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Subterranean Termites

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Introduction

Subterranean termites are the most destructive insect pests of wood in the United States. They are found throughout Utah causing more damage in the southern than in the northern part of the state. In nature any type of wood is attacked if it comes in contact with moist soil. The breakdown products of the wood are returned to the soil as humus. Their presence is usually unnoticed and damage often is discovered before the termites are seen. Problems result when termites invade human structures. The homeowner can practice prevention and perhaps treat small infestations, but successful chemical control of large infestations usually requires the services of qualified pest control operators.

Identification

Subterranean termites are social insects that maintain nests or colonies in the soil. At least three forms or castes are found in the colonies -- reproductives, workers, and soldiers. Members of each caste go through three growth stages: from egg, to nymph, to adult.

Reproductives can be winged or wingless, and each has the capability to produce new offspring. Winged reproductives, also called swarmers or alates, vary in body color from coal black to pale yellow-brown. The wings may be pale or smoky gray to brown and have few distinct veins. These termites are about 1/4 to 3/8 inch long. Wingless 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, 1/4 to 3/8 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 squirt or exude a sticky substance to entrap enemies of the colony.

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

Termites
Antennae not elbowed
Two pair of wings of equal length
Eyes present or absent
Waist thick
Soft-bodied
Usually light-colored

Ants
Antennae elbowed
Two pair of wings of unequal length
Eyes always present
Waist thin
Hard-bodied
Usually dark-colored

Biology and Habits

Termite colonies mature after 2 to 4 years and then swarming occurs. Each species has a definite set of conditions under which it will swarm. Environmental factors such as heat, light and moisture trigger the emergence of swarmers, which usually begins in the daylight after a rain. The number of swarmers produced will be proportionate to the age and size of the colony, but regulated by environmental conditions. The most common western species, Reticulitermes hesperus Banks, swarms in the spring; in some western species, swarming occurs in late summer.

Swarming reproductives fly from the colony and travel varying distances. They are extremely weak flyers so those traveling great distances more than likely are carried by wind currents. Only a small percentage survive to develop colonies; the majority end up as food for birds, toads, insects and other predators. Many also die from dehydration or mechanical injury. A pair of swarming termites eventually lands and immediately seeks cover under rocks, stones or other areas in the soil where a very small nest is developed before they mate. They shed their wings, usually after mating; the wings break off along a weakened line at the base, leaving only a stub (the scale) attached to the thorax. At first, only a few eggs are laid by the new queen termite so the male, or king, remains with the female since periodic mating is required for continued egg development.

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. In subsequent years, the young queen grows larger and lays more eggs. When the queen reaches maximum egg production the colony stabilizes with nymphs, adult workers, soldiers and reproductives. If the queen dies, secondary reproductives can produce fertile eggs. The 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.

Damage

Subterranean termites derive their nutrition from food composed of cast skins and feces of

other individuals, dead individuals and from wood and other material containing cellulose. Paper, cotton, burlap or other plant products often are actively attacked and consumed by termites. The cellulose is digested by flagellated protozoans or bacteria living in the termites digestive tract. Worker termites and older nymphs share their nourishment with the developing young, other workers, soldiers and reproductives.

Moisture is important to subterranean termites. They are attracted to odors of wood-decaying fungi which make the wood easier to penetrate. In some instances, the fungus provides a source of nitrogen in the termite diet. They also have little resistance to dehydration. To survive, they must maintain contact with moist soil or other above-ground moisture sources such as in structures having defective plumbing or guttering.

Termites also must protect themselves from temperature extremes and attack by ants and other insects. Those that forage above ground protect themselves with shelter tubes constructed 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 between the soil and the food source. Connecting tubes often are used to bridge masonry or other objects, allowing termites access to a food source above ground.

Dead trees and brush are the original food source of subterranean termites. When land is cleared of this material and houses are constructed on these sites, these structures become subject to attack. Buried scrap wood often provides a food source to establish a colony. The termites can then 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.

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

The first sign of infestation homeowners generally notice is the presence of swarming reproductives on windowsills or near indoor lights. Their presence in or near a structure could indicate the presence of an active infestation. If so, there is no need to panic -- termites can and do cause substantial structural damage to homes, but it is highly unlikely that they will bring the house crashing down around you in the near future. There is usually time to take corrective measures before significant damage is done, unless the colony has been active for a long period of time.

Wood damage often is not found at first so careful observations must be made. 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.

Detection

Control measures include reducing the potential for subterranean termite infestation, preventing termite entry and applying residual chemicals for remedial treatment. Inspections can be performed by anyone who has knowledge of the basic construction elements, the

environmental requirements for termite survival and the behavior of these termites.

