



House-infesting ants and their management

Bastiaan M. Drees and Bill Summerlin*

As a group, ants are the most difficult household pests to control. In some cases, treatment methods such as spraying ant trails only make the problem worse! Learning to identify pest ants, understanding their biology and knowing control alternatives will help make combating them a success.

Behavior

Ants are social insects. Their nests or colonies can be found indoors and out, although some species have preferred nesting sites. A nest contains one or more queen ants laying eggs and being cared for by worker ants. Worker ants—sterile or non-reproductive female ants—tend the queen and brood (eggs, larvae and pupae) and forage for food. Foraging ants can invade households from colonies outdoors.

Nests often can be located by following “trails” of foraging ants. Indoors, ants nest almost anywhere. For instance, Pharaoh ants readily nest in attics, appliances, linens, heating ducts, wall voids and light switches or fixtures. Killing foraging ants rarely solves an ant problem in the home because the colony remains unaffected.

During certain times of the year, most species produce reproductives, winged male and female ants that leave the nest to mate and establish new colonies. When winged ants swarm in the home, their colony is likely to be located somewhere inside. Winged ants can be distinguished from termites by three characteristics (also see Extension publications L-1781, *Subterranean Termites* and L-1782, *Drywood Termites*):

Winged ants

- Hind pair of wings shorter than front
- Elbowed antennae
- Narrow “waist” between abdomen and thorax

Winged termites

- Both pairs of wings have same size and shape
- Hairlike antennae
- No narrow “waist”

The presence of winged ants outside, such as around porch lights, should not be a concern, although in high numbers they can be a nuisance. Most winged forms are unsuccessful in establishing a new colony. Turn off porch lights or use yellow “bug” lights to make these locations less attractive to them.

Ants form new colonies in several ways. Most are started by a newly mated winged reproductive, now called the queen ant. After finding a suitable nesting site, the queen loses her wings and begins laying eggs, which hatch into legless, grub-like larvae. The queen feeds the larvae as they develop through several stages in which they molt and grow between each stage. Afterward, they form pupae and soon emerge as adult ants. Once worker ants have developed, the queen no longer needs to care for the brood.

Some ant colonies have more than one queen, and mating may occur within the nest without swarming. These ants form new colonies when one or more queen ants, along with some workers and brood, leave the nest and move to a new location. Ant colonies do not nest in permanent locations; frequently entire colonies move from one nesting site to another almost overnight. Particularly during very wet or abnormally hot and dry weather, ant colonies whose nesting areas are flooded or lack food and water often migrate indoors.

* Professor and Extension Entomologist; Technician II; The Texas A&M University System

Worker ants foraging for food and water become a concern when they infest food or other items in the home. Although most ants consume a wide variety of foods (they are omnivorous), certain species prefer some types of foods and some even change their preferences over time (Table 1). Species of ants that sting, such as red imported fire ants, can endanger young children, confined pets and bedridden people.

Foraging workers of some ants establish temporary chemical (pheromone) trails that help other ants find food and water. These species can “recruit” other ants to a resource quickly and in high numbers. Food is brought back to the colony and fed communal-

ly among the other members of the colony, including the queen(s) and brood, a process called trophallaxis.

For some species, such as Pharaoh

ants, larvae are

an essential part of the food chain because they digest food brought by worker ants and regurgitate it for the rest of the colony to consume.

Without larvae, the colony would starve. Most adult ants cannot ingest solid food particles.



Pharaoh ant

fatty foods (pies, butter, liver and bacon). Nests are found rarely outdoors and almost anywhere indoors (light sockets, potted plants, wall voids, attics, in any cracks and crevices), particularly close to sources of warmth and water.

Life cycle: Complete metamorphosis. A worker ant develops from an egg (5 to 6 days) through several larval stages (22 to 24 days), a prepupal stage (2 to 3 days), a pupal stage (9 to 12 days) to an adult ant. Development from egg to adult takes from 38 to 45 days (4 days longer for sexual forms).

Colonies consist of one to several hundred queen ants, sterile female worker ants, periodically produced winged

male and female reproductive ants (sexuals) and brood (developmental stages).

