



Subterranean termites

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What You Should Know

- Termites eat and digest cellulose, and are attracted to moist or decayed wood.
- Subterranean termites need wood-to-soil contact and construct mud tubes to stay protected.
- Mature termite colonies can have over 1 million members and consume one pound of wood per day.
- Thorough termite inspections and treatments should be completed by licensed professionals.

Subterranean termites are social insects with a caste system, and belong to the order Isoptera and family Termitidae. These termites are closely related to drywood (*Kalotermitidae*) and dampwood (*Termopsidae*) termites. Although all three kinds of termites can be found in Utah, the eastern subterranean termite (Fig. 1), *Reticulitermes hesperus*, is the most common. Termites can be found throughout Utah, but are most common in the southern counties. Termites are considered the most destructive insects in the world because of their feeding damage to wooden structures. In the U.S., over \$5 billion is spent on termite management every year. People in New Orleans spend over \$350 million annually to control termite damage.



Fig. 1. Eastern subterranean termite soldiers.¹



Fig. 2. Subterranean termites build protective mud tubes to prevent desiccation while foraging.²

Termite Feeding

Animals cannot directly digest wood, but some have developed gut symbionts to break down cellulose for nutrition. Termites are not born with the symbionts, but are dependent on gut protozoa to aid in digestion. Older workers must pass on the beneficial gut symbionts mouth-to-mouth or anus-to-mouth along with food through a process called trophallaxis. Symbionts allow termites to eat the cellulose found in wood and wood by-products (e.g., paper, plywood, cotton, burlap). Carpenter ants, by comparison, do not eat wood, but use wood to make nests for their offspring.

Before human expansion, subterranean termites fed on dead trees and other woody plants. But as wooden structures developed in termite habitat, termites took advantage of the food availability. Any wood material in direct contact with the soil is a point of infestation for termites. Workers are especially attracted to wood-decaying fungi in rotting wood.

A subterranean termite infestation can go unnoticed for 1-8 years, because the colony builds very slowly at first. Some nests may be 18-20 feet below the soil surface. Homeowners do not generally notice feeding damage, but do see winged swarmers in the spring, mud tubes (Figs. 2, 7) bridging non-wooden structures, or frass (feces) on or near wood.

Description and Life Cycle

Termites are commonly mistaken for ants, especially the winged forms (Fig. 3). Three body characters distinguish termites from other insects. Termites are soft-bodied and have a broad waist compared to ants that have a hardened exoskeleton and a constricted waist. Termites have straight antennae that resemble a string of beads, while ants have elbowed antennae. Termite swarmers have both pair of wings about the same size and shape, but winged ants have large forewings compared to the hind wings.

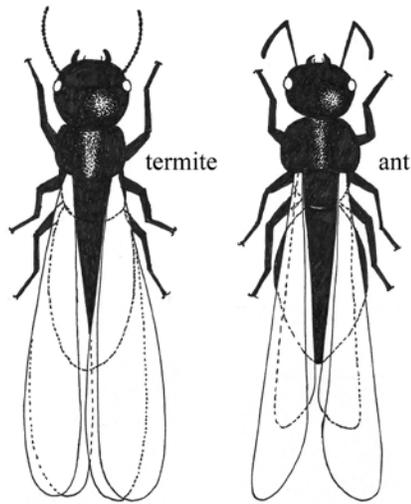


Fig. 3. Winged termite and ant.³

Termites go through simple metamorphosis (egg, nymph, adult), and start new colonies by producing winged swarmers. Male and female swarmers mate, find a suitable habitat to start a new colony, and break off their wings. Now the king and queen will begin to forage for food and construct a nest, preferring areas with decayed wood in the soil. At first, egg production is slow because the king and queen have all the responsibilities. But as eggs hatch and develop into nymphs, the queen begins to divide the labor into a caste system. Eventually, workers, soldiers and secondary reproductives will be produced.

