Extension Bulletin 0818

insect answers

CARPENTER ANTS: THEIR BIOLOGY AND CONTROL

Fig. 1. *C. modoc* colony.

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.

Fig. 2. *C. modoc* in crawlspace of house.

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.

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 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 of this parent colony. Com-

Fig. 3. Typical carpenter ant damage.

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Fig. 4. Carpenter ant trail in a lawn.

Fig. 5. *C. modoc* in tree.

munication 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 is probably 10 to 20,000 workers, with large colonies having 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 also 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.

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.

Identification

Carpenter ants, genus *Camponotus*, belong to the subfamily Formicinae, which is characterized by a circular anal orifice (opening) surrounded by a fringe of hair (hand lens of 20X required, Fig. 6). Carpenter ants are large, with queens about 16–18 mm long (Fig. 7A) and workers varying from 6–13 mm long (Fig. 7B and C). When workers vary in size, this is called polymorphism (many sizes). The workers of some ants are monomorphic (one size).

For species identification of carpenter ants, it is essential that the largest workers, called majors, be collected. *Camponotus* workers are easily recognized by the thoracic dorsum, which is evenly convex when viewed from the side (Fig. 8). Other ants that may be confused with *Camponotus* have a notch or depression on the thoracic dorsum (Fig. 9). Color is not a good means of identification, as Washington has several species of carpenter ants that vary in color from 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 the legs which are reddish.

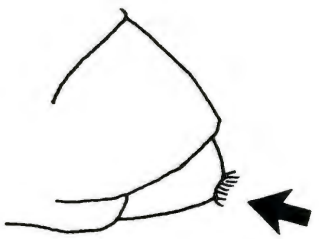

Fig. 6. Terminal, circular anal orifice fringed with hair.

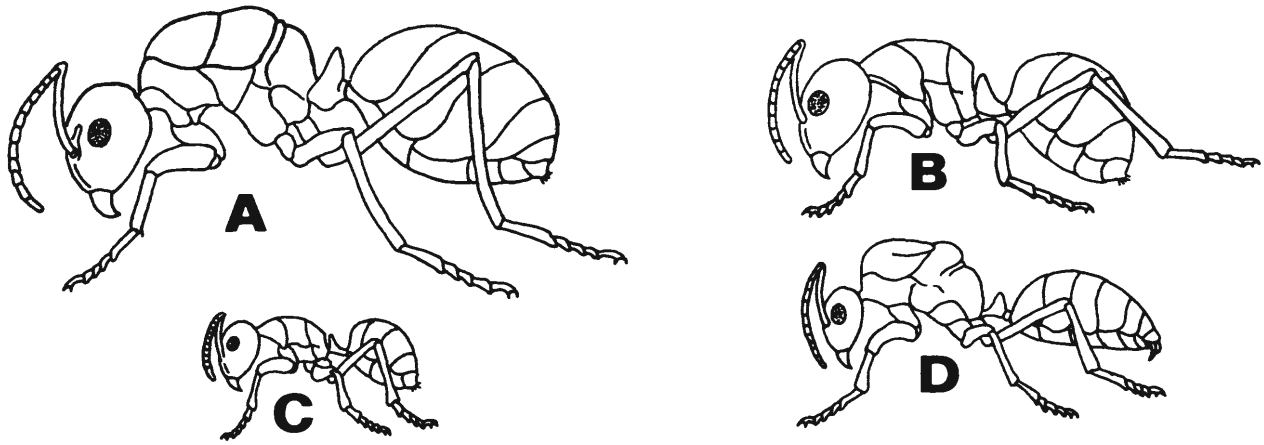

Fig. 7. Size relationships within carpenter ant colony: A—Queen 16-18 mm; B and C—Workers 6-13 mm (major and minor, respectively), D—Male 12-14 mm.

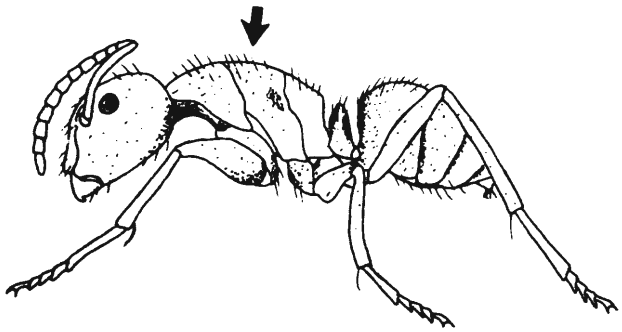

Fig. 8. *Camponotus* sp. (carpenter ants) showing evenly convex thoracic dorsum.