These ants do not

swarm. Colonies multiply by “budding,” in which a large part of an existing colony migrates carrying brood to a new nesting site.

Red imported fire ant, *Solenopsis invicta*

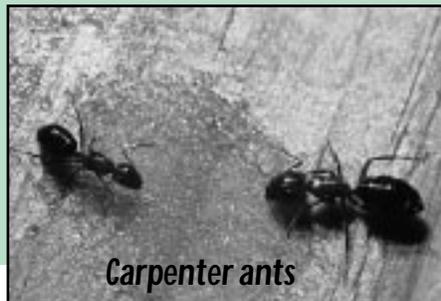
Red imported fire ants infest the eastern two-thirds of Texas. They build hills or mounds in open areas where the colonies live, although colonies occasionally occur indoors and in such structures as utility housings and tree trunks. When a mound is disturbed, worker ants mount a rapid defense, quickly running up vertical surfaces.

Worker ants range from $\frac{1}{16}$ to $\frac{3}{16}$ inch (1.5 to 5 mm) long and are dark brown. Queen ants are larger ($\frac{3}{8}$ inch) and lose their wings after mating.

Sterile female fire ant workers can sting repeatedly. First they bite; then, while holding onto the skin with their jaws, they inject venom with stingers at the end of their abdomens. The unique venom produces a fire-like burning sensation. Most people react by developing a whitish pustule or fluid-filled blister at the sting site after a day or two. Those hypersensitive to the stings should be prepared for a medical



Red imported fire ants



Carpenter ants

Common indoor ant species

Several ant species are common household pests in Texas, with Pharaoh ants, fire ants and carpenter ants topping the list:

Pharaoh ant, *Monomorium pharaonis*

This is the most commonly occurring indoor ant in Texas. Also called “sugar ants” or “piss ants,” these are some of the smallest ants, about $\frac{1}{12}$ to $\frac{1}{16}$ inch long, with light tan to reddish bodies. In hospitals, they have been suspected to be carriers of more than a dozen pathogenic bacteria including *Staphylococcus*, *Salmonella*, *Pseudomonas* and *Clostridium*. These ants do not sting and usually do not bite.

Pharaoh ants are omnivorous, feeding on sweets (jelly, particularly mint apple jelly, sugar, honey, etc.), cakes and breads, and greasy or

emergency if stung. Most people can tolerate multiple stings, but may have problems with secondary infections at the sting sites.

Fire ants are considered to be medically important pests of people, pets, livestock and wildlife. Although omnivorous, fire ants primarily eat insects and other invertebrates. Their predatory activities suppress populations of ticks, chiggers, caterpillars and other insects.

Life cycle: Complete metamorphosis. Eggs hatch in eight to 10 days; larvae develop through

four stages (instars) before pupating. Development requires 22 to 37 days, depending on temperature. Fire ants are social insects, with each colony containing one or more queen ants. Queen ants can produce about 800 eggs per day. A “mature” colony can contain more than 200,000 ants along with the developmental and adult stages of winged black-colored male and reddish-brown female reproductives. These ants stay in the colony until conditions exist for their nuptial flight.

Ant Characteristics

Table 1. Characteristics of common house-infesting ants of Texas.

Species	Preferred nest location	Foods preferred indoors	Swarming season	Workers' ability to sting	Workers' ability to bite	Follow trails	Length of workers (inches)
Nest location: primarily indoors							
Pharaoh ants	in scattered locations near heat and moisture sources	grease, meats, sweets	none	No	No	Yes	1/16
Nest location: usually nest outdoors, but can be found in or on buildings							
Red imported fire ants	lawns, gardens, plant beds	meat, greases	all year	Yes	Yes	Yes/No	1/8 to 1/4
Carpenter ants	usually in stumps and logs; also in homes and fences	sweets and nearly anything else	May to late July	No	Yes	Yes/No	1/4 to 1/2
Thief ants	nests of other ants, soil, cracks in wall	grease in cheese and meat, sweets	late July to September	No	No	No	1/16
Odorous house ants	under stones or boards in walls or under floors	sweets, meat, dairy products	seldom	No	No	Yes	1/8
Acrobat ants	protected galleries in mortar and wood	slight preference for sweets and meats	early summer to early fall	No*	Yes	Yes/No	1/8 to 1/4
Nest location: generally nest only in soil, outdoors							
Argentine ants	lawns, plant beds, leaf litter, trash piles	sweets, animal fat	rare, April, May	No	No	Yes	1/16 to 1/8
Crazy ants	trash piles, tree cavities, rotten wood, soil	sweets, meat grease, fruit	spring	No	No	Yes	1/16 to 1/8
Little black ants	lawns, under objects, rotten wood	grease, sweets, meat, fruits and vegetables	May to September	No	No	Yes	1/16
Tramp ants	cracks in or near sidewalks, pavement	grease, meat honey	May to June	No	No	Yes	1/8
Pyramid ants	gardens and plant beds	sweets	June to August	No	No	Yes	1/8

