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## CARPENTER ANTS

Structural Pests in the Northwest

The Carpenter Ant is one of the most destructive structural pests in the northwest United States. We have assembled some expert information for you from Washington State University.

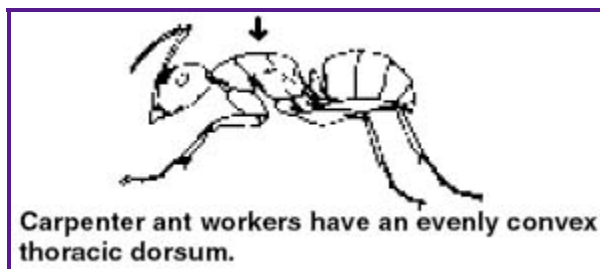
### [Ant Overview](#)

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#### Identification

Carpenter Ants have an evenly curved "thoracic dorsum", this is the back of the insect. The most common member of this family is Modoc; it is black with reddish colored legs, but color is not a good indicator as some types have red parts. These ants are often found moving along foraging lines about 1 foot apart. Trees, fences and firewood are all regular paths that they are known to use.



#### Damage in the Home

Carpenter ants will damage homes by nesting in them. They will dig out tunnels in wood to expand their living spaces and can lead to structural damage. The infestation in the home usually is a satellite colony, with the main one within a hundred yards or more in a stump or other decayed wood. When colonies start to establish themselves in homes, they may start small (a few hundred members) but can grow to several tens of thousands. There can be 20 or more satellite colonies.

#### Making your Home Resistant to Carpenter Ants

##### *Stumps, fire wood:*

Take care when storing firewood. This is a favorite nesting location for Carpenter ants. Always keep wood elevated and covered from the rain. A wet pile of firewood in contact with the ground is an ideal infestation location. Stumps left in the yard are common locations for colonies.

##### *Landscaping:*

Never allow plants to make contact with the home. Trees and shrubs provide natural paths for insects and are frequently foraging sites.

##### *Wood/Soil contact:*



It is a conducive condition for pests when wood touches soil. Wood should rest on concrete or other suitable support, and when it is in direct contact with the ground pressure treated lumber is recommended. Beauty bark or other landscaping is often piled too high next to homes. This can lead to rot/decay and lead to a Carpenter ant infestation.

*Ventilation:*

Crawlspaces and attics need adequate ventilation to keep the moisture content low. If the ventilation is not adequate, there will be biogrowth (mold, mildew or fungus) and create conditions that encourage infestations. Vapor barriers are recommended in crawlspaces. This will help keep the framing under the home dry and provide a barrier to discourage pests.

*Points of Entry:*

Check for holes in the exterior of the home, where pipes and electrical wires enter. Doors, windows, foundation cracks, siding and trim are all common locations for ants. Seal these areas with caulk or other suitable materials to discourage entry.





## CARPENTER ANTS: THEIR BIOLOGY AND CONTROL

### Structural Damage

Carpenter ants are a problem to humans because of their habit of nesting in houses (Figs. 1, 2). They do not eat wood, but they remove quantities of it to expand their nesting facilities. This can result in damage to buildings and, if the main structural beams are hollowed out, can result in an unsafe condition. Typical damage is shown in Fig. 3.

Most carpenter ant species establish their initial nest in decayed wood, but, once established, the ants extend their tunneling into sound wood and can do considerable damage to a structure. However, this damage occurs over 3 or more years, since the initial colony consists of a single queen. Workers are produced at a slow rate, so that a colony consisting of 200 to 300 workers is at least 2 to 4 years old.



Fig. 1. Activity in a *C. modoc* colony.

Most problems in Washington caused by carpenter ants are due to *Camponotus modoc* and *C. vicinus*. These species commonly nest in standing trees (living or dead), in stumps, or in logs on the forest



Fig. 2. *C. modoc* under insulation in the crawl-space of a house.



Fig. 3. Typical carpenter ant damage.

floor. Since many houses are being built in forested areas, well established, vigorous colonies are readily available in the immediate vicinity to attack these dwellings. This is especially true when the homeowner insists that the home be built with a minimal removal of trees.

