Carpenter Ants

Ecology Publication #97-420

Carpenter ants are large black or reddish black social insects, living in colonies and having castes of different workers for different tasks. This document covers Integrated Pest Management (IPM) techniques for control of carpenter ants.

Contents

Facts about carpenter ants

How to tell a carpenter ant from other ants or a termite

Carpenter ants, **moisture ants** and **termites** can all be found in damaged wood or insulation. Although ants and termites appear similar, it is not difficult to tell them apart if you have a specimen in a container or on a sticky trap to look at it. Ants have a bend or "elbow" in their antenna while termites have a more flexible "beaded" antenna. Ants have a "waist" and termites don't. Both species can have wings. Once you identify an ant, determine if it is a carpenter ant or one of the other species of ant that live in rotted wood. Several ant species will move into already wet and severely damaged wood, although they do not damage the wood as carpenter ants do. Carpenter ants are the largest size ants. Workers are ¼ to ½ inches and queens are ¾ inch long. Other ants are 1/8 to ¼ inches long. Carpenter ant workers also have a smooth, arched back profile while other ants have bumps or notches.

Carpenter ant

Moisture Ant

Termite

A pest control professional is necessary if you are unable to find or get access to the ant's nest inside or outside.

Hazards of carpenter ants

Carpenter ants **destroy wood** by excavating tunnels through it to live in. If they are in parts of a building that are not visible or little used they can cause extensive damage before they are detected. An important thing to remember about carpenter ants is that their colonies grow slowly and their **damage is done slowly**.

Benefits of carpenter ants

Ants are a **natural predator of other insects** that are pests to humans, especially termites. Carpenter ants are also important in the landscape for their role in the **breakdown of wood debris and the creation of soil**. They should be left alone if they are in a location where they are not bothering humans.

Carpenter ant food

Carpenter ants' primary foods are **other insects**, the honeydew produced by aphids and