Outdoors, examine the foundation of the house, garage and other structures for characteristic 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. 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, stairs 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. Examine any attached earth-filled porches, all known or suspected joints, cracks or expansion joints in the foundation and unusual blistering in paint or wallboard surfaces. The inspection should be especially critical where plumbing or utility pipes enter the foundation or flooring. Carefully examine the plumbing, particularly in bathrooms on slab construction. Examine attics for shelter tubes, water leakage, wood rot or damaged wood.

If the house has a crawl space, inspect the inside of the beams, chimney bases, hearths or piers for shelter tubes. Examine areas underneath or close to earth-filled porches, patios, planters and bathrooms for water leakage and termite damage. Closely examine plumbing and utility lines which pass through the floor of foundation walls.

Control and Insecticide Treatments

We do not generally recommend that homeowners attempt to treat existing termite infestations. The special training, expertise and equipment required to do the job properly are generally beyond the experience and/or financial assets of the average homeowner. However, small infestations in a limited area can often be safely and effectively treated by the howmeowner.

Motivated homeowners could conceivably perform trenching and make foundation treatments on their own, but most people are not willing or able to invest this much time and effort. Detailed information about trenching and foundation treatments is provided in the USDA Bulletin listed under Additional Information.

The most effective methods of controlling subterranean termites are soil poisoning with insecticides, replacing damaged wood, breaking soil to wood contact, and improved ventilation. Methods that are of little value include fumigation (except under slabs), spraying of exposed timbers, pressure injection of exposed timbers, and the use of entomophagous (insect-eating) nematodes to control termites (which have not been shown to be effective against termites except under laboratory conditions).

Effective termite soil treatment requires laying a complete insecticide barrier around and under the house in the soil. This involves the use of one or more application techniques,

depending on the individual structure and the equipment available to the pest control operator. Insecticide may be applied by trenching, rodding and/or drilling.

Trenching involves digging access trenches down to the top of the footing, applying the chemical, and backfilling the trench -- treating insecticide in the soil. Rodding is often used in place of, or in combination with, trenching. Drilling is used in combination with rodding to get insecticide into the soil beneath or behind concrete floors or walls. It is also used to treat structural voids, such as the foundation voids formed by concrete block construction, which can serve as termite access areas. A good termite control job is not cheap, until you compare it to the alternative.

Table 1 shows the active ingredient summary for insecticides labeled for termite control using soil treatments around domestic dwellings. Many labels include more wide-ranging label sites, as indicated by the notes in the table. However, the label of the specific products should be consulted to determine whether a given site can be treated with that product.

Chemicals applied for termite control in the past (mostly chlorinated hydrocarbons) were able to deter termite attacks for many years. These very- long-residual products are no longer available, and choices available today only include organophosphates, carbamates, synthetic pyrethroids, and a few other types of insecticides which generally have less residual life.

Among the insecticide classes listed above, the most widely-registered active ingredients include the organophosphate insecticide chlorpyrifos, the synthetic pyrethroids cypermethrin and permethrin, and the slow-release toxicant sulfluramid.

Bait formulations of termite insecticides are available and have been shown to be effective in detecting and controlling termites. Baits utilize the active ingredients diflubenzuron, hexaflumuron, hydramethylnon, or sulfluramid. Diflubenzuron and hexaflumuron are insect growth regulators, while hydramethylnon and sulfluramid are slow-release toxicants.

Other insecticides used for termite control are the wood preservatives. These active ingredients include boron compounds, naphthenates, pentachlorophenol, and others.

Methyl bromide is a fumigant for use only in vacated structures or other specialized situations. It is not available for purchase use except by licensed commercial applicators and requires special training and equipment to be used safely.

Table 1. Insecticide active ingredients in products labeled for termite soil treatments. Numbers following active ingredients show the total number of products, number of homeowner-type products, and number of commercial/professional-type products supposedly registered in Utah.