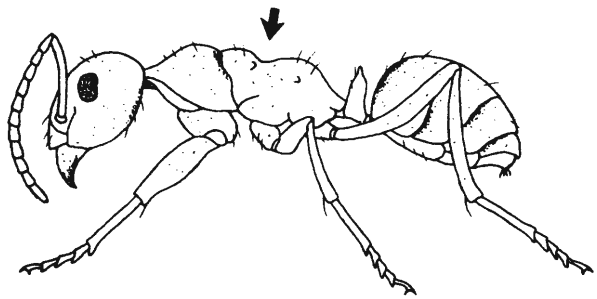

Fig. 9. *Formica* sp. (western thatching ant and other ants) showing notched thoracic dorsum.

Life History

All ants undergo complex metamorphosis, or change, and pass through the following stages: egg, larva, pupa, adult. 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 queens and males (Fig. 7D), which are produced during the late summer and overwinter in the 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 houses. The queen then breaks off her wings along lines of predetermined weakness, 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. 7C). They usually number about 15 to 25. These workers then take over the functions of foraging for food, nest excavation, and brood rearing.

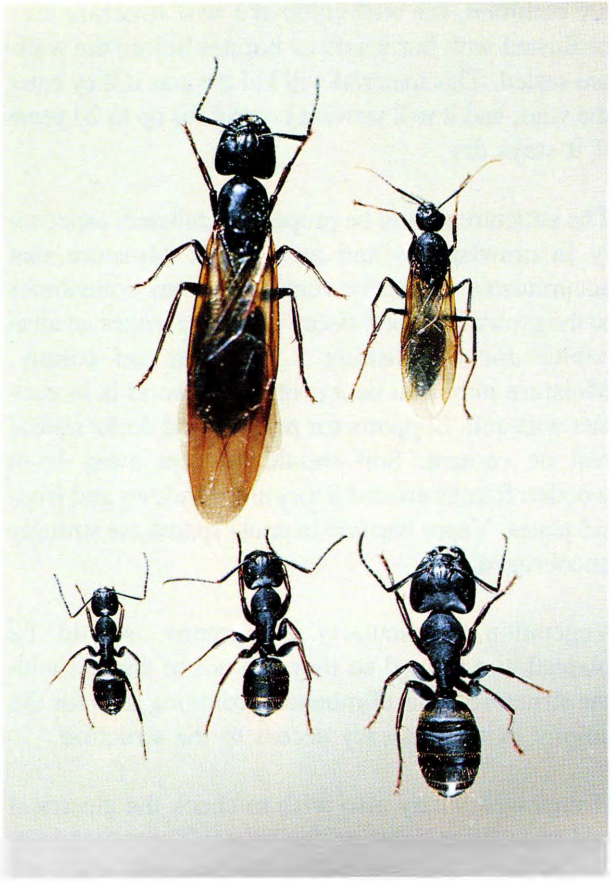

Fig. 10. Dorsal view of the adult stages of the carpenter ant: Top left—Queen; top right—Male; bottom left—Minor worker; bottom middle—Intermediate worker; bottom right—Major worker.

The queen's primary function from this point on 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. 7B). The colony does not produce reproductives (winged males and queens) until it is from 6 to 10 years old and contains about 2,000 workers. Dorsal views of all adult forms are shown in Fig. 10.

While most carpenter ant colonies are probably initiated by a single queen, 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 are also attracted to other sweet materials such as decaying fruits.

Control

It is important to determine if an infestation of carpenter ants is actually present, as ants may enter houses while foraging, or new queens may enter homes after nuptial flights and may not actually be causing problems.

The best indication of an infestation is the sawdust which the ants throw out of their tunnels. Another clue is the presence of a foraging trail which is easiest to locate between sunset and sunrise when the ants are most active. These foraging trails lead away from the house, and the perimeter should be carefully searched, especially in the proximity and direction of evergreen trees and shrubs.

Another indication of an infestation is sound produced by the workers as they excavate wood to enlarge the nest. This sound can often be heard adjacent to the infested wall. If an infestation is present, it is important that the nest be located. This is often difficult but not impossible.

Gently tap all floor joists, etc., with a metal rod, jackknife, or hammer, and listen for differences in sounds. A nest cavity gives a hollow ring. A knife blade inserted at this point will readily penetrate the wood if it is infested.

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 and wall joists and give the ants easy access to all parts of the house. Crawl spaces under the building and in the attic should also be inspected for ant activity.

Once the colony is located, it is also important to determine if it is a parent or satellite colony. This may take some searching, but the location of a trail easily directs one to a parent colony. For effective control, it is imperative to locate the parent colony.