A number of workers from these large “parent” colonies will frequently move into a dwelling as a “satellite” colony. Communication and travel between colonies is maintained, and the satellite colony may contain larvae, pupae, and winged reproductives. Since these colonies are already established, damage to houses can occur in a shorter time and is not limited to decayed wood. Indeed, these ants may become established in houses still under construction. The size of a typical colony ranges from 10,000 to 50,000 workers, and large colonies can have up to 100,000 workers. Not surprisingly, satellite colonies found in houses frequently contain up to several thousand workers.

The ants usually maintain a trail between the parent and satellite colonies. These trails follow natural contours and lines of least resistance and frequently cut across lawns (Fig. 4). The trails are about 2 cm wide, and the ants keep them clear of vegetation and debris. Traffic on these trails may be noticeable during the day, but peak traffic occurs after sunset and continues throughout the night, sharply decreasing before sunrise.



**Fig. 4. Carpenter ant trail in a lawn.**

The parent colony is often located in a tree, stump, or in stacked wood within 100 meters of the house (Fig. 5). Wood and stumps buried in the yard when the house was constructed or stumps and decorative wood pieces used to enhance the beauty of a yard or driveway may also be the source of a parent colony.



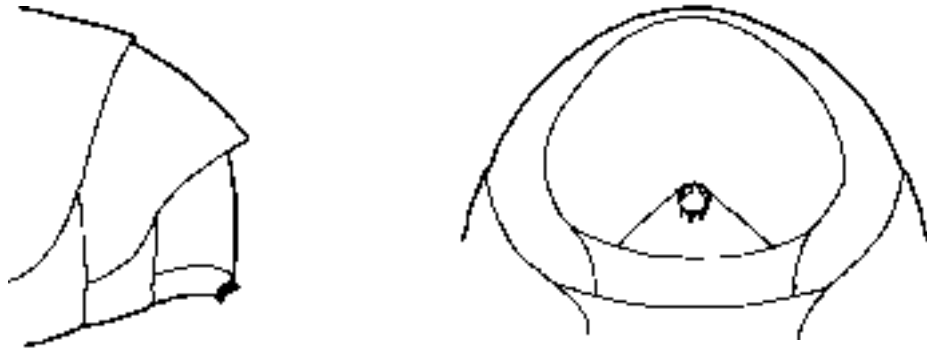
**Fig. 5. Sawdust excavations from a *C. modoc* colony in tree.**

## Identification

Carpenter ants, genus *Camponotus*, belong to the subfamily Formicinae, which is characterized by a circular anal orifice (opening) surrounded by a fringe of hairs (hand lens of 20X required, Fig. 6). Carpenter ants are large, having queens 16–18 mm long (Fig. 8A) and workers varying from 6–13 mm long (Fig. 9A and B). When workers vary in size, they exhibit polymorphism (many sizes). The workers of some ants are monomorphic (one size).

For species identification of carpenter ants, collect the largest workers, called majors, or soldiers. *Camponotus* workers are easily recognized by the thoracic dorsum, which is evenly convex when viewed from the side (Fig. 9). Other ants that may be confused with *Camponotus* have a notch or depression on the thoracic dorsum (Fig. 10). Color is not a good means of identification, as Washington has several species of carpenter ants that vary in





**Fig. 6. Terminal, circular anal orifice fringed with hairs: lateral view, posterior view.**

color from all black to red thorax with black gaster (the enlarged part of the abdomen) and head, to a light brown. However, the most common *Camponotus* infesting houses and other structures in Washington is *Camponotus modoc*. This species is black except for reddish colored legs.

### Life History

All ants undergo complex metamorphosis, or change, and pass through the following stages: egg, larva, pupa, adult (Fig. 7). Under normal conditions, the egg to adult sequence takes about 60 days. Nests contain workers (sterile females), a single functional queen (usually), and may also contain winged females and males (Fig. 8A and C), which are produced during the late summer and overwinter in the nest.