Baits:
DIFLUBENZURON (1:0/1)
HEXAFLUMURON (2:0/2) [E]
HYDRAMETHYLNON (1:0/1) [C]
SULFLURAMID (5:2/3) [A] [B] [C] [E]

Carbamates:

BENDIOCARB (2:0/2) [A] [C]

Organophosphates:
CHLORPYRIFOS (41:17/24) [A] [B] [C] [D] [E]
CHLORPYRIFOS+XYLENE RANGE AROMATIC SOLVENT (1:0/1) [C]

Synthetic Pyrethroids:
BIFENTHRIN (2:0/2) [C] [E]
CYFLUTHRIN (8:1/7) [A] [C]
CYFLUTHRIN+MGK 264+PRALLETHRIN (1:0/1)
CYPERMETHRIN (6:0/6) [A] [B] [C] [D] [E]
DELTAMETHRIN (5:2/3) [A]
FENVALERATE (1:1/0) [B] [E]
LAMBDA-CYHALOTHRIN (3:2/1) [C]
PERMETHRIN (6:0/6) [A] [B] [C] [E]
TRALOMETHRIN (1:0/1)

Wood Preservatives:
BORAX+COPPER NAPHTHENATE (2:0/2)
BORIC ACID (1:0/1)
CALCIUM OXYTETRACYCLINE (1:0/1) [A]
COPPER NAPHTHENATE (24:0/24) [D] [E]
DISODIUM OCTABORATE TETRAHYDRATE (4:0/4) [C] [D] [E]
OXINE-COPPER (2:0/2)
PENTACHLOROPHENOL (2:0/2) [E]
ZINC NAPHTHENATE (2:0/2)

Other Insecticides and Fumigants:
FIPRONIL (2:0/2) [A] [C] [E]
IMIDACLOPRID (4:0/4) [A] [B] [C] [E]
METHYL BROMIDE (5:0/5)

- NOTES -

SOME FORMULATIONS SUPPOSEDLY LABELED FOR THE FOLLOWING SPECIFIC SITES:

[A] FOR PERIMETER SOIL TREATMENTS (TRENCHING)
[B] FOR WALL VOIDS AND CHANNELS
[C] FOR BUILDING FOUNDATION SOIL TREATMENTS
[D] FOR CONSTRUCTION WOOD
[E] FOR FENCE POSTS

Pesticides recommended for trenching treatments include chlorpyrifos (Dursban, Duration, Empire, Ortho-Klor, etc.), permethrin (Dragnet, Flee!, Torpedo, etc.), cypermethrin (Demon, Prevail, etc.), and bifenthrin (Biflex). Many of these are intended for use by pest control operators (PCO's) only.

Supplemental treatments of wall voids and channels in damaged wood can be made using certain formulations of bendiocarb (Ficam W) and chlorpyrifos (Dursban LO). Permethrin in

the form of Pounce 3.2 EC (EPA Registration No. 279-3014, FMC Corporation) is labeled for pre-construction treatment of timbers and logs as a dip, brush-on, spray, or pressure treatment.

At least some chlorpyrifos products in 12.6% formulations include labeling for foundation and fence-post treatments by homeowners. All the chlorpyrifos formulations listed under outdoor treatments for homeowners contain 12.6% active ingredient.

Selecting A Termite Control Service

If you decide to use a pest control service, contact at least two reputable pest control operators (PCO'S) in your area and ask them to inspect the structure for signs of an active infestation. If they find more termites, ask them to show you where they are and get an idea of whether or not structural repairs will be required after the treatment.

If treatment is needed, compare the application fees, techniques, guarantees, and follow-up procedures offered by each firm and choose the best. Reputation and reliability of a firm is an important point to consider. Ask whether the firm has a list of references (other customers) you can contact to find out if they were satisfied with the treatment that was performed. Check with the Better Business Bureau or Chamber of Commerce to find out if the firm has an established place of business and if any complaints have been lodged against it. Ask whether the firm is a member of a national, state, or local association of pest control operators. Find out if their workers are licensed certified applicators or otherwise receive specific training in the use of pesticides.

Beware of anyone who wants to treat only a portion of the structure for a reduced price. Such a treatment may save money in the short run but require retreatment if the infestation is not killed out and they move to a different portion of the house. Be skeptical of anyone who says he can control termites by merely spraying insecticide on the surface of the soil, on the foundation, or in the basement.

Further useful advice on selecting a termite service is given in the Pacific Northwest Insect Control Handbook, listed under Additional Information.

Additional Information

The following references contain additional valuable information about subterranean termites and their control:

1997 Pacific Northwest Insect Control Handbook. Oregon State University. pp. 282-284

Subterranean Termites, Their Prevention and Control. USDA Home and Garden Bulletin # 64. January 1976.

Precautionary Statement

All pesticides have both benefits and risks. Benefits can be maximized and risks minimized

by reading and following the labeling. Pay close attention to the directions for use and the precautionary statements. The information on pesticide labels contains both instructions and limitations. Pesticide labels are legal documents, and it is a violation of both federal and state laws to use a pesticide inconsistent with its labeling. The pesticide applicator is legally responsible for proper use. Always read and follow the label.

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