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CARPENTER ANTS: THEIR BIOLOGY AND CONTROL

By
Laurel D. Hansen, Ph.D., Adjunct WSU Entomologist, Spokane.
Arthur L. Antonelli, Ph.D., Washington State University Extension Entomologist, Puyallup

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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.

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. 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 l00, 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. 2. C. modoc under insulation in the crawlspace of a house.

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

Fig. 3. Typical carpenter ant damage.

Fig. 4. Carpenter ant trail in a lawn.

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

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 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 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.

During the first warm days of spring—January- June, depending on locality—these reproductive 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.

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

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

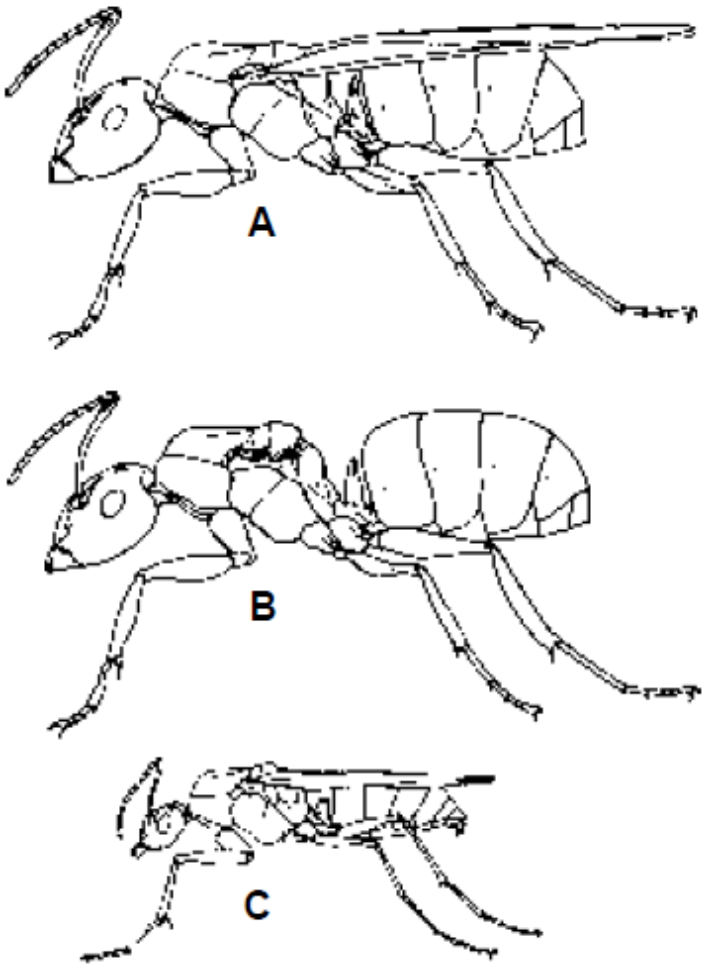

Fig. 8. Reproductives in a carpenter ant colony: A. winged female, B. queen without wings, C. male.

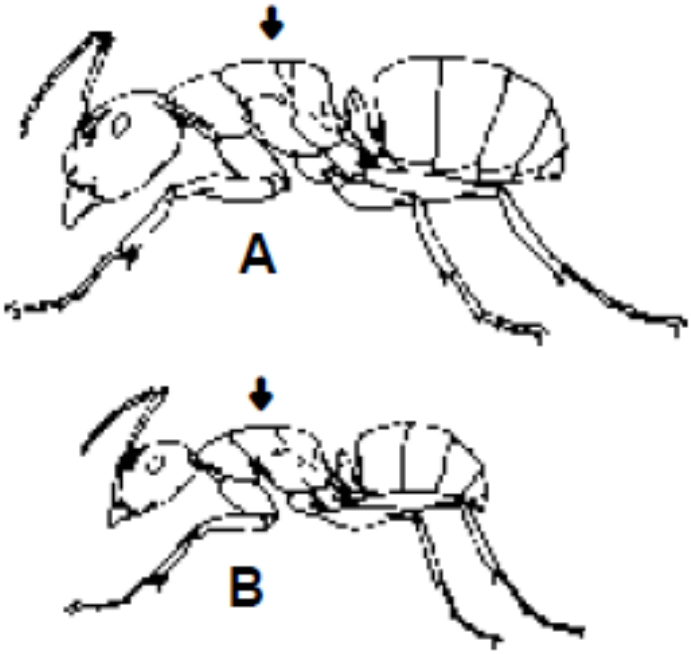

Fig. 9. A. major workers, B. minor worker. Carpenter ant workers have an evenly convex thoracic dorsum.

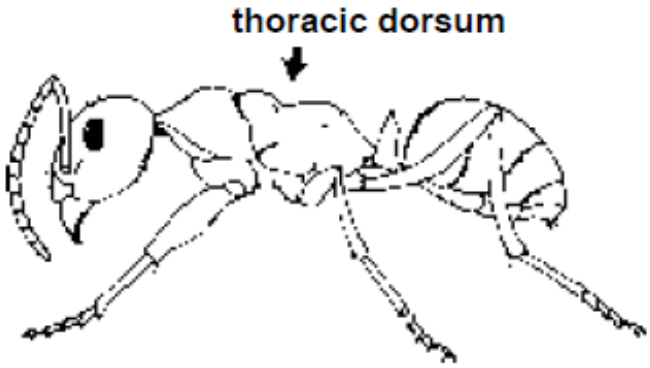

Fig. 10. Formica sp. (western thatching ant and other formicine ants) showing notched thoracic dorsum.

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.

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.

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.

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.

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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Drawings in Figs. 6, 8, and 9 by Janet D. Reynolds

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*

Cover image courtesy of Sharon Lilly, International Society of Arboriculture, Bugwood.org

Use pesticides with care. Apply them only to plants, animals, or sites as 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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