* have non-functional stinger

Carpenter ants, *Camponotus* sp.

Fourteen species of carpenter ants live in Texas. The largest, the black carpenter ant, *Camponotus pennsylvanicus*, is found primarily outdoors in wooded areas. Common indoor species, *Camponotus rasilis* and *C. sayi*, have workers with dull red bodies and black abdomens. Worker ants range from 1/4 to 1/2 inch long. They can be distinguished from most other large ant species by the top of the thorax, which is evenly convex and bears no spines. Also, the attachment (pedicel) between the thorax and abdomen has but a single flattened segment. Although these ants bite, they do not sting.

Foraging worker ants in the home can be a nuisance. Carpenter ants usually nest in dead wood, either outdoors in old stumps and dead parts of trees and around homes (in fences, firewood, etc.) or indoors (between wood shingles, in siding, beams, joists, fascia boards, etc.). Ant colonies are often located in cracks and crevices between structural timbers, but the ants can also tunnel into structural wood to form nesting galleries, although this is less common in Texas. They seem to prefer moist, decaying wood, wood with dry rot or old termite galleries. However, damage is often limited because these ants tunnel into wood only to form nests and do not eat wood. Galleries excavated in wood to produce nesting sites can weaken structures.

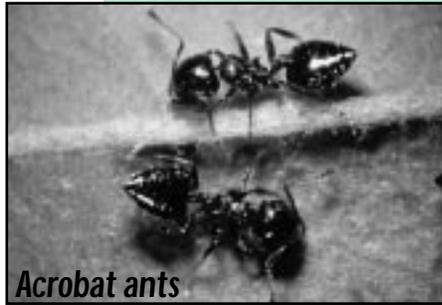
Occasionally carpenter ants, particularly *Camponotus rasilis*, nest under stones or in other non-wood cracks and crevices. Foraging worker ants leave the nest and seek sweets and other foods such as decaying fruit, insects and sweet exudates from aphids or other sucking insects.

Nesting tunnels when produced by carpenter ants usually follow the grain of the wood and around the annual rings. Tunnel walls are clean and smooth. Nests can be located by searching for piles of sawdust-like wood scrapings (frass) under exit holes. These piles accumulate as the

nests are excavated and usually also contain parts of dead colony members.

Life cycle: Eggs develop from egg to worker ant in about two months. Carpenter ants are social insects, living in colonies made of different forms or "castes" of ants. Mature colonies contain winged male and female forms (reproductives), sterile female workers of various sizes, and a wingless 9/16-inch-long queen. Winged forms swarm during May through late July. The presence of 3/4-inch-long winged forms in the home indicates that a colony is living indoors.

Other ant species occasionally encountered in and around the home include:



■ **Acrobat ants**, *Crematogaster* sp., which nest under stones, in stumps or dead wood, and occasionally invade the home. Some species make carton nests in trees. These ants often hold their heart-shaped abdomen up over their bodies. They feed primarily on honeydew produced by aphids.

■ **Argentine ants**, *Iridomyrmex humilus*, whose workers are light to dark brown and generally nest outdoors. They are uncommon in areas infested by fire ants.