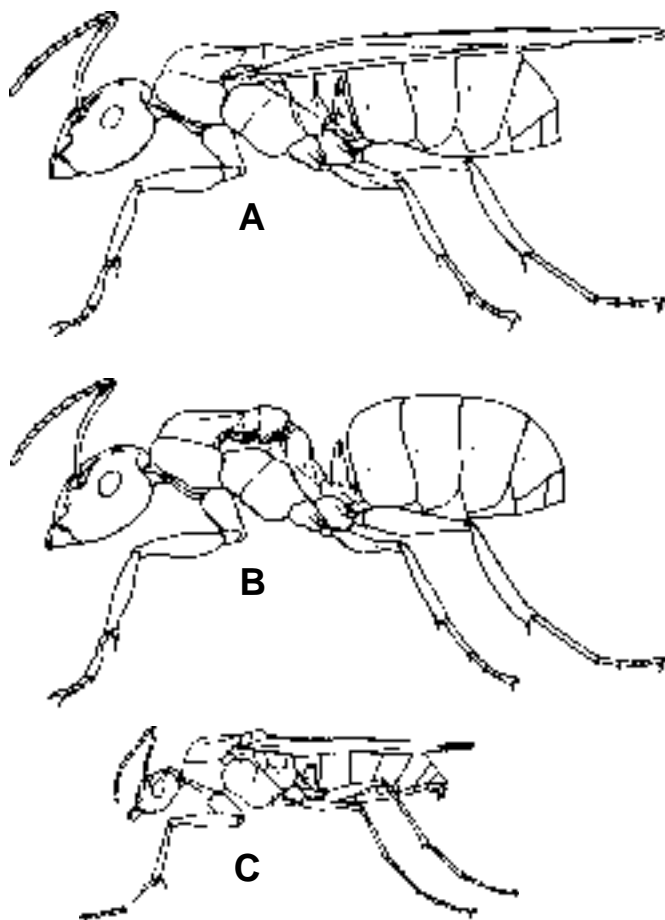


**Fig. 7. Eggs, larvae, and pupa from a carpenter ant nest.**

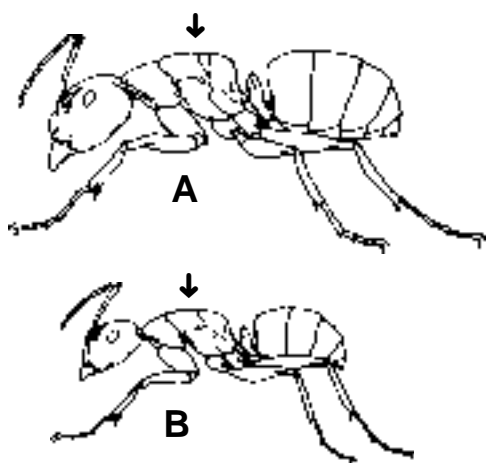
During the first warm days of spring—January-June, depending on locality—these reproductives emerge from the nest for their mating flights. After mating the males die. The inseminated queen selects a nest site, usually in a small cavity in a stump, log, under bark, or in the timbers of a house. The queen then breaks off her wings along lines of predetermined weakness (Fig. 8B), and within a few days lays her first eggs. These soon hatch into larvae, which are fed by the queen from reserves within her body. The queen does not leave the nest to forage for food during the entire time she feeds and raises this brood.

At the end of their developmental period, the larvae pupate and eventually emerge as workers. Since these first workers have been fed only on the reserves within the queen's body, they are very small and are called minors or minor workers (Fig. 9). They usually number about 10 to 25. These workers take over the functions of foraging for food, nest excavation, and brood rearing.

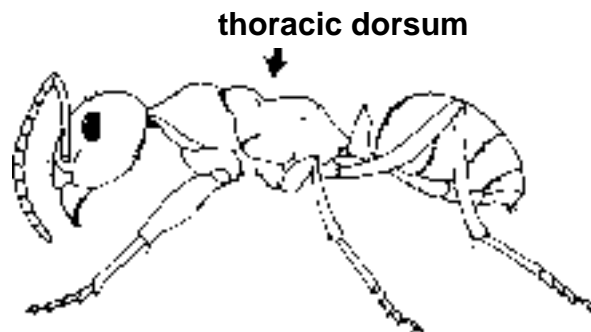
The queen's primary function after production of the first brood is to lay eggs. The colony produces successive broods and, since the larvae are fed by foraging workers, the size of the workers increases. Some may be very large and are called majors (Fig. 9). The colony does not produce reproductives (winged males and females) until it is from 6 to 10 years old and contains over 2,000 workers. Dorsal views of all adult forms are shown in Fig. 11.