King and Queen: the king is slightly larger than the workers in the colony and is white in color. The queen is also white and has a physogastric, or greatly distended, abdomen for laying eggs (Fig. 4). With her bloated body, she is not very mobile and depends on workers for food.

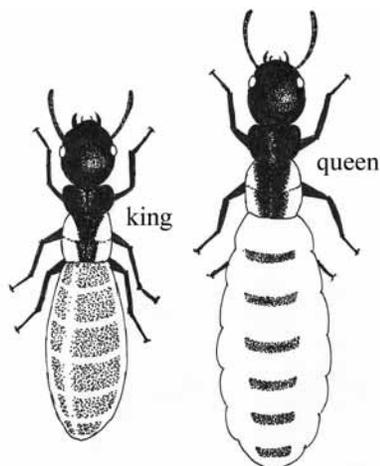


Fig. 4. Termite king and queen with enlarged abdomens.³

Workers: blind and wingless with white to grey bodies; and range from 1/4-3/8" long (Fig. 5). Workers represent 80-95% of the colony. They clean the nest, construct new mud tubes, forage for food, care for young, and feed all the other members of the colony.

Soldiers: resemble workers except they have enlarged mandibles, are wingless and blind, and may have darkened heads and be slightly larger than workers (Figs. 1, 5). Soldiers represent 5-10% of the colony. They defend the colony from ants, birds and other predators.



Fig. 5. Formosan termite soldiers and workers.⁴

Swarmers: vary in color from coal black to yellow brown; long, smoky grey wings that extend past the abdomen; and range from 1/4-3/8" long (Fig. 6).



Fig. 6. Eastern subterranean termite swarmers.⁵

Secondary Reproductives: resemble workers except they usually have extended abdomen and wing pads. Secondary reproductives represent less than 1% of a colony, and are located in satellite colonies to provide supplemental egg production.

Mud Tube Construction

Subterranean termites require high temperature and moisture levels (75-95°F) to prevent desiccation. As a result, most colonies are found in the soil where conditions are relatively constant. Workers must forage away from the nest, but rarely will be exposed to the air. To prevent desiccation and predation, workers build mud tubes to expand the foraging potential of a colony. The mud tubes are a mixture of saliva, wood and soil. Mud tubes, or shelter tubes, bridge gaps between direct wood contact. Workers will build mud tubes over almost anything, including concrete, plaster, brick, and metal. Active mud tubes will be moist inside, while inactive tubes may be dry and crumbly.

There are three main types of termite mud tubes: working, exploratory and drop tubes.

Working or utility tubes (1/4-1" in diameter) are wide and support thousands of active foraging termites (Figs. 2, 7). Some working tubes develop "lanes" to direct traffic to and from the colony. Exploratory or migratory tubes (<1/16" in diameter) are narrow and fragile tubes designed to find new food sources. Drop or suspended tubes are also narrow and exploratory. But drop tubes are created in an attempt to make working tubes more accessible, and are usually suspended from wooden ceilings.



Fig. 7. Eastern subterranean termite mud tubes on a post.⁶

Communication and Sanitation

Termites are blind or have poor vision, and spend their entire lives under the soil or within mud tubes. A fully developed subterranean termite colony has well over 1 million members and can forage over 24,000 ft² or 1/2 acre. To compensate, termites have developed other means of communication through body chemicals called pheromones. Each colony will develop their own specific odor. The queen releases pheromones to regulate caste formation (e.g., how many soldiers should be produced to protect the colony, etc.), and the foraging workers leave a trail pheromone to direct traffic to food. Pheromones are passed throughout the colony by constantly grooming. Grooming also keeps the colony healthy by removing pathogens (e.g., bacteria, fungi) picked up by workers. Sound is another means of termite communication; soldiers will bang their heads in tubes to alarm the colony of potential threats.

Where to Look for Termites

Thoroughly examine the exterior structure for termite activity (e.g., mud tubes, frass, swarmers), especially near wood-to-soil contact or cracks in the structure. Any areas with increased moisture is particularly attractive.