■ **Bigheaded ants**, *Pheidole* species, whose major worker ants have relatively large heads compared to their bodies. They have 12-segmented antennae with a three-segmented club. Similar in habits to fire ants, they feed on live and dead insects, seeds and honeydew outdoors and greasy food sources and sweets indoors.

■ **Crazy ants**, *Paratrechina longicornis*, whose fast-running, grayish-black worker ants have long legs and antennae. Although they nest primarily outdoors, they will forage in homes. They are omnivorous, but difficult to attract to ant baits.

■ **Little black ants**, *Monomorium minimum*, small, slow-moving, shiny black ants. Workers prey on insects and feed on honeydew produced by sucking types of insects such as aphids.

■ **Odorous house ants**, *Tapinoma sessile*, which look somewhat like fire ants, but when crushed have a pungent “rotten-coconut-like” smell.

■ **Tramp ants**, *Tetramorium* species (e.g., *T. bicarinatum*), whose workers also resemble fire ants. However, close examination reveals that the head and thorax are roughened with parallel grooves rather than smooth.

■ **Ghost ants**, *Tapinoma melanocephalum*, also becoming a problem in Texas.

How to manage ants

Ant problems occur in homes and structures primarily because food, water and favorable nesting sites are available there. Meticulous housekeeping eliminates significant ant problems by removing needed resources.

Furthermore, ant bait treatments are more effective if alternative food sources for the ants are eliminated as much as possible.

Most ants prefer to nest in soil or wood outdoors, but homes offer many favorable nest sites for certain ants. Cracks and holes in brick veneer, wall voids and structural wood close to heat and moisture sources are commonly used. Reduce water sources and nesting sites by caulking cracks and crevices, fixing leaks and replacing wet or rotten wood. Pay particular attention to ant colonies infesting potted plants or fire wood brought indoors.

Insecticides registered for ant control are formulated as liquid sprays, dusts, fogs and baits. Many are generally labeled to control “ants,” although some are specifically registered for particular ant species.

The most effective ant control is to find the nest and treat it with insecticide. An alternative is to use the workers to carry an insecticidal bait back to other colony members. In the home, extensive, undirected insecticide treatments, such as ant trail treatments or total-release aerosol fogs, are usually unsatisfactory because

they kill only a few workers and often do not greatly affect the colony, the source of workers. Using surface applications on ant trails actually can make Pharaoh ant colonies divide and make the infestation worse! When home control attempts fail, seek help from a licensed commercial pest control operator.

Appropriate control methods vary with the ant species and nature and locations of infestation (also see Extension publications, L-1783, *Carpenter Ants*, and B-6043, *Managing Red Imported Fire Ants in Urban Areas*). Other house-infesting ants can be controlled through the general methods discussed below

with insecticide products containing ingredients listed in Table 2.

Finding and treating ant nests: To locate ant nests, investigate movement patterns. Worker ants will often lead you back to the nest.

Another good technique is to use small bait stations to trick the ants into revealing their nest locations.

Use soft-drink or pill-bottle caps baited with small

amounts of peanut butter, mint apple jelly, bacon grease or other attractive materials. One or more of these foods will attract the ants. Watch them as they locate the food and take some of it back to the nest. They may even establish an odor trail for other workers to use to find the food, so an ant column may develop.

Although these steps take time and effort, they eliminate undirected, ineffective insecticide spraying indoors and make ant elimination by nest treatment quick and efficient. Also, remember which food item(s) the ants prefer and where ants were attracted. Knowing this allows you to make a more effective ant bait and place it where ants are most active.

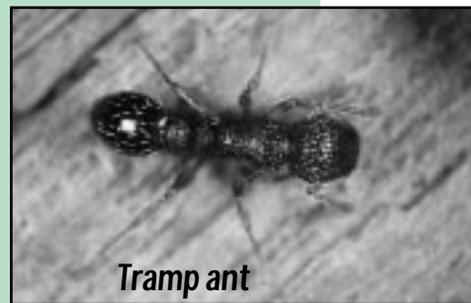
Treat indoor nests with an insecticide registered for this use. Dust formulations are preferred for treating nests indoors because they do not stain and generally give longer residual control than sprays. Apply dusts sparingly in thin,



Little black ant



Odorous house ant



Tramp ant

Insecticides for Ants

Table 2. Insecticides registered for control of ants in and around the home (Note: Some products have mixtures of listed ingredients, and some products are available only to licensed pest-control operators.)