**Fig. 8. Reproductives in a carpenter ant colony:** A. winged female, B. queen without wings, C. male.



**Fig. 9. A. major workers, B. minor worker.** Carpenter ant workers have an evenly convex thoracic dorsum.



**Fig. 10. *Formica* sp. (western thatching ant and other formicine ants) showing notched thoracic dorsum.**

While a single queen initiates carpenter ant colonies, queens may also initiate colonies in close proximity of each other to create multiple queen colonies. These colonies are probably more successful and grow at a faster rate.

The natural food for these ants consists of insects and other arthropods and sweet exudates from aphids and other insects. They also are attracted to other sweet materials such as decaying fruits.

## Control

Determine if an infestation of carpenter ants is actually present. Ants may enter houses while foraging, or new queens may enter homes after nuptial flights during spring months. These occasional ants may not actually be causing problems.

If an infestation is present, locate the nest. This is often difficult but not impossible. The best indication of an infestation is the sawdust that ants excavate from their tunnels. Another indication of an infestation is sound produced by the workers as they excavate wood to enlarge the nest. This sound often can be heard through the infested wall. Another clue is the presence of foraging trails, which are easiest to locate between sunset and sunrise when the ants are most active. These foraging trails lead away from the house to foraging sites, often in trees.



**Fig. 11. Dorsal view of the adult stages of the carpenter ant: Top left—Winged female; top right—Male; bottom left—Minor worker; bottom middle—Intermediate worker; bottom right—Major worker.**

Search the perimeter carefully, especially in the direction of evergreen trees and shrubs, and in the area around them.

Carpenter ants also have a regular network of trails they use in traveling about the house. Most frequently used are the tops of water pipes and electrical wires. These go through floor joists and wall studs, allowing the ants easy access to all parts of the house. Also inspect crawl spaces under the building and attic spaces under insulation for ant activity.

In a house with a crawl space, gently tap all floor joists, etc., with a metal rod, jack-knife, or hammer, and listen for differences in sounds. A nest cavity gives a hollow ring. A knife blade inserted at this point will usually penetrate the wood if it is infested.

Once you find the colony, determine if it is a parent or satellite colony. This may take some searching, but finding a trail leads to a parent colony. The parent colony requires a source of

moisture such as wood in contact with soil, damp areas in crawl spaces or in wall voids that may involve leaks in plumbing, gutters, or drainage problems. Ants are also attracted to moist areas in bathrooms and kitchens. Treating the parent colony provides the most effective control.

Chemical treatment consists of direct treatment of the colony or colonies or a perimeter spray against the foundation of the house.

## **Cultural Control**

Before building a new house in a forested area, the contractor may wish to consult an entomologist or pest control company to determine whether colonies of carpenter ants are located on the property. Colonies should be chemically controlled before construction begins. Do not bury wood, stumps, or logs at the construction site. Remove or burn this wood. Where carpenter ants are common, dust the wall voids of a new structure with boric acid or borates before the walls are sealed. This material will kill the ants if they enter the void, and will provide many years of protection.

Make sure the structure is properly ventilated, especially in crawl spaces and attic areas. Moisture that accumulates in poorly ventilated areas contributes to the growth of wood-decay fungi and makes ideal habitats for establishing carpenter ant colonies. Moisture also may be a problem if wood is in contact with soil. Supports for porches and decks should rest on concrete. Keep soil away from wooden frames around doors and windows and from sill plates. The use of vapor barriers in crawl spaces is strongly encouraged.

Avoid planting vegetation, particularly evergreens, where they will come in contact with the structure. Plantings that touch the house should be pruned so they do not provide a foraging area for the colony or easy access to the structure.

Homeowners also may wish to check areas where the electrical and water lines enter the

house. These frequently provide a ready access to the house for the ants. Plugging gaps with plastic caulking material will deter entry by the ants.

Decorative bark, stumps, and driftwood brought into the yard for aesthetic effects frequently harbor colonies of carpenter ants or are a convenient site for colony establishment. This is also true of firewood (Fig. 12). Store firewood and lumber on concrete blocks away from the sides of buildings. Blocks will allow airflow under the wood.



**Fig. 12. *C. modoc* excavations in woodpile.**

## **Biological Control**

No effective biological control for carpenter ants is known.

