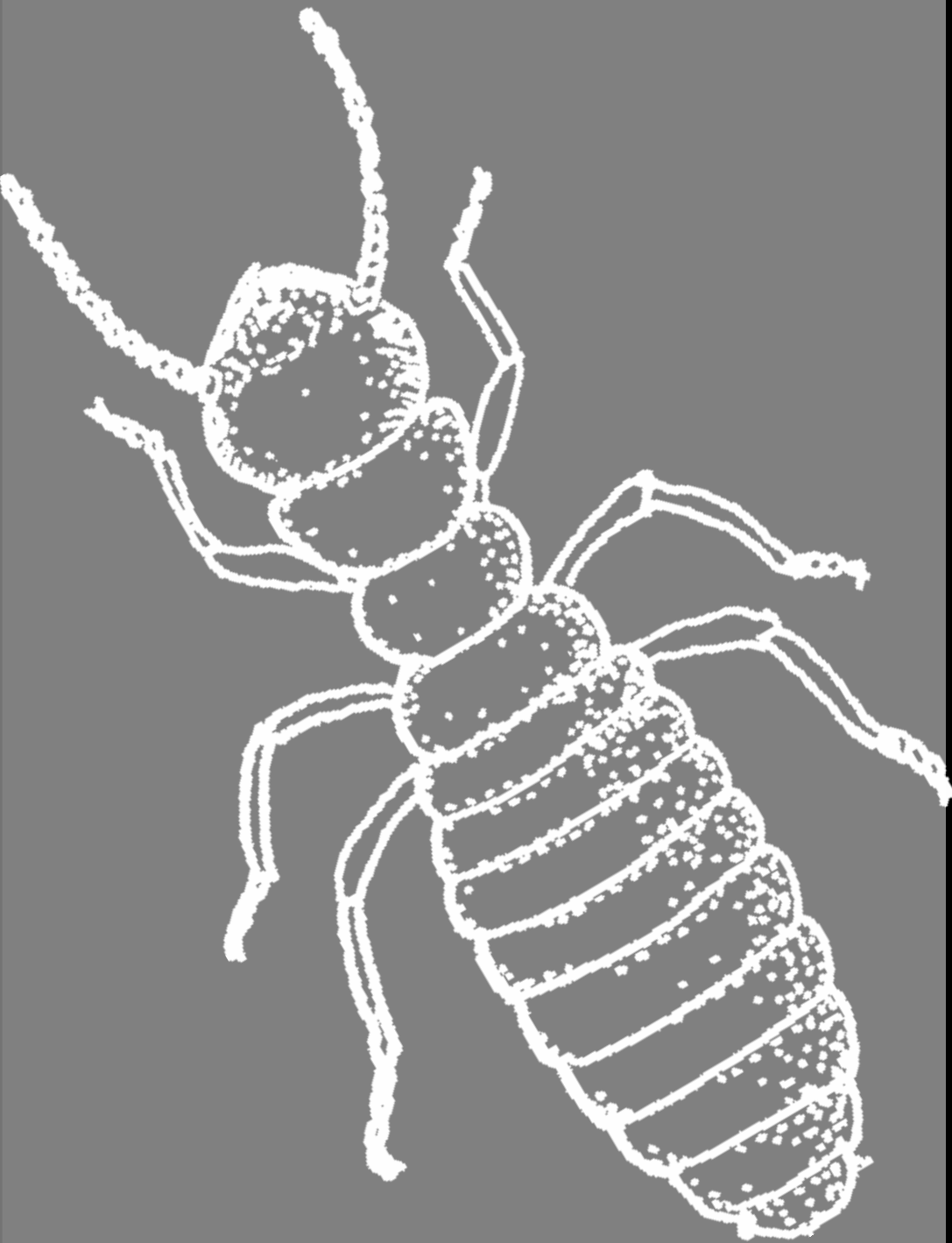


Formosan Subterranean Termite Infestation 2000

Lighter

Heavier

Native subterranean termites are found throughout Louisiana. Formosan subterranean termites, native to East Asia, arrived in the United States after World War II and were established in New Orleans by 1966. Now they are believed to infest parishes south of Interstates 10 and 12 and a few parishes north of these highways, with an introduced infestation in Ouachita Parish, and are continuing to spread into other parishes.



