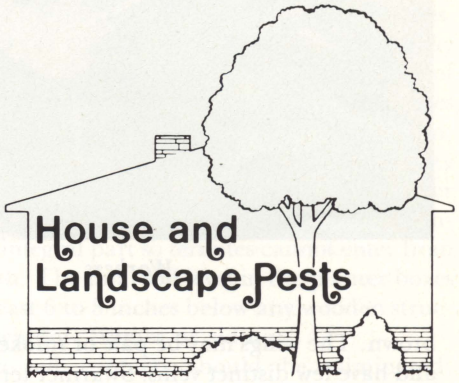
12-2-85
L-1781
20m maj. Rev.

Texas Agricultural Extension Service

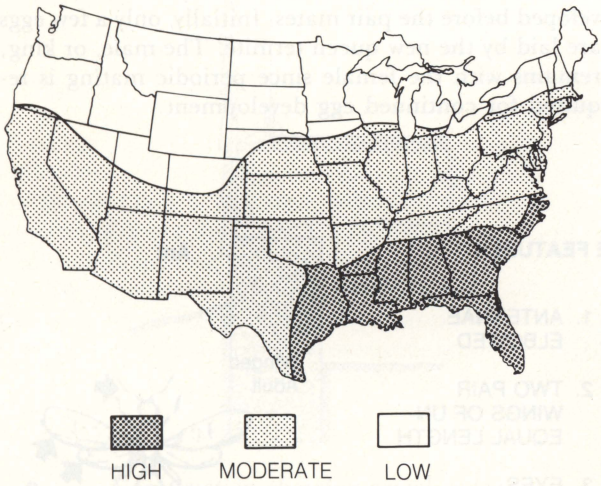
People Helping People



SUBTERRANEAN TERMITES

Philip J. Hamman*

Subterranean termites are the most destructive insect pests of wood, causing more than $1 billion of damage each year in the United States. In nature, they scavenge wood, breaking down the large amounts of dead trees and other wood which accumulate in forests. The breakdown products of wood are returned to the soil as humus. Problems begin when termites invade human structures. Their presence is not readily noticed and damage often is discovered before the termites are seen. The homeowner can practice prevention, but successful chemical control nearly always requires the services of qualified pest control operators.



Geographic distribution of subterranean termites

Distribution

Subterranean termites are found throughout the United States except Alaska. These wood-destroying insects are found throughout Texas, decreasing in frequency from the Gulf Coast to central regions. Termites represent a great hazard to wooden structures in these areas. In the High Plains and far West Texas, subterranean termites less frequently attack structures. However, homeowners in all areas of Texas should watch for subterranean termites and take preventive measures.

Identification

Subterranean termites are social insects that live in nests or colonies in the soil. Three termite forms or castes are found in the colonies — reproductives, workers, and soldiers. Individuals of each caste have three growth states — egg, nymph and adult.

Reproductives can be winged (primary) or wingless (secondary). Each has the capability to produce new offspring. Primary reproductives, also called swarmers or alates, vary in body color from coal black to pale yellow-

Winged Reproductives

*Extension urban entomologist, The Texas A&M University System.

Workers

Soldier

brown. The wings may be pale or smokey gray to brown and have few distinct veins. Swarmer termites are about ¼ to ⅜ inch long. Secondary reproductives, found in the colony, are generally white to cream colored and may have short wing buds.

Termite workers are wingless, white to grayish-white, ¼ to ⅜ inch long and make up the largest number of individuals within a colony. Workers gather food, enlarge and maintain the nest, and feed and care for all other castes in the colony.

Soldiers resemble workers in color and general appearance. However, they have large, well-developed, brownish heads with strong mandibles or jaws. Soldiers defend the colony against invaders, primarily ants. Soldiers in some types of termites generally occurring in arid regions are called *nasutes.* Nasute soldiers have pear-shaped heads with a long, tube-like projection on the front. They exude a sticky substance to entrap their enemies.