## **Chemical Control**

In the selection and use of pesticides and formulations for the control of carpenter ants, read and follow all label recommendations. Exercise caution in handling all pesticides and be certain to read the label for both cautionary statements and use procedures.

Dust formulations are very effective against ants, because ants are hairy and the dust adheres to the surface of their bodies. As they clean themselves and feed other ants and larvae, the insecticide is spread rapidly throughout the colony. This

formulation is effective only as long as it does not become wet. It is used primarily in wall voids and on ant trails within the house.

Liquid sprays are preferred in the treatment of exterior surfaces such as foundations, foraging trails, and under the lower edge of the siding.

The suggested control procedure should provide effective control of carpenter ants. Another approach is to employ the services of a reputable pest control operator if you have a particularly difficult infestation to locate or eradicate.



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### Additional WSU Extension Publications on Ants

EB0671, *Identification and Habits of Key Ant Pests of Washington*

EB0929, *Thatching Ants*

EB1382, *Moisture Ants*

EB1550, *Odorous House Ants*

EB1514, *Pharaoh Ants*



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Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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EB0818

# CARPENTER ANT UPDATE

More than 24 different species of carpenter ants are found in the U.S. Here's an update on their biology and control. By Laurel D. Hansen

**T**houghts of spring in many parts of the country have turned to thoughts of carpenter ants for pest management professionals. These ants, particularly the winged forms, have started an influx of telephone requests as clients demand their demise. If winged forms have overwintered in the structure, males begin crawling out of nesting sites as early as February and females make their appearance later in the spring just before the mating flight. These winged forms emerge in heated structures before their outside counterparts as the flights are synchronized by a combination of photoperiod, temperature, sunlight hours and recent rainfall. Although there is usually one large mating flight, several mating flights may occur in some years.

After the nuptial flights, males die and the females lose their wings and look for nesting sites. The appearance of these large wingless queens as they crawl around in garden areas and on decks is also alarming to homeowners. Carpenter ant activity for the remainder of the season consists of workers moving between foraging sites and nests or the moving of a satellite colony into a structure.

**DIFFERENT SPECIES.** More than 30 different species of ants are found in and around structures in North America. Usually carpenter ants are considered to be one "kind" of ant; however, it is important to note that across the United States and Canada, there are 24 different species of carpenter ants. Each of these species has unique differences in appearance, biology and behavior but all will nest in wood and are considered either structural or nuisance pests due to their choice of nesting sites. The most important species of carpenter ants by area include the following:

Western North America (west of the Great Plains):

- *Camponotus modoc*
- *C. vicinus*
- *C. esigi*



## CARPENTER ANT Q&amp;A

The following information — which has been excerpted from *ANThology: The Best of Stoy Hedges* — examines carpenter ant control by answering common questions pest management professionals may have concerning carpenter ants and their control.

**Q:** Do carpenter ants only nest in wet or moisture-damaged wood?

**A:** A main (or parent) colony of carpenter ants generally needs moist wood to survive. Inside buildings, they infest wood moistened by improper drainage, poor ventilation or leaks. But satellite colonies may infest wood that is relatively dry. A colony may also continue to reside in previously wet wood even after a leak has been repaired. Colonies can survive in relatively dry wood near an area where water is readily available, such as a gutter or a leak.

**Q:** How many satellite colonies can be

present in a typical infestation of carpenter ants?

**A:** Research concerning carpenter ant satellite colonies has primarily been completed on the two major species of carpenter ants. The western species, *C. modoc*, may have as many as 20 or more satellite colonies associated with a single main colony. The eastern species, *C. pennsylvanicus*, has fewer satellite colonies, usually no more than 10 or 12. In most situations the number of satellite colonies present is much fewer than these maximum numbers.

To order *ANThology: The Best of Stoy Hedges*, contact Lori Skala at 800/456-0707 or visit [www.pctonline.com/store](http://www.pctonline.com/store).



Eastern North America (east of the Great Plains):

- *C. pennsylvanicus*
- *C. noveboracensis*
- *C. nearcticus*

In addition to the above, *C. floridanus* is an important species in the southeastern United States. Another carpenter ant that occurs across the northern United States, including Alaska, southern Canada and northern Europe, is *C. herculeanus*.