Once the colony is located, chemical treatment can provide good control. This consists of direct treatment of the colony and a perimeter spray against the foundation of the house (*inside the foundation also* if the house has a crawl space instead of a basement).

Since the ants frequently follow electrical lines, it is recommended that all electrical plates be removed and insecticide applied through the access into the void between the walls (dust is the most effective formulation for wall voids. In addition, the use of a dust avoids electrical shorts that may occur if a spray is put into the wall void onto the electrical wires, and also avoids matting and other damage that sometimes occurs with the use of sprays. Therefore, we recommend only dusts be used in wall voids.) If the electrical box fits snugly, you can make a small access hole between the box and wall void, choosing the side that is not fastened to a stud. *Be sure to turn off main power switch prior to treatment as a safety precaution to avoid being electrocuted.*

If the colony in the house is in a place inaccessible for direct treatment, a ⅛ inch drill bit can be used to make small holes in the wall so an insecticide wand can be inserted. These small holes are nearly invisible when placed in the joints between decorative paneling and in other carefully selected locations. Thoroughly treating the parent colony and trail(s) is essential.

Ants may also use a nearby tree to gain entry into the home via a bough or branch that is touching the structure. Tie back or remove such branches so this pathway will be unavailable to them.

Cultural Control

Before houses are built 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.

It is also essential that scrap wood, stumps, and logs not be buried at the construction site, but rather, should be removed or burned. Where carpenter ants are common, the wall voids of a new structure may be dusted with boric acid or borates before the walls are sealed. This material will kill the ants if they enter the void, and it will provide control for up to 20 years if it stays dry.

The structure should be properly ventilated, especially in crawlspaces and attic areas. Moisture that accumulates in poorly ventilated areas contributes to the growth of wood-decay fungi and makes an ideal habitat for establishing a carpenter ant colony. Moisture may also be a problem if wood is in contact with soil. Supports for porches and decks should rest on cement. Soil should be kept away from wooden frames around doors and windows and from sill plates. Vapor barriers in crawl spaces are strongly encouraged.

Vegetation, particularly evergreens, should be planted and pruned so they are not in contact with the structure. This eliminates a foraging area for the colony as well as easy access to the structure.

Homeowners may also wish to check the electrical and water lines entering the house. These frequently provide a ready access to the house by the ants. Plugging the gaps with a 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 piled high against the house. This is a poor practice and the wood should be stacked elsewhere (Fig. 11).

Fig. 11. *C. modoc* in woodpile.

Biological Control

There is no known effective biological control for carpenter ants.

Chemical Control

Dust formulations are very effective against all Hymenoptera (the insect order that contains bees, ants, and wasps), particularly ants, because they are hairy and the dust adheres to the surface of their bodies. Then 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, so it is used primarily in wall voids and on ant trails within the house.

Only dust formulations should be applied in wall voids. Ficam (bendiocarb) 1% dust, and 99% boric acid dust are registered for this use by homeowners. Diazinon (diazinon) 2% dust, Tim-Bor 98% dust, and dursban (chlorpyrifos) dust, are registered for this use only by licensed applicators. A 0.10% Tempo dust will soon be registered in Washington for use in wall voids.

Insecticides that can be used for perimeter sprays include Knox-out 2FM (encapsulated diazinon) at 1% final concentration, Dursban (chlorpyrifos) at 0.5%, Tempo (cyfluthrin) at 0.05%, and Demon (cypermethrin) at 0.1% final concentrations.

Boric acid, as mentioned previously, can be obtained in an insecticidal formulation under the trade names: Roach Prufe, Roach Ridd, Roach Kil, Borid, and several others. Tim-Bor is sold only to pest control operators in 25- or 1-pound bags.

Exercise caution in handling all pesticides and be sure to read the label for both cautionary statements and use procedures.

Hazard to Pets

A major concern of homeowners in treating carpenter ant infestations is whether the chemicals used pose a serious health hazard to their pets, especially dogs and cats. The insecticides recommended for control in this bulletin are only moderately toxic to mammals and, if used as directed, will not poison pets.

If the lawn or other areas where pets roam are treated, it is advisable to keep them away from these areas for one to several days following treatment.

The remedies suggested should provide effective control of carpenter ants if you strictly follow the procedures. Another approach is to employ the services of a reputable pest control operator.

Additional WSU Extension Publications on Ants

EB0671, *Identification and Habits of Key Ant Pests of Washington*
EB0929, *Thatching Ants*
EB1382, *Moisture Ants*

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