Termite (Isoptera) eat wood and wood-based (cellulose) materials. Their role in nature is to recycle wood. This job is important as a natural part of the environment, but termites become destructive pests when they try to recycle houses or living trees. There are about 2,500 species of termites worldwide. Although only about 2% of them are frequent invaders of wood structures used by humans, termites must be managed because they can and will cause great damage.

Separating Termites from Ants

The first step in managing any insect is to identify it correctly. People usually confuse termites and ants because of their similar appearances. Termites are not **ants** and certainly not **white ants**. Ants do not eat wood, but some ants tunnel through wood and live in it. The following three major characteristics can help you tell them apart:

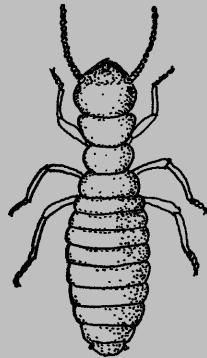
Termites

Ants

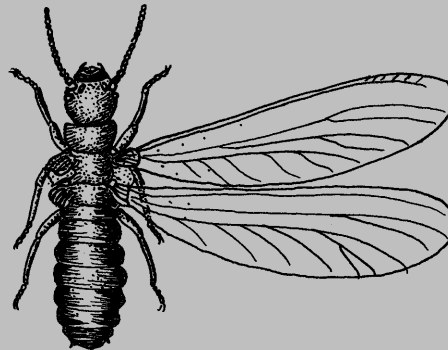
Waist
Antennae
Wings

Broad
Straight and beadlike
Equal sized front and hind wings

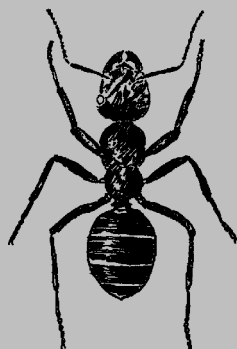
Very narrow (constricted)
Elbowed
Front wings larger than hind wings



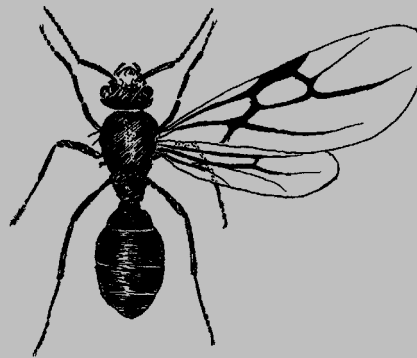
wingless termite



termite alate



wingless ant



ant alate



Identifying Termite Castes

The second step is to collect samples for further identification. Termites are social insects living in colonies. Each colony contains specialized castes, or types of individuals, such as reproductives, workers and soldiers, that perform different jobs. Individuals from specific castes must be collected for identification.

Reproductive Caste

Reproductives can be winged (primary) or wingless (secondary). Each has the capability to lay eggs. Winged reproductives, called alates or swarmers (photo 1), develop in colonies that are several years old or relatively large and start colonies of their own. Alates are the only caste not living underground or within wood. Alates themselves neither cause damage to structures nor physical harm to people. The alate's flight is short, and they are weak fliers. Shortly after landing, alates shed their wings and search for a mate. Although an enormous number of alates try to start new colonies, few survive to do so because of natural hazards. A paired de-alate (shed wings) female (Primary, queen) and de-alate male (Primary, king) (photo 2) carry out the sole job of producing offspring in an underground chamber (nest). The queen may live up to 30 years. If either the queen or king dies, or becomes separated from their original colonies, other members of the colony can change into wingless reproductives (secondary queens and kings) to take over the colonies.

Worker and/Immature Caste

These soft-bodied, creamy-white wingless termites make up the largest number of termites within a colony. The workers (photo 3) and immatures (photo 4) are the only caste that damages wood. Workers build mud tubes and tunnels, forage for and obtain food to feed themselves and the entire colony, construct and maintain nests, and care for eggs and young.

Soldier Caste

The soldiers (photo 5) resemble workers in color and general appearance, but they have large, hard yellow-brown heads with enlarged jaws. The major role of soldiers is defense (photo 6).

To identify termites, samples of alates, wings, soldiers, wood injury or information on the habitat or nest type are needed. Workers alone are inadequate to identify termites to species at this time.



Recognizing Types of Termites

The third step is to determine which type of termite you have found. There are two major groups of termites in Louisiana: drywood and subterranean termites. The subterranean termites are divided into two subgroups: the native subterranean termites and the Formosan subterranean termite. The former is native to Louisiana and includes several species; the latter was introduced into this state and refers to one species.