Ants and termites often swarm around the same time of year. It is important to distinguish swarming ants from termites because control measures for both are quite different in technique and price.

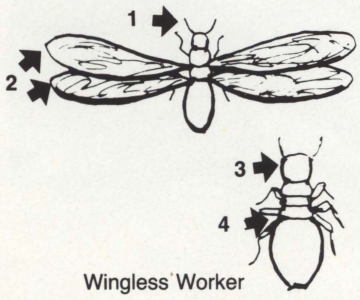
Biology and Habits

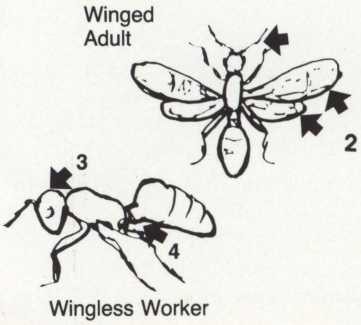
After a termite colony matures, which requires from 2 to 4 years, swarmers will be produced. Swarming occurs during the daylight, usually after a rain. Environmental factors such as heat, light and moisture trigger the emergence of swarmers. Each species has a definite set of conditions under which it will swarm. The number of swarmers produced will be proportionate to the age and size of the colony, and is otherwise regulated by environmental conditions.

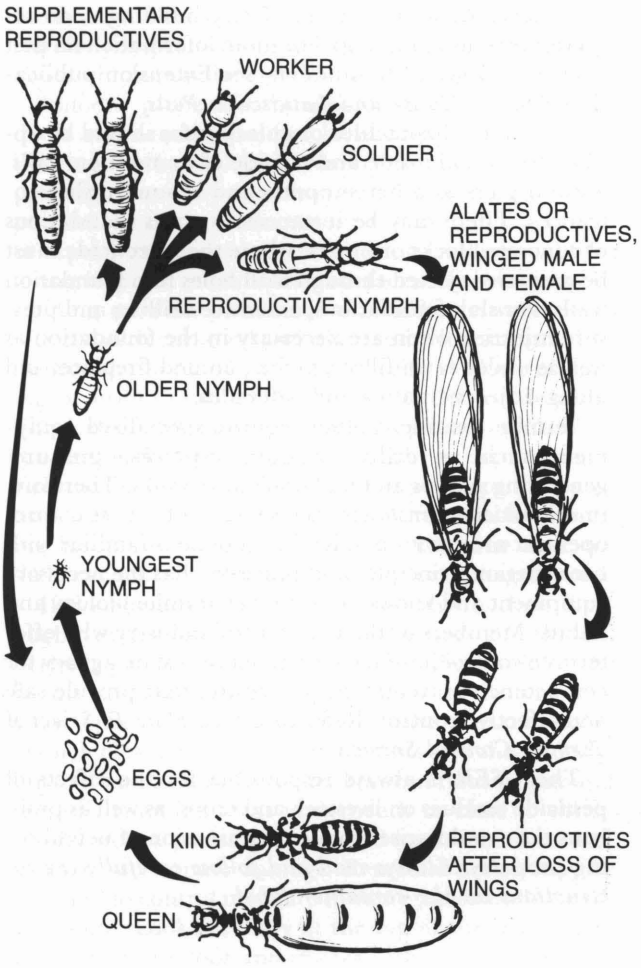
Both male and female swarmers fly from the colony and travel varying distances. They are extremely weak flyers and those traveling great distances more than likely are carried by wind currents. Only a small percentage of the swarmers survive to develop colonies; the majority fall prey to birds, toads, insects and other predators. Many also die from dehydration or mechanical injury. A pair lands and immediately seeks cover under rocks, stones or other areas in the soil. A very small nest is developed before the pair mates. Initially, only a few eggs are laid by the new queen termite. The male, or king, remains with the female since periodic mating is required for continued egg development.

