

Formosan Subterranean Termites



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Formosan subterranean termites are wood-destroying insects native to Central America and the Far East that have been introduced into the United States. They are considered the most aggressive and economically devastating termites in the country. Like other subterranean termites, Formosan termites feed on materials that contain cellulose, but they attack a greater variety of materials at a faster rate than native termites. They have an enormous reproductive capacity, and a typical colony will exceed 1 million insects.

Although considered "subterranean" (underground, hidden) in habit, the members of the genus *Coptotermes* regularly construct aerial (above ground) nests within the structures they infest. This possibility of both a subterranean nest close to the infested structure and an aerial nest within the infested structure can greatly increase the damage potential of these termites.

Distribution

The first infestations of Formosan termites in the state were collected in 1956 from a floating dry dock on the Houston Ship Channel in the city of Pasadena, Harris County, Texas. Since then, Formosan termites have been detected in 15 counties in Texas: Angelina, Aransas, Bexar, Dallas, Denton, Galveston, Harris, Hidalgo, Jefferson, Liberty, Nueces, Orange, Smith, Tarrant, and Travis (Fig. 1).

It is believed that Formosan termites were transported to the Houston Ship Channel in wooden cargo from the Far East. In many cargo holds,

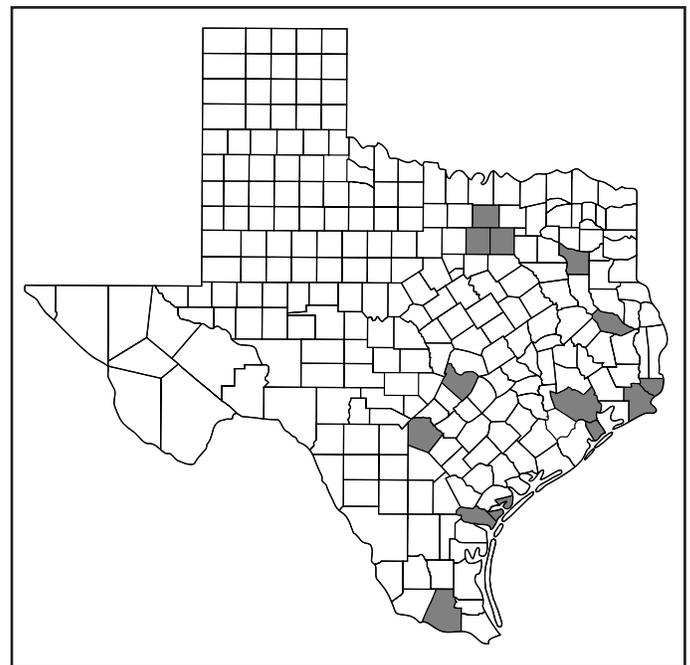


Figure 1. Known distribution of the Formosan termite in Texas.

large timbers (shores) are used to hold crates and containers to prevent their shifting during passage. At the port of destination, these timbers are unloaded from ships so the cargo can be removed.

These shoring timbers have been thought to be a primary source of introduction of the Formosan termite into the port cities of Texas and possibly other parts of Texas. Shoring timbers are used not only for their original purpose but often are taken from the docks and used by landscaping companies for construction of terraces or planting beds. If these infested timbers are not properly fumigated with an approved fumigant, the termites can travel with the timbers and infest the soil at a landscaping site. And while most of the infestations in inland cities in Texas likely occurred in this way, in Angelina County and Smith County in

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east Texas, the termites probably arrived in pine mulch used in horticultural operations. Sod from infested areas and cargo pallets that have rested on infested soil have also spread the Formosan termite into Texas.

An initial infestation in a city can become a seed colony for subsequent infestations in that neighborhood or in distant locations. For example, in 1994 a neighborhood in the northern part of Austin, Texas, discovered an infestation of the Formosan termites. Within six years, 10 more infestations were discovered in the neighborhood. An additional infestation was discovered three-fourths mile north of that neighborhood in 1999.

Identification

Formosan termites are social insects. Three forms, called castes, are found in the colony—reproductives (winged or wingless), soldiers and workers (pseudergates). Soldiers and winged reproductives (alates) are the castes used for identification purposes. Figure 2 shows the life cycle of the termite.