Drywood Termites

They are always found inside dry wood and require neither soil contact nor external moisture. They do not build mud tubes and there is no soil in the wood they infest, but they eat and build galleries both across and within the wood grain and produce dry, six-sided seed-like fecal pellets (photo 7). The pellets are often ejected from their galleries. The wings (photo 8) of drywood alates have three or more major veins on the front edge. Drywood soldiers (photo 9) have teeth on the inside edge of the mandibles.

Subterranean Termites

They can be found both in the wood and in the soil. They start colonies in the soil, require moisture, build mud tubes (photos 10,11) to access aboveground wood, and bring soil in the wood they infest (photo 12). Most of them prefer to eat wood along the grain (photo 13). They do not produce fecal pellets, but may build cartons to make aboveground nests. A carton (photo 14) is composed of chewed wood, saliva and excrement. The wings of subterranean alates have two major veins on the front edge. Subterranean soldiers lack teeth on the inside edge of the mandibles.

Formosan subterranean termites vs. native subterranean termites

The wings of Formosan subterranean termites (photo 15) are covered with small hairs, whereas those of native subterranean termites have none (photo 16). The Formosan subterranean termite soldier has a teardrop-shaped head and a large fontanel (opening in the head for release of a secretion), whereas the native subterranean termite soldier (photo 18) has a rectangular-shaped head and a small fontanel.





Photo 1. Termite alates (winged reproductives)



Photo 2. A paired queen and king, and eggs



Photo 3. Termite worker

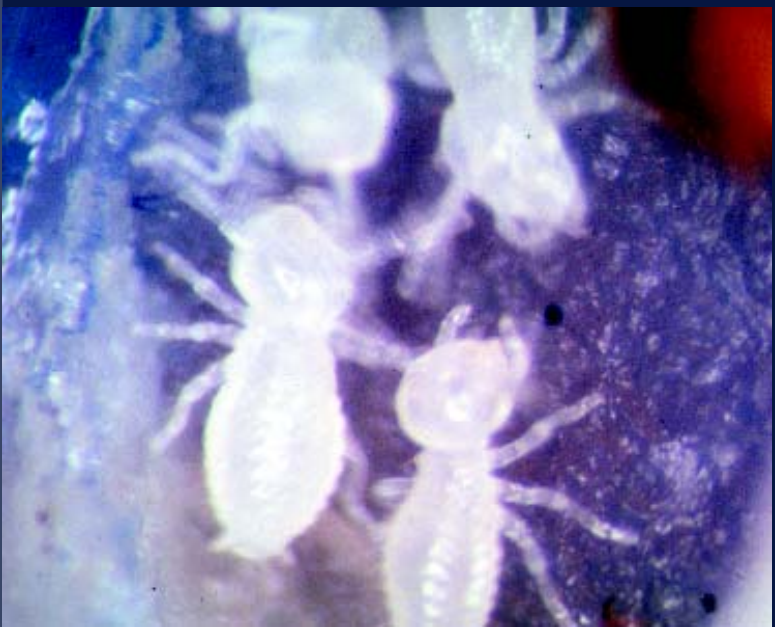


Photo 4. Termite immatures



Photo 5. Termite soldier, showing fontanel emitting a milky-white defensive secretion





Photo 6. Termite soldier's defensive behavior, puncturing invader (human finger)



Photo 7. Wood damaged by drywood termite: large and smooth galleries across and with the grain, with dry and six-sided fecal pellets