COMPARE THESE FEATURES

Termite	Ant
1. ANTENNAE NOT ELBOWED	1. ANTENNAE ELBOWED
2. TWO PAIR WINGS OF EQUAL LENGTH	2. TWO PAIR WINGS OF UN-EQUAL LENGTH
3. EYES ABSENT	3. EYES PRESENT
4. WAIST THICK	4. WAIST THIN







Termite Life Cycle

Nymphs hatch from the eggs within several weeks and are cared for by the new king and queen. After two successive molts, nymphs become workers and begin to feed and care for the original pair. Eggs are not deposited continuously; in fact, few are deposited during the first year. In subsequent years, the young queen grows larger and lays more eggs. The colony stabilizes when the queen reaches maximum egg production. At that point the colony contains nymphs, adult workers, soldiers and reproductives. If the queen dies, secondary reproductives take over the queen's duties. The maximum size of a colony depends upon factors such as location, food availability and environmental conditions. Some colonies remain small while others contain up to several hundred thousand individuals.

New colonies form when the old colony produces swarmers or groups of termites become isolated from the main colony and establish subcolonies. This is called colony splitting. These subcolonies may exist independently or unite with the main colony.

Subterranean termites derive their nutrition from wood and other material containing cellulose. Paper, cotton, burlap or other plant products often are actively attacked and consumed by termites. Subterranean termites cannot digest cellulose. They depend on large numbers of one-celled animals (protozoans) that exist in the termite intestine to break down the cellulose to simple compounds that the termites can digest. Worker termites and older nymphs consume wood and share their nourishment with the developing young, other workers, soldiers and reproductives.

Termites are highly attracted to odors of wood-decaying fungi which, through the decay process, make the wood easier to penetrate. In some instances, the fungus provides a source of nitrogen in the termite diet.

Moisture is important to subterranean termites. Subterranean termites have relatively little resistance to dehydration. To survive, they must maintain contact with the soil (their primary moisture source) or other above-ground moisture sources such as in structures having defective plumbing or guttering.

They also must protect themselves from temperature extremes and attack by natural enemies such as ants and other insects. Termites that forage above ground for food protect themselves with shelter tubes. These tubes are constructed by the worker termites from particles of soil or wood and bits of debris held together by salivary secretions. The tubes may be thinly constructed or large and thick-walled to accommodate large numbers of termites moving vertically between the soil and the food source. This contruction material also is found lining the galleries constructed in wood being attacked and aids in identifying termite-damaged wood. Shelter tubes often are used to bridge masonry or other objects, allowing termites access to a food source (wood) above ground.

Damage

Dead trees and brush are the original food source of subterranean termites. When land is cleared of this cellulosic material and houses are constructed on these sites, these structures become subject to attack. Termites can enter buildings through wood that is in direct contact with the soil, by building shelter tubes over or through foundations, or by entering directly through cracks or joints in and under foundations.

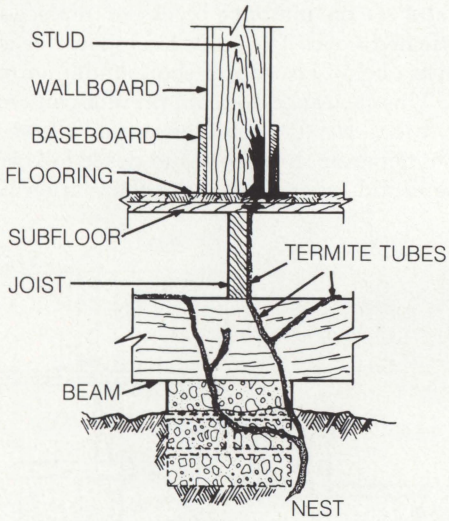
Termite shelter tubes on foundation wall

Any material in direct contact with the soil, such as trees, vines or plumbing fixtures, serves as an avenue of infestation. Rarely, subterranean termite swarmers may be blown into or on structures and then initiate a new colony.