- foundation, slabs, sill plates, joists
- garage, porches or crawl spaces
- sidewalks or steps
- roof eaves or gutters
- windows, AC/fan units
- wood piles, trellises and other vegetation

Also inspect for termites inside, paying close attention to areas with high moisture. Sometimes feeding can cause wood to crack or paint to blister (Fig. 9).

- joists and other basement supporting structures
- plumbing and heating units
- drywall, baseboards, window frames



Fig. 8. Subterranean termites often feed along the spring wood and leave behind frass.⁷



Fig. 9. Heavy subterranean termite feeding damage can cause paint to blister.⁴

Termite Prevention

Inspecting for termites on a regular basis is the first step to minimizing feeding damage (Figs. 7-10). But there are many ways to make a home or other structure less attractive to swarming termites, including:

- eliminate wood-to-soil contact when possible, and keep wood and mulch away from the home
- seal all cracks and holes in the foundation
- wood siding, stucco and foam board should be at least 6" away from the ground
- keep vegetation trimmed and away from the foundation; grade the soil away from the home so that water does not accumulate
- discard infested wood - do not bury debris
- repair leaking faucets, plumbing and other sources of water; keep gutters clean and fix leaky roof/eaves
- reduce humidity in crawl spaces, basements, and attics by using additional ventilation
- use thick plastic sheeting on soil in crawl spaces and porches to provide a physical barrier



Fig. 10. Subterranean termites can shred solid wood beams.⁴

Termite Control

In general, homeowners are not equipped for termite control because of the speciality training and tools it requires to effectively treat the colony. Termite control is expensive because it is labor intensive. There are several management tactics available in Utah, including liquid insecticides and baiting.

Liquid insecticides. Effective termiticides provide a chemical barrier around the exterior of the home. Liquid insecticides should be slow-acting, picked up by foragers and passed throughout the colony by grooming. Often this involves trenching down to the top of the footing, applying the chemical, and backfilling the trench with insecticide. Depending on the type of construction, rodding can be used in combination with trenching to deliver insecticide behind concrete walls or floors. More recently, termiticides are applied at very low rates and require less than 8 oz of active ingredient to treat an entire home. Fipronil (Termidor[®]) is a non-repellent product effective for at least 10 years.

Baiting. Using baits is an alternative to liquid insecticides, but usually is more expensive and not an instant method of control. Baiting ground stations are placed around a home and checked on a regular basis (Fig. 11). Sometimes the baits are used only for monitoring termite activity and contain no insecticide. Initially, baits can be considered "hit or miss" because termites accidentally bump into the stations and begin to eat wood with insecticide. Baits are also slow-acting and attractive to foraging workers. Products registered in Utah include: benzamide (Recruit II[®]), sulfluramid (FirstLine[®]), diflubenzuron (Labyrinth[®]), and hydramethylnon (Subterfuge[®]).



Fig. 11. Termite baiting systems can slowly kill a colony.⁴

¹ Image courtesy of USDA-ARS Photo Unit (www.ipmimages.org).

² Images courtesy of USDA Forestry Service Archive (www.ipmimages.org).

³ Images courtesy of Scott Bauer, USDA-ARS (www.ipmimages.org).

⁴ Images courtesy of Susan Ellis (www.ipmimages.org).

⁵ Image courtesy of Terry Price, Georgia Forestry Commission (www.ipmimages.org).

⁶ Image courtesy of Erin Hodgson, Utah State University Department of Biology (www.utahpests.usu.edu).

Precautionary Statement: All pesticides have benefits and risks, however following the label will maximize the benefits and reduce risks. Pay attention to the directions for use and follow precautionary statements. Pesticide labels are considered legal documents containing instructions and limitations. Inconsistent use of the product or disregarding the label is a violation of both federal and state laws. The pesticide applicator is legally responsible for proper use.

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