Photo 8. Wing of drywood termite, showing three or more major veins



Photo 9. Soldier and worker of drywood termite



Photo 10. Entrance mud tube by Formosan subterranean termite



Photo 11. Wood damaged by subterranean termite: galleries with soil





Photo 12. Mud tube built on tree by subterranean termite



Photo 13. Wood damaged by subterranean termite: showing damage along grain



Photo 14. Aboveground carton built by subterranean termite

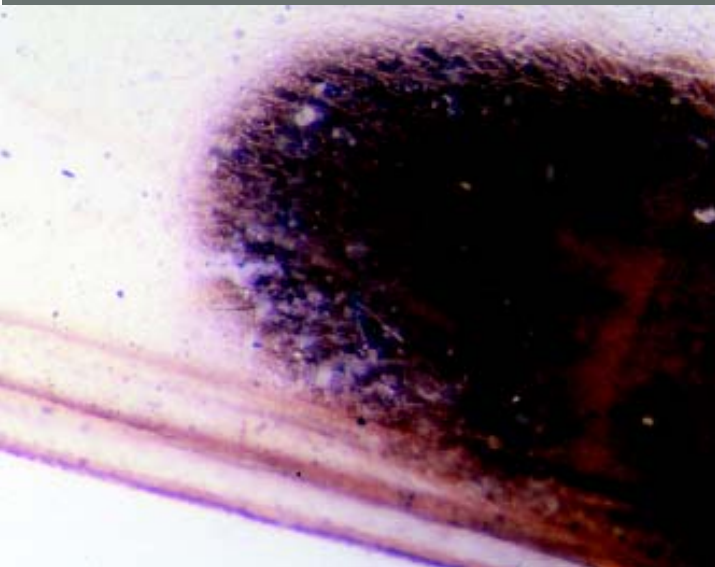


Photo 15. Wing of Formosan subterranean termite, covered with fine hairs, two major veins on front edge



Photo 16. Wing of native subterranean termite, no hair on surface, two major veins on front edge and several cross veins near the tip





Photo 17. Soldier of Formosan subterranean termite



Photo 18. Soldier of native subterranean termite



Photo 19. Drilling hole in concrete foundation to install bait station



Photo 20. Building infested by Formosan subterranean termites



Photo 21. Tree drilling for foaming treatment



Photo 22. Wooden floor infested by Formosan subterranean termite



Photo 23. Wooden door frame damaged by Formosan subterranean termite



Photo 24. Wood above pillar damaged by Formosan subterranean termite



Photo 25. Beam damaged by Formosan subterranean termite



Photo 26. Living tree infested by Formosan subterranean termite



Photo 27. Books infested by native subterranean termite



Understanding the Threat from Termites

The damage termites cause may not be as dramatic as a fire or a tornado, but eventually it can threaten the structural integrity of your house. Their presence is not readily noticed, and damage often is discovered before the termites are seen.

Drywood termites live entirely within dry wood, have small colonies containing a few thousand individuals. Thus, it takes a long time before drywood termites cause much damage. Structures may be infested with drywood termites for years without being noticed. Drywood termites disperse naturally through alates that take flight. Shipment of infested wood or furniture may relocate entire colonies or nests.

Subterranean termites usually make their nests in the ground, excavate passageways connecting nests and tunnel through the soil in search of moisture and food. They break into houses through construction elements such as expansion joints, hollow bricks, crevices in walls, support structures, concrete slabs, plumbing and utility penetrations, under exterior facings such as stucco and wooden siding via openings as small as 1/32 of an inch. They build mud tubes (shelter tubes) to reach aboveground wood and are capable of establishing isolated aboveground infestations in buildings where they have access to water from condensation, leaking pipes, roofs or other sources. Subterranean termites have large colonies ranging from hundreds of thousands to millions. Termites from a single colony may attack more than one structure. They cause serious damage much faster than drywood termites. Subterranean termites feed on dead wood, and often injure living trees and shrubs. They also show a tendency to injure vegetables in dry seasons. Subterranean termites disperse naturally through foraging movements of workers and soldiers and by the flight of alates.

Native subterranean termites have colonies ranging up to several hundred thousand termites and forage territories up to 1/3 acre. The foraging distance from the colony may be over 200 feet. They may be found injuring living trees, but usually feed on dead tissues.

Formosan subterranean termites eat wood much faster than native subterranean termites and grow the largest colonies of any termite species in North America. A mature colony has up to 10 million termites or more and may extend passageways 10 feet deep underground and over 1/2 acre in area. Formosan subterranean termites are more likely than native subterranean termites to survive in a structure without ground contact. They are also more likely than native subterranean termites to injure living plants. Although an infested tree is not usually killed by Formosan subterranean termites, the injury weakens the trunk, branches and roots, making them susceptible to breakage during high winds. To reach cellulosic materials or a water source, Formosan subterranean termites will chew through and destroy many non-cellulosic materials, such as thin sheets of soft metal, electric lines, plastics, mortar, plaster, rubber insulation, stucco, neoprene and seals on water lines.