Older, well-established colonies will include a main colony containing the queen, brood, winged forms and workers plus additional satellite colonies containing workers, older brood and often winged males and females before the next mating flights. The number of satellite colonies will vary with the larger number found in northern latitudes. Main colonies are often found outside the structure where young brood can be reared within a nest with high humidity. Satellite colonies may be found either outside or inside structures and because these ants do not require high moisture levels, they may be found in extremely dry and warm conditions such as under insulation in subfloors or attics.

**CARPENTER ANT MANAGEMENT.** Here are some tips to help with carpenter ant inspection, assessment, treatment and evaluation.

**Inspection and assessment.** Inspection provides information to assess the infestation and to determine treatment protocols. The client or homeowner can often provide valuable information in this process.

**Determine how long ants have been present and in what form?** If ants have been present in the structure for more than one year, if ants are seen during the winter months or if winged ants are present before swarming activity, the pest management professional can assume that either satellite(s) or a main colony is established in the structure. This may require a complete treatment.

If ants are seen only on the exterior and if ants are seen only during the foraging season, the colony is probably located outside the structure. A thorough inspection of the exterior will determine possible outside nesting sites. Location of trails during the foraging season will also help determine nesting sites and the foraging arena. A perimeter spray to protect the structure may be sufficient to keep ants from establishing satellite colonies within the structure.

**Has the structure had any water leaks?** A list of previous water damage should be checked with the homeowner. These might include:

1. Water leaks from appliances such as dishwashers, washing machines or hot water tanks.
2. Plumbing leaks from showers, sinks, pipes or drains.

3. Structural leaks from gutters, the roof, chimneys, windows, skylights or doors.

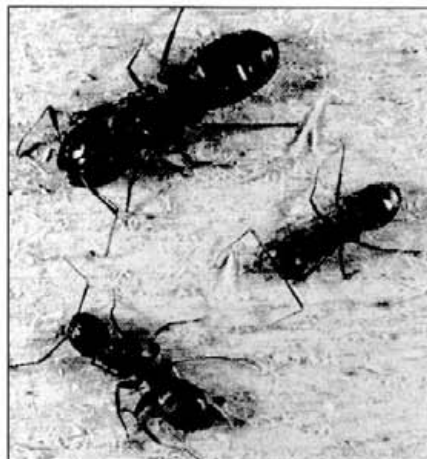
4. Drainage problems, such as water in basements or crawlspaces.

An inspection of the structure should note any stained or water damage to floors, subfloors, roofs, ceilings and walls. Inspections should also look for any wood in contact with soil such as siding, deck and porch pillars or timbers used in landscaping. Wood that has been damaged by water is easier for ants to excavate and is often selected by ants for nesting sites.

**Do trees or other landscaping plants contact the structure?** Plants touching either the sides of the house, roof or deck not only add moisture to the structure, but provide access from the structure by foraging ants. These plants may also be foraging sites for ants. Inquire about the removal of trees and stumps. Wood debris left in the ground after tree removal provides ideal nesting sites. Also inspect wires that connect to the structure, particularly if these wires come into contact with tree limbs.

**Do fences make contact with the structure?** Ants will use fences, particularly wooden fences, to arrive at foraging sites, especially if fences are in contact with the sides of the structure. Also inspect for stacks of firewood, lumber or wood debris near the structure. If these stacks are left for more than a year, they may become sites of carpenter ant activity.

**TREATMENT AND EVALUATION.** The management of carpenter ants has many similarities to management of other ant species, but is often more difficult because of the number of satellite colo-



Three different sizes of *Camponotus modoc* workers.



nies, diversity of carpenter ant species and the diversity of foraging activities.

A complete and accurate assessment of the infestation will help determine management options for carpenter ants at each site. A "menu" of options allows the homeowner to become involved in management decisions (see box at right). This also allows for a range of pricing and a range of guarantees.