Signs of Infestation

Generally, the first sign of infestation homeowners notice is the presence of swarming reproductives on windowsills or near indoor light. Swarmers found inside the house nearly always indicate an active infestation in the structure. The presence of swarmers outdoors is a natural phenomenon, but should warn that termites are in the vicinity and possibly attacking a nearby building.

Another indication is the presence of wings, discarded by swarmers as a normal part of their behavior, that may be found near emergence sites, on windowsills or in cobwebs. Infestations also can be detected by the presence of shelter tubes going up the sides of piers, utility entrances or foundation walls.

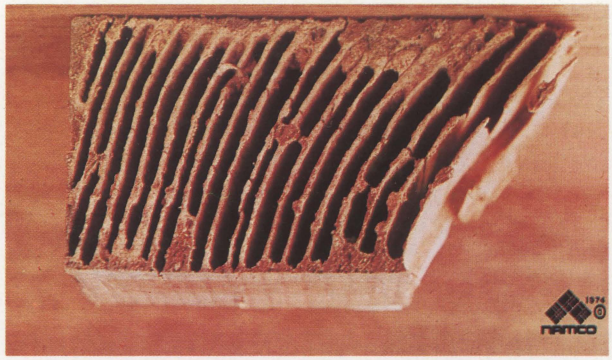


Typical termite shelter tubes

Wood damage often is not found initially, but it definitely indicates termite infestation. Any wood-to-soil contact is a potential site of entry into a home. Wood which yields a dull, thudding sound when struck by a screwdriver or hammer should be examined. Careful probing of suspected areas with a sharp, pointed instrument such as an ice pick will disclose termite galleries or damage.

Characteristics of Damaged Wood

Subterranean termite damage almost always is confined to the soft, springwood growth of the wood. Tunnels tend to follow the wood grain. They are either lined with the same material used to construct shelter tubes, or have a pale, spotted appearance resulting from soft fecal material plastered on tunnel surfaces. Determine if moisture sources are present that may cause wood



Typical wood damage by subterranean termites
(Photo courtesy of Van Waters and Rogers)

decay which can encourage subterranean termite infestation. Extensive deterioration from wood decay can be confused with termite damage. Other insects attack wood and their appearance or the nature of their damage varies widely. Refer to L-1782 *Drywood Termites;* L-1783 *Carpenter Ants;* L-1826 *Carpenter Bees;* and L-1784 *Wood Destroying Beetles* for more information.

Control

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

Inspection

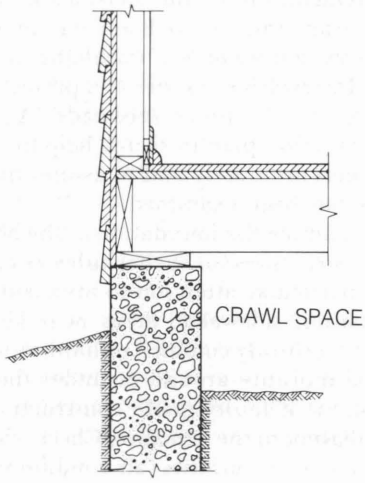
Thorough inspections determine the presence of infestations and damage, the need for remedial control measures and conditions conducive to termite attack. Inspections can be performed by anyone who has knowledge of the basic construction elements, the environmental requirements for termite survival and the behavior of suberranean termites. Tools and equipment needed for an inspection include a flashlight, ice pick or sharp-pointed screwdriver, ladder and protective clothing (bumpcap, coverall, rubber knee pads). A clipboard, graph paper and floorplan or sketch help to record inspection findings accurately and to assure that the entire structure has been examined.

Outdoors, examine the foundation of the house, garage and other structures for shelter tubes coming from the soil. 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 adjacent to the structure. Check window and door frames and where utilities (air conditioning pipes, gas and electric services) enter the structure for termite infestation or wood decay. Observe roof eaves and guttering closely for defects that might cause leakage 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. Open and examine any exterior electrical meter or fuse

boxes set into the walls, a common point for infestation. Carefully inspect wood materials adjacent to swimming pools which may be splashed frequently by water.