Treatments for Termites

The goal of termite integrated pest management is to prevent or reduce problems caused by termites. There are several options for treating an existing structure for termites. Qualified pest control operators should be consulted for options to be used because treatments vary according to termite species, degree of damage, building construction, environmental conditions, etc. Since proper treatment includes the use of specialized equipment, large quantities of diluted insecticide and frequently involves drilling concrete foundations, bricks or walls, it is not recommended that untrained people attempt to treat a structure for termites.

Application of Termiticides - Soil treatment

This is the standard practice for treating a structure. A termiticide is placed into the soil under and around a structure to create a continuous **chemical barrier** which blocks potential routes of termite entry. A trench at least 4-inches wide by 6-inches deep is dug around slabs, piers or other supports touching the soil. The soil put in the trench is saturated with termiticides. Any material that has a void and touches the soil must be drilled and the void treated with termiticide. Currently labeled soil termiticides will protect a structure for approximately five years. **Wood treatment** can be used either as a preventive measure or for the treatment of termite-infested wood. Termiticide foams have been used recently as a way of improving chemical barriers, especially in callback situations (a return call on a customer to give re-treatment service on a treated house). Termiticide foams are very useful in treating structural voids by providing a full surface cover of the voids.

The Bait system (photo 19)

This is a new technology for treating subterranean termites. Two types of stations have been used. **In-ground bait stations** are placed around a house in the soil. Generally, monitoring stations are installed first and inspected several times a year for signs of termite activity. Monitoring stations contain a cellulosic material, such as wood or cardboard. After termites are found in the station, the cellulosic material is replaced by termiticide-treated cellulosic material. **Aboveground stations** are placed on walls and floors directly or adjacent to termite activity or infestation. Termite baits work by killing workers that eat the toxin directly or termites that have shared the toxic food with workers or by eating intoxicated termites. Thus, colonies can be reduced. There are no attractants other than cellulose in the baits.



Fumigation

In this process, structures are covered with a tent and a lethal gas is released into the structure. This treatment kills termites in the structure, but not termites in the soil. It is effective in killing drywood termites as they infest and live self-contained in the wood in a structure. It is not recommended without other treatments for controlling subterranean termites because termites in the soil may re-enter the structure as soon as 24 hours after fumigation.

Treating trees

Termites in living trees can be controlled by drilling holes and injecting termiticide into the void made by the termites. A new technique of foaming termiticide in infested trees (photo 20) has been developed and is more effective than using liquids. It is not known how long trees will be protected from termites after treatment.

Maintaining and Inspecting a House

Treatments for termites must be integrated with proper maintenance. Eliminate as many conditions conducive to termite infestations as possible following five general categories of rules:

1

Do not give termites easy access to the house.

- ▶ Eliminate wood to soil contact.
- ▶ Install wood siding, door and window frames and latticework at least 6 inches above ground level.
- ▶ Support outdoor wood porches and steps on a concrete base extending at least 1 inch above ground level.
- ▶ Do not allow any non-structural wood and tree branches to touch a house.

2

Do not provide termites with moisture.

- ▶ Place gutters and slope yard so that surface water drains away from the house.
- ▶ Be sure air conditioning condensate drains away from the house.
- ▶ Be sure moisture does not enter around windows, doors and siding.
- ▶ Repair leaks of roof, gutter, downspouts and plumbing promptly.
- ▶ Ensure sufficient clearance between soil and structural wood in crawl space to have adequate cross-ventilation.
- ▶ Keep mulched beds and gardens 12 inches away from foundation.



3 Eliminate hidden access to a house.

- ▶ Do not fill dirt beneath porches, terraces or steps.
- ▶ Do not extend stucco or foam insulation below the ground.
- ▶ Do not disturb the chemical barrier after soil treatment. Prevent and fix cracks in concrete walls, piers and slabs.

4 Minimize the amount of wood available for termites.

- ▶ Remove all scrap wood, form boards and grade stakes used in construction.
- ▶ Remove wooden debris and cellulose material from under and around the house.
- ▶ Replace rotten or destroyed structural wood with properly pressure-treated wood or non-cellulose material.
- ▶ Store woodpiles away from the house, and make sure they are raised off the ground.
- ▶ Paint or seal all exterior wood.