Ingredient	Formulation(s)	Use	Indoors	Outdoors
acephate	wettable powder, dust, aerosol	surface application, perimeter barrier, mound treatment	x	x
allethrin	liquid, aerosol	surface application, aerosol	x	x
arsenic (arsenic trioxide)	bait	bait station	x	x
abamectin B	bait	bait	x	x
bendiocarb	wettable powder, dust, granule	surface application, perimeter barrier, mound treatment	x	x
bifenthrin	wettable powder, granule	potting media treatment		x
borax (sodium tetraborax decahydrate)	liquid	bait station	x	
boric acid (orthoboric acid)	bait, dust, aerosol	bait, surface application, perimeter barrier	x	x
carbaryl	liquid, wettable powder, dust, granule	surface application, perimeter barrier, mound treatment		x
chlorpyrifos	liquid, wettable powder, dust, granule, aerosol	surface application, perimeter barrier, mound treatment, paint	x	x
cyfluthrin	liquid, wettable powder	surface application, perimeter barrier		x
cypermethrin	liquid, wettable powder	surface application, perimeter barrier	x	x
diazinon	liquid, granule, aerosol, microencapsulated	surface application, perimeter barrier, mound treatment	x	x
dichlorvos	controlled release	electric box treatment		
esfenvalerate	liquid	surface application, perimeter barrier, mound treatment	x	x
fenoxycarb	bait	bait		x
fenthion	liquid	surface treatment	x	
fenvalerate	liquid, aerosol	surface application, perimeter barrier		x
fluvalinate	liquid	surface application		x
hydramethylnon	bait	bait, bait station	x	x
isazophos	liquid	surface application		x
lambda-cyhalothrin	wettable powder	surface application, premise barrier	x	x
malathion	liquid	surface application	x	
permethrin	liquid	surface application, perimeter barrier, mound treatment	x	x
pine oil, turpentine	liquid	mound treatment		x
propetamphos	liquid	surface treatment	x	
propoxur	liquid, wettable powder, dust, aerosol, bait	surface application, perimeter barrier, bait station	x	x
pyrethrins (many contain piperonyl butoxide)	liquid, dust, aerosol	surface application, perimeter barrier, fog, mound treatment	x	x

Ingredient	Formulation(s)	Use	Indoors	Outdoors
resmethrin	liquid, aerosol	surface application, perimeter barrier, mound treatment	x	x
rotenone	liquid, dust	mound treatment		x
S-bioallethrin	liquid	surface application	x	
silica dioxide (diatomaceous earth)	dust	surface application	x	
silica gel	dust	surface application	x	
sulfonamide	bait station	bait station	x	
sumithrin	aerosol	surface application, fog	x	
tetramethrin	aerosol	surface application, mound treatment	x	x
tralomethrin	wettable powder	surface application, perimeter barrier	x	x
trichlorfon	liquid, bait	surface application, perimeter barrier, bait	x	x

even layers in the ant nest area. Professional pest-control operators have equipment to drill holes into colonies nesting in wood and wall voids and for injecting insecticides directly into the nests.

Baits: If the nest cannot be found, use a bait-formulated product (below) or prepare a 1 (or 2) percent boric acid bait using the following recipe:

- Choose the most attractive food material for the ant species present, such as peanut butter, mint apple jelly, corn syrup, etc.
- Mix 1 part boric acid powder (available from most pharmacies) per 100 (or 50) parts bait material, e.g., 1 teaspoon per 2 (or 1) cups food material.

Do not make the bait concentration of boric acid too strong as this reduces its effectiveness. The 1 percent bait is better than higher concentrations because it is less repellent to ants and kills them as efficiently. Keep the bait fresh and moist. Small amounts of bait can be placed in bottle caps or on pieces of aluminum foil, or injected into short (2-inch-long) sections of soda straws using a squeeze bottle. Place 20 to 30 small bait stations where ants have been seen or were attracted to baits as described in the previous section. Do not place stations in areas accessible to small children or pets. If proper food is used and bait kept fresh, ants should be controlled after three to four weeks.