Indoors, probe or carefully sound exterior porches, doors and window facings, baseboards and hardwood flooring. Be careful not to deface finished wood when probing. Carefully examine any attached earth-filled porches. Examine all 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 which can decay wood and aid termite infestation. The inspection should be particularly critical where plumbing or utility pipes enter the foundation or flooring. Check floor coverings for raised or split areas. Carefully examine the plumbing, particularly in bathrooms on slab construction. There should be access to the bathtrap area. If none exists, construct a removable plumbing hatch for periodic inspection. Examine attic for shelter tubes, water leakage, wood rot or damaged wood.

If the house is of pier and beam construction, thoroughly inspect the area between the floor and the underlying soil (crawl space). Examine the inside of the beams, chimney bases, hearths or piers for shelter tubes. Crawl-space construction should have a minimum of 18-inch clearance between floor joists and the underlying soil, and at least 12 inches between floor beams and the soil. Examine 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. Look carefully at the top of the foundation wall where the floor and the wall intersect. Closely examine plumbing and utility lines which pass through the floor of foundation walls.



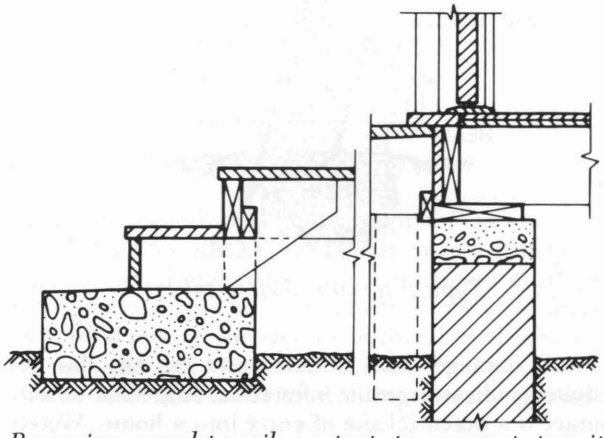
Construction showing crawl space

Prevention

Many termite problems encountered by homeowners can be prevented through sound initial designs, mechanical alterations and sanitation. The basic premise behind prevention is denying termites access to food (wood), moisture and shelter.

During preconstruction, planning is extremely important. Position or modify the construction site so the soil grade slopes away from the structure in all directions. Houses already constructed may need remedial grading or installation of positive drain lines. Soil-filled porches, patios, sidewalks or breezeways should slope gently away from the house. There should be at least 2 inches of clearance between soil-filled porches and planter boxes and the house. This spacing will not prevent infestation, but will allow free air movement and an opportunity for visual inspection or mechanical control. Planter boxes, if not separate from the house, should be constructed as an integral part so termites cannot enter from the soil beneath. The final soil level in the planter boxes should be at least 6 to 8 inches below any wooden structure such as window frames or siding.

All wood-to-soil contacts should be eliminated, including attached fence posts, stair casings, trellises and door facings. These structures can be removed from the soil and set on masonry blocks or replaced with pressure-treated wood. The grade level should be at least 6 to 8 inches below the top of the foundation or wall covering. This clearance does not prevent construction of shelter tubes over the foundation but allows visual inspection. Separate shrubbery and dense foliage from the house to aid inspection of the foundation line.



Removing wood-to-soil contact to prevent termite entry

A plastic film used to cover at least 70 percent of the area underneath the house may prevent moisture build-up in the subflooring. Foundation wall vents should be positioned opposite each other and close enough to the corners of the foundation to provide cross flow ventilation and eliminate dead air spaces. A rule of thumb for the number and size of vent opening is 1/150 of the net area covered by the building.

Wood used in construction exposed to constant wetting from rain should be pressure-treated. Wood marked "Wolmanized" is worth the added cost. Rest wood por-

ches, steps and stair carriages on concrete bases and separate them from the soil by at least 6 inches. Seal openings through the foundation, such as plumbing traps and service utilities, with a good grade of roofing coal tar pitch or rubberoid bituminous sealer. Remove extraneous cellulose material, such as wood scraps or stumps, from underneath and around foundations.