5 Inspect your property frequently for termites.

- ▶ If a property is to be treated, get at least three licensed companies to inspect the property. They will make a diagram of the property showing proposed treatments and give you an estimate. Ask for a copy of the company's bond, insurance and contract. Ask to see copies of the labels and material safety data sheets (MSDS) for the termiticides to be used. With the above information, you are able to compare the services offered and the prices the companies want to charge. Read the contract carefully. Remember, it is a LEGAL contract.



Termite Inspection

In addition to the annual inspection by a pest control operator, homeowners should look frequently for signs of infestation or termites inside and outside of houses, including attics, crawl spaces and garages.

Mud tubes (shelter tubes) extending from the ground over exposed surfaces of a house are good indicators of the presence of subterranean termites. Small piles of tiny pellets usually found in doorways, closets, attics or under sinks are good indicators of the presence of drywood termites.

Damaged wood in walls, baseboards, floors and roofs is another sign of infestation (photos 21, 22, 23, 24, 25, 26). Damaged wood sounds hollow.

Also look for **swarmers** (alates) emerging indoors or from the building exterior. Drywood termites and Formosan subterranean termites swarm from early April through June. They usually begin flying at dusk and are attracted to lights. Drywood termite alates are much less numerous than Formosan subterranean termite alates. Native subterranean termites usually swarm from January through April. They fly during the day.

Construction and Renovation

The best control of termites is prevention. The best time to provide protection against termites is during the planning and construction process of a building.

Before beginning a building project, make sure that the minimum specifications for the treatment of structures for wood destroying insects will be met. The “Minimum Treating Standards for Termite Control Work” (‘ 14135) are issued by and available from the Louisiana Department of Agriculture and Forestry. Though not law, these regulations provide better protection from termite injury. Some basic standards are:

1

The soil beneath and around a building should be treated with labeled termiticide before adding slabs and piers, and the perimeter treatment should be performed within 12 months. Stainless steel mesh or rock barriers may be placed under the structure.



2

Do not allow wood to soil contact to exist. Wood should not extend through concrete or masonry, but be placed on concrete.

3

All pipes should be at least 3 inches above ground level.

4

Slab houses should have at least 6 inches of exposed slab. Raised houses should be high enough to ensure sufficient ventilation and clearance for inspections.

Properly pressure-treated structural wood and non-cellulose materials are strongly recommended. Both borate and CCA (chromate copper arsenate) pressure-treated wood are available in Louisiana. Both products will kill termites that feed on them. CCA-treated wood may be used for interior or exterior uses. Borate-treated wood should be used for interior uses and continual wetting must be prevented. Paper on sheetrock and cellulose insulation can be treated with a borate. Spraying borate onto wood or foaming and misting borate in wall voids is not as effective as using borate pressure-treated wood. Borate sprays will penetrate the wood only 1/4 to 3/8 of an inch. Termites can eat through the center of the wood.

If foam insulation is used, be sure it is treated for termites. Be sure it does not extend below the top of the slab.

Renovation should correct as many factors contributing to termite infestation as possible. Get rid of wood, trash and lumber, direct wood to soil contact and standing water under pier type structure. Eliminate faulty plumbing, leaks, dampness from drains and condensation or leaks from the roof. Do not break the chemical barrier around the building by removing and adding soil around the foundation. Damaged wood should be replaced with properly pressure-treated wood.



House Buying

Have a licensed pest control operator (PCO) inspect the house before buying it. Although the inspection is commonly referred to as a termite inspection, it is actually an inspection for evidence of the presence of all wood-destroying insects. The PCO will give you a “Wood Destroying Insect Report” that is approved by the Louisiana Structural Pest Control Commission. Again, currently it is a regulation, not a law. Remember that if the statement says that no visible signs of termites were found at the time of inspection, it does not mean that termites are not in the structure nor that termites will not get in the structure. It simply means that visible signs of termites were not found when the structure was inspected.

If the house has had a history of termites, find out what company treated it and if there are any warranty provisions you are entitled to. Inspect the property for improper cultural practices. Make sure you have all the information you need to make a sound decision.

Consider the termiticide residue in the soil before re-treating a structure. Find out the termiticide use history of the house, when the house was last treated for termites and which product was used. Chlordane was used before 1988, and it is thought to provide protection for 30 years. If chlordane was used 10 or more years ago, it may not be advisable to dig up the chlordane and replace it with a current product that will last only 5 years.



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Weste Osbrink, USDA/ARS Southern Regional Research Center	2, 4
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Alan Morgan and Janine Polizzi	19, 20, 21
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