Winged reproductives (swarmers): Winged Formosan termite reproductives or "swarmers" are yellowish-brown in color and 12 to 15 mm long

(0.5 to 0.6 inch) (Fig. 3). They swarm at night and are attracted to lights. They have a dense covering of hair on their wings, as do other species of termites native to Texas. (Some drywood termites are also a honey-brown color and are about the same size as Formosan termites. They, too, swarm at night and are attracted to artificial lights.) The two species can, however, be distinguished by other identifying features, such as veins in the wings and characteristics of the head (Fig. 4). If in doubt, have the termites identified by the Department of Entomology at Texas A&M University (979) 458-0852 or (979) 458-0853.

Samples for identification may be mailed to Center for Urban and Structural Entomology, Department of Entomology, MS 2475, Texas A&M University, College Station, TX 77843-2475.



Figure 3. Swarmer.

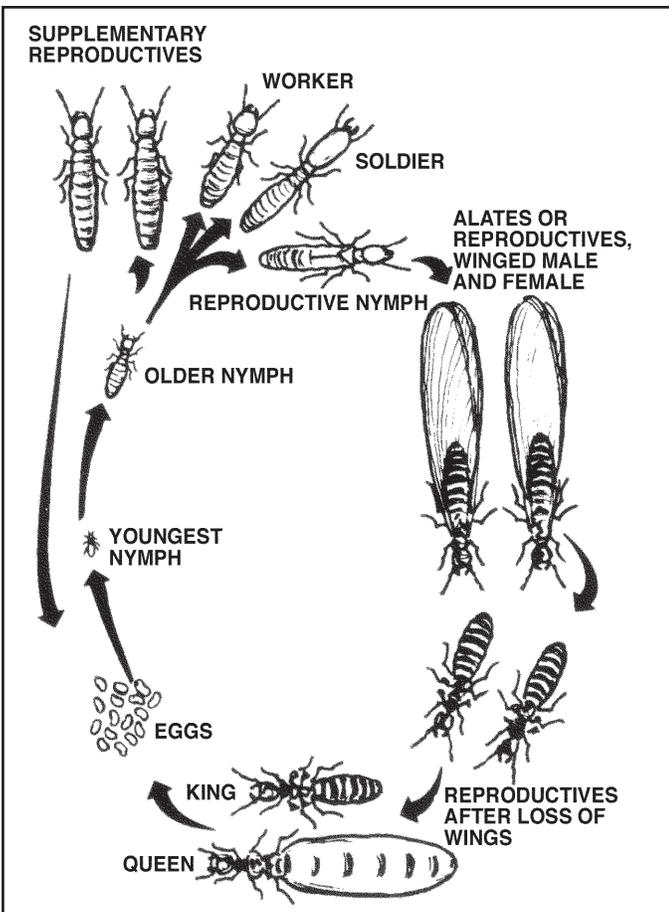


Figure 2. Life cycle.

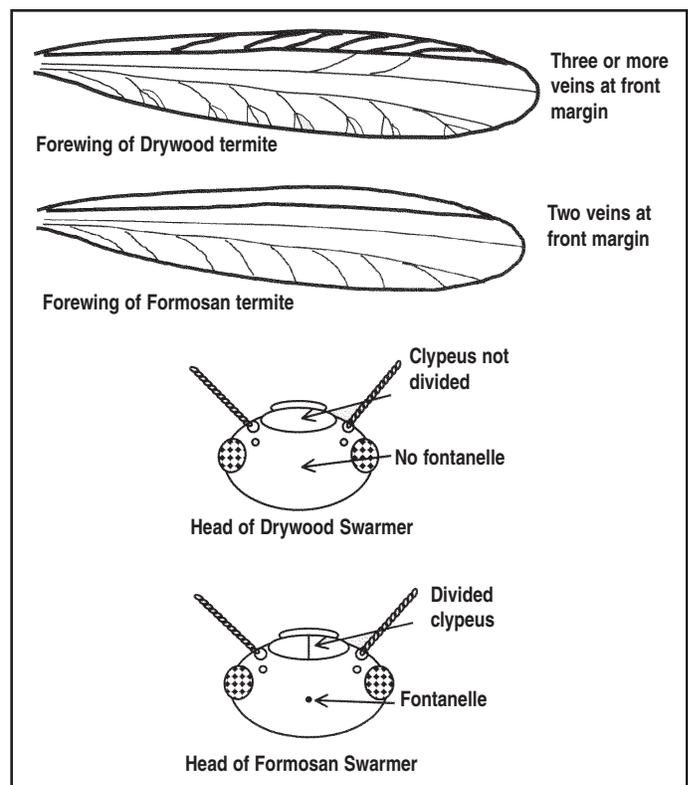


Figure 4. How to distinguish Formosan and Drywood termites.

Soldiers: Formosan termite soldiers have tear-dropped or egg-shaped heads compared to the more parallel-sided head of native subterranean termites (Fig. 5). Formosan termite soldiers are more aggressive than native subterranean termite soldiers and, when disturbed, exude a small amount of a white, defensive secretion from the fontanelle, a gland located on the front of the head.



Figure 5. Soldiers.



Figure 6. Workers

Workers: Workers of Formosan termites are white to off-white in color and are difficult to distinguish from other termite species (Fig. 6). Although ants often swarm at the same time of year as termites, it is easy to distinguish ants from termites by body, wing, and antenna shape (Fig. 7).

Biology and habits

Formosan subterranean termites belong to the same family as native subterranean termites (family *Rhinotermitidae*). They construct their primary nests in the soil of a material called "carton" (Fig. 8). When they infest a human-made structure, they can form this carton in the wall spaces (Fig. 9). Formosan termites often live for months or even years on the moisture in the carton material while they feed on wood in the above-ground portions of a structure. If the colony is separated from its subterranean nest, this aerial nest can still survive, and the termites can continue to damage the structure.



Figure 8. Carton nest.

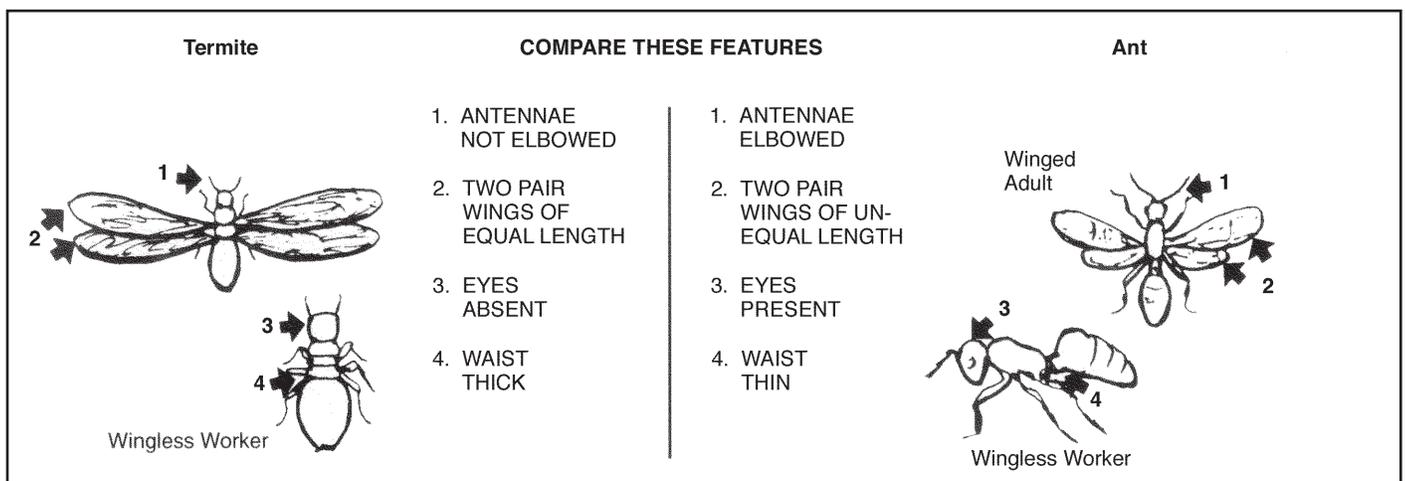


Figure 7. Distinguish ants from termites.



Figure 9. Carton in wall.

When new nests and foraging areas are established, the colony can expand rapidly. Like other termites, Formosan termites feed on cellulose, including living plants. They have been known to attack more than 47 plant species, including citrus, wild cherry, cherry laurel, sweet gum, pecan, cedar, willow, wax myrtle, Chinese elm and white oak (Fig. 10). While native subterranean termites generally feed on the softer wood produced during spring growth and avoid the harder summer growth wood, Formosan termites eat both (Fig. 11). The damage resembles that of drywood termites but lacks the fecal pellets in the feeding galleries. Like other subterranean termites, they may also chew through non-cellulose material, such as asphalt, plaster, creosote, rubber, and plastic, searching for food and moisture.



Figure 10. Damage to tree.



Figure 11. Damage in wood.

Signs of infestation

The presence of swarmers, shed wings or damaged wood signals that termites are infesting a structure.

Swarmers: The first sign of an infestation generally noticed by homeowners is the presence of swarming reproductives on window sills or near indoor lights. Because Formosan termites swarm at night and are attracted to lights, a homeowner may first notice the swarmers around porch lights or during a night-time backyard party. The presence of swarmers warns that termites are near and possibly attacking a nearby building. Swarmers inside a house almost always indicate an active infestation in the structure.

Shelter tubes: Shelter tubes constructed of soil and ascending from the soil up the side of a foundation are sure indications of a subterranean termite infestation (Fig. 12). When broken open, the active tubes will be filled with termite workers and soldiers.



Figure 12. Shelter tube.

Damaged wood: Wood damage often is not discovered initially but definitely indicates the past or present presence of termites. Frequently, damaged wood may be hidden under a coat of paint; this wood will yield a dull sound when tapped with a hard object. Wood damaged by Formosan termites resembles wood damaged by other subterranean termites in that it will contain deposits of soil.

Nests: Formosan termites often make aerial nests of chewed wood, soil, saliva, and fecal material. These nests can be as large as several cubic feet and can be found both in the soil and above ground level in buildings.

Management

Control measures include reducing the potential for subterranean termite infestation, preventing termite entry, and applying residual chemicals for remedial treatment.

Inspection

Thorough inspections can determine whether infestations and damage are present, whether remedial control measures are needed, and discover any conditions that can encourage termite attack. Inspections can be performed by anyone who knows the basic construction elements, the environmental requirements for termite survival and the behavior of subterranean termites.

Tools and equipment needed for an inspection include a flashlight, ice pick or sharp-pointed screwdriver, ladder and protective clothing (bump cap, coverall, rubber knee pads). A clipboard, graph paper and floor plan or sketch help record inspection findings and ensure that the entire structure has been examined. A moisture meter can often detect increased moisture levels in the shelter tubes hidden behind walls as well as high moisture conditions that encourage Formosan termite infestations.

Where to check outside. Examine the foundation of the house, garage and other structures for shelter tubes coming from the soil (Fig. 12). Pay particular attention to attached porches, connecting patios, sidewalks, areas near kitchens or bathrooms and narrowly confined or hard-to-see places. Check the soil moisture around or under the foundation to determine if faulty grade construction creates moist areas next to the structure. Check for termite infestation or wood decay around window and door frames and where utili-

ties (air conditioning pipes, gas and electric services) enter the structure.

Observe roof eaves and gutters for defects that might cause leaks and eventual wood rot. Inspect behind closely planted, dense shrubbery or foliage. Note particularly any earth-to-wood contact such as fences, stair carriages or trellises.

Where to check inside. Check the inside walls for shelter tubes (Fig. 13). A moisture meter is extremely helpful in locating nests hidden in wall spaces and ceilings. Probe or sound exterior porches, doors and window facings, baseboards, and hardwood flooring, being careful not to deface finished wood when probing. Examine any attached earth-filled porches, known or suspected joints, cracks or expansion joints in the foundation and unusual blistering in paint or wallboard surfaces. Discoloration or staining on walls or ceilings may indicate water leaks that can decay wood and aid termite infestation. Especially inspect where plumbing or utility pipes enter the foundation or flooring.



Figure 13. Shelter tubes on interior walls.

Check the floor covering for raised or split areas. Examine the plumbing, particularly in bathrooms on slab construction. There should be access to the bath trap area. If none exists, build a removable plumbing hatch for periodic inspection. Examine the attic for shelter tubes, water leakage, wood rot or damaged wood. If the house is of pier and beam construction, inspect the area between the floor and the underlying soil (crawl space). Crawl space should have a minimum of 18 inches between floor joists and the underlying soil and at least 12 inches between floor beams and the soil.

Examine the inside of beams, chimney bases, hearths or piers for shelter tubes. Look at areas underneath or close to earth-filled porches, patios,

planters and bathrooms for water leakage and termite damage. Remedial action may be required to control moisture if water stands underneath the house. Observe the top of the foundation wall where the floor and the wall intersect. Closely inspect plumbing and utility lines passing through the floor of foundation walls.

Preventive management

Prevention is the best management tool against Formosan termites. The best time to protect against any termite species is before and during construction. At that time, treat the soil under and around the foundation with the recommended insecticides.

After the foundation is completed, remove all wooden form boards and reinforcing stakes. During construction, avoid placing any siding or insulation material in contact with the soil or below grade. There should always be a 4- to 6-inch gap on the foundation between the soil grade and lower edge of any siding material to permit thorough regular inspections for termite activity. Pressure treated lumber containing ACZA, CCA or DOT will prevent termite infestation. Ask your builder about these materials.

Remedial treatment

Several options are available for the remedial treatment of Formosan termite infestations: barrier treatments, tent fumigation, and baiting programs. The methods may be used alone or in combination.

Barrier treatments. The purpose of this type of control measure is to establish a barrier of treated soil around a foundation's perimeter and at the point of any penetrations through slab foundations. Spot treatments may not stop Formosan termites from gaining access elsewhere in the structure. Even a thorough treatment around the perimeter of the foundation and all plumbing penetrations may not be successful if the termites can enter a structure through hidden cracks in the foundation. Find and treat all possible entry points that termites might use.

Formosan termite colonies are large and persistent about gaining access. Also, structures should be thoroughly inspected to discover and eliminate moisture sources that termites could use to build aerial nests. The aerial nests, or carton, should be located and removed. Again, a moisture meter is a valuable tool in locating aerial nests.

Fumigation. Fumigation is the use of a poison gas to penetrate the wooden parts of a structure. Professional pest control operators have the choice of two fumigants registered for the control of Formosan termites: Brom-O-Gas® (methyl bromide) and Vikane® (sulfuryl fluoride). When fumigation is completed and the structure is vented, no residual pesticide remains for future termite control or prevention. The use of fumigation alone, with no soil treatment, does not prevent re-entry of termites from the soil.

When fumigation is used, three steps must be performed, in this order, to control Formosan termites:

1. Establish a chemical barrier in the soil around the foundation of the infested structure and at all entry points such as plumbing penetrations and cracks in the foundation.
2. Remove all carton nest material.
3. Conduct a tent fumigation.

Baits. These products should be called "feed through termiticides" rather than baits. The term bait generally is reserved for substances that will attract insects. The termiticide baits presently available do not attract termites; the substances are merely palatable to them. These termite baits contain chemicals that will kill the members of the termite colony, similar to the use of baits to control fire ants. Foraging termites feed on the bait and return to the nest to share it with the other termites in the colony.

There are several choices in baiting systems. Above-ground baits are placed in contact with locations where the termites are actively feeding on wood. Within a few days, the termites will begin to feed on the bait and transfer it throughout the colony. Baits are also placed in the soil surrounding the structure. These bait stations provide an additional source of bait; however, the time required for the termites to begin to feed on the in-ground baits is several months longer than required for the termites to begin to feed on the above-ground baits.

Use of such a baiting system requires a pest control operator knowledgeable about termite biology and behavior to apply the baits correctly and monitor the process aggressively. Bait systems are an active form of termite control requiring frequent visits by the pest control operator in charge of the job.

Due to the higher rate of consumption by Formosan termites, baits must be inspected on a bi-weekly basis rather than on a monthly interval, as with native subterranean termites. The bait stations should always contain fresh bait. After several months, the interval between bait inspection and replacement can usually be extended to four weeks as the number of remaining termites declines.

Some baiting systems are used in combination with liquid termiticide applications. Other baiting systems have been designed for use without other chemicals. In general, baits require several trips to a site for installation and monitoring. Control may take from a few weeks to more than one year.

Treatment of infested trees

A tree infested by Formosan termites also requires treatment to eliminate the infestation and to prevent further damage to the tree or even the death of the tree. Termites in infested trees can spread to other structures. Applying termiticide to the surface of the bark will not control Formosan termites, which hollow out the center of a tree and construct their carton nests in the void (Fig. 10).

To manage a Formosan termite infestation in a living tree, drill into the tree above the soil line and locate the void area. This may require several exploratory drill holes before the space is located.

Then inject an approved termiticide into the void. Foaming termiticide is a valuable tool in these treatments—the foam expands within the void spaces in the tree, allowing a more thorough application of the chemicals.

Keys to management

Formosan subterranean termites pose significant potential for structural damage and expense. It is important, therefore, that a homeowner use the proper techniques to manage these termites, including:

- Accurate, positive identification of the soldiers or winged reproductives.
- Thorough knowledge of their biology and behavior.
- A comprehensive inspection based on that knowledge.
- A thorough, aggressive treatment program.
- Meticulous annual inspections to detect evidence of termite activity.
- Preventive management measures, such as maintaining a gap between soil grade and building materials.

For further information see <http://termites.tamu.edu>.

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