The most common practice for a full treatment includes placing chemical in wall voids, attic areas and on sill plates in crawlspaces. A perimeter spray should also be part of this treatment. Chemical, usually as a dust formulation, can be injected into walls by removing electrical switch plates or by drilling into wall voids where ants are active and injecting small amounts of dust. Working around electrical outlets requires caution or turning off the power during the treatment. A perimeter spray includes spraying the sill plate in the crawlspace as well as the exterior perimeter. Treatment in the crawlspace may require loosening the insulation to expose the sill plate. Proper spray placement on the exterior involves directing

## CARPENTER ANT TREATING OPTIONS

1. Full treatment with wall injections and perimeter spray
2. Spot or partial treatment
3. Baiting
4. Protective treatment
5. Exclusion
6. Combinations of the above



An example of a proper spray application beneath the lower edge of siding.

the spray under the lower edge of the siding and around window and door frames. Trails leading away from the structure to foraging sites or to the main colony should also be sprayed. Synthetic pyrethroids provide residual activity against carpenter ants in a perimeter spray application, as well as for void treatments.

A spot or partial treatment may be an option in the case of a new infestation. Satellite colonies move into structures during the month of July in the Pacific Northwest. It is helpful to determine when satellites are established in your area. If a colony is in the process of establishing a satellite, a partial treatment to the structure may be sufficient. The homeowner could be offered this option with a limited guarantee.

Many clients request a treatment without the use of chemicals and will accept the application of baits, even though chemicals are involved. Many homeowners view a baiting program as being more environmentally friendly. It is important that baiting programs are properly presented to homeowners. Baiting may require a longer time and more frequent visits. Continual evaluation of a baiting program is essential and the homeowner may become an active participant by providing observations and evaluation.

Development of a good baiting program for carpenter ants has been difficult for a number of reasons. Their food preferences are diversified because the ants feed on a variety of carbohydrate and protein sources. Protein is essential at certain times for egg production and brood development; however, carbohydrates are required throughout the foraging season. These differences not only occur between different species of carpenter ants but between colonies of the same species in the same locality. Once a colony has established a foraging site, it is difficult to entice the ants to switch from their foraging arena to a bait. Some of these natural foraging sites may need to be eliminated before a baiting

program can be initiated.

At potential baiting sites, offer several types of baits that are marketed for carpenter ants. Different baits are available in solids, gels and liquids. Carpenter ant management has been achieved with all of these formulations and all have been effective at some sites. The challenge with using baits is to determine which bait and which formulation the ants will accept and which bait will be more attractive than their established foraging source.

Obviously, baiting protocols are more effective during the foraging season. During the dormant season (winter), carpenter ants do not normally feed because they live on stored body reserves. Some carpenter ant activity may occur within a structure over winter because of the heating conditions. These ants may be found around water in bathroom and kitchen areas. Though these ants are found on fruit scraps, in empty soda cans or sweets, baiting has had limited success until after the ants become more active during the foraging season.

In many areas where homes are built



The author is shown with a *Camponotus modoc* infestation in railroad ties. Notice the debris between the ties.

in forested areas, carpenter ants are part of the resident ecological community. It is often difficult to prevent main colonies in standing trees from establishing satellite colonies within these structures. To protect homes from infestation by satellite colonies in nearby trees, it may be necessary to apply an annual perimeter spray. Also, in urban areas, a home may require a protective spray when the main colony is located in a standing tree on the homeowner's or on neighboring property.

Exclusion may be a possibility when a tree branch or other landscaping comes

## SPRAY AND BAIT CONSIDERATIONS

The natural foraging arena for carpenter ants is outside, usually in trees, where they feed on honeydew from aphids, caterpillars and other insects. In combining spray applications with a baiting program, all of the following must be considered:

1. Spray carpenter ant trails to discourage their use.
2. Spray bases or trunks of trees used as foraging sites.
3. Do not spray near baits because ants need to be encouraged to frequent baiting sites and synthetic pyrethroid sprays will repel the ants.
4. Do not apply a perimeter spray because ants need to exit the structure to forage at baiting sites.

into contact with a structure and provides an avenue that was not formerly present. Trimming branches in contact with the roof or side of the structure may eliminate the sudden appearance of ants within the structure.

**CONCLUSION.** Goals for pest management professionals in carpenter ant management include knowing the species of

ants in your area and gathering information on their biology and behavior — particularly timing of foraging, swarming and movement of satellite colonies. For your clients, provide a menu of choices for carpenter ant management with a variety of pricing, chemicals, formulations and guarantees. The rapport you establish with your clients will demonstrate your flexibility to provide management options to fit

their budget and their management needs. Become partners with your clients to meet the challenges presented in carpenter ant management. 🐜

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