Chemical Treatment

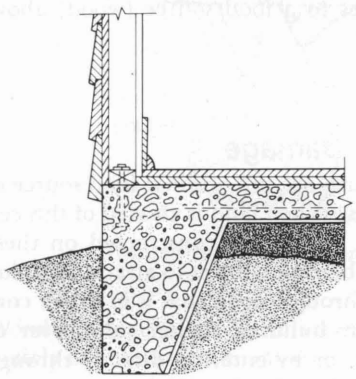
Subterranean termites live in the soil and their attacks on houses and other above-ground wooden structures emanate from there. Chemicals applied to the soil can deter attacks for many years. Develop a barrier of chemically-treated soil between the structure and deeper soil areas to prevent termite entry. Products containing chlordane, heptachlor, a mixture of the two or chlorpyrifos are effective. Tests conducted at a United States Department of Agriculture Forest Service research facility show that chlordane treated soil prevents termite infestations for as long as 35 years; heptachlor for 29 years; and chlorpyrifos for 16 years.

Chemical soil treatment before construction can be as effective as treatment of existing structures and is considerably less expensive. Chemicals applied during certain phases of construction eliminate the necessity of drilling injection holes, allow more accurate application and do not disrupt the household. Unfortunately, many municipalities do not require pretreatment in building codes or do not enforce compliance. When building a home, insist that the contractor or architect specify pretreatment. An examination of city building code requirements also may help. For more information on pest control and pesticide products, see Extension publication B-1373, *House and Landscape Pests.*

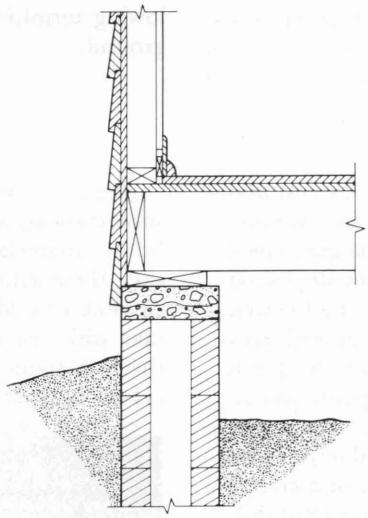
Chlordane, heptachlor or chlorpyrifos should be applied to the soil inside and outside of foundation walls, around piers or other supports and around utility entrances. There may be instances, such as foundations of concrete blocks or bricks, where the insecticide must be pressure injected through drill holes into foundation walls. For slab foundations, extensive drilling and pressure injection often are necessary in the foundation as well as under earth-filled porches, around fireplaces and along adjacent patios and sidewalks.

Termite treatment often requires specialized equipment such as drills, pressure injectors, pressure-generating pumps and high-gallonage tanks. Therefore, *in almost every instance,* the services of a pest control operator are recommended because he is familiar with construction principles and practices, has the necessary equipment and knows subterranean termite biology and habits. Members of the pest control industry who offer termite control have been certified by a state agency for competence in treatment procedures that provide safe and effective control. Refer to L-1785 *How To Select A Termite Control Service.*

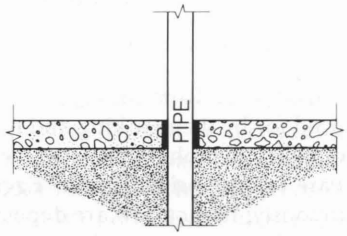
The *USER* is always responsible for the effects of pesticide residues on livestock and crops, as well as problems that could arise from contamination of neighboring property. *Always read and follow carefully the instructions on the container label.*



Slab house must be completely insulated from the ground by treated soil



Crawl space houses are treated only around the foundations and piers



Pipes and utility lines entering through walls and slabs are heavily treated

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Zerle L. Carpenter, Director, Texas Agricultural Extension Service, The Texas A&M University System.
20M—8-85, Revision.

ENT