Some bait formations for indoor use are available commercially:

- **Abamectin** baits, such as PT® 370, Ascend™ Fire Ant Stopper Bait, affect fire ants and “related ants.” Formulated similar to Amdro® (see below).
- **Hydramethylnon** baits include Combat®, Superbait®, and MaxForce® Ant Killer Bait Stations for acrobat, Argentine, carpenter, crazy, fire, pavement, Pharaoh, thief and odorous house ants. These formulations contain ground-up silkworm caterpillars and differ from Amdro® and Seige® formulations (registered for outdoor use for fire, harvester and big-headed ants), in which the same active ingredient is formulated in soybean oil coating defatted, processed corn grit particles.
- **Sulfonamide** baits include Raid®, Max Ant Bait and Johnson Wax Raid® Ant Baits Plus for Argentine, cornfield, Pharaoh and black carpenter ants, and FluorGuard™ Ant Control Baits for Argentine, cornfield, Pharaoh and a “variety of household” ants.
- **Sodium tetraborate** (borax) and **ortho boric acid** liquid or solid baits such as PIC Ant Control System are attractive to sweet- and grease-eating ants such as pavement, little black, black carpenter and odorous house ants. Drax Ant Kill Gel contains 5 percent orthoboric acid in a mint jelly-based bait formulation for Pharaoh ant control.

- **Methoprene**, an insect growth regulator, is the active ingredient in Pharorid® for Pharaoh ant control. Queens fed this bait fail to produce viable eggs and larval development is terminated.

Effective bait formulations contain slow-acting pesticides that are collected by foraging worker ants and brought back to the colony, where the pesticide is fed to the other ants, queen(s) and brood. These products should not be confused with “bait traps,” which kill only the foraging workers attracted to the bait station.

Tips for using baits to control house-infesting ants include:

- Use fresh product and follow directions carefully with the correct number of bait stations or material to treat the infestation.
- Make bait more effective by removing or covering other food sources that compete with the bait’s attractiveness.
- Before and during baiting efforts, avoid using surface applications of long-acting contact insecticides (often applied to control cockroaches or to ant trails) that would prevent foraging worker ants from being able to reach the bait station.
- Be patient for the baits to work. It may take three to four weeks or more to eliminate some colonies.

After ants have consumed the bait, apply dusts or other formulations to cracks, crevices and ant trails if necessary to kill surviving worker ants.

Barrier treatments around the home:

When ants nesting outdoors invade the home, it is often worthwhile to treat with an insecticide a 3- to 4-foot-wide bank or swath of soil around the perimeter of the home and the lower 3 to 4 feet of the house. If renewed at two- to three-week intervals while ants are active, this “barrier” treatment should greatly reduce or eliminate ant invasion into the home.

Granular insecticide formulations can be used instead of sprays to treat the soil. Water the treated area lightly after applications to release the insecticide from the granules. Wettable powder formulations are generally more effective on brick veneer homes.

Treating around the home: Do not routinely treat the entire premises for ants unless the landscape is infested with fire ants, or the ants continually enter the home (see Extension publications B-6043, *Managing Red Imported Fire Ants in Urban Areas* or L-5070, *The Two-Step Method Do-It-Yourself Fire Ant Control*). Ants are generally beneficial in our landscapes as they scavenge for food and prey on other potential pests such as various caterpillars and chinch bugs. Some seed-gathering ants, such as the red harvester ant, *Pogonomyrmex barbatus* Smith, collect and feed on weed seeds.

Acknowledgments

The authors are grateful for the constructive comments and reviews from Jerry Cook, Harry Howell and Dr. Pat Morrison. This is a revision of a manuscript originally written by John M. Owens (1983) and revised by Philip J. Hamman (1985).

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 Texas Agricultural Extension Service or the Texas Agricultural Experiment Station is implied.

Educational programs of the Texas Agricultural Extension Service are open to all people without regard to race, color, sex, disability, religion, age or national origin.

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.

5M-9-97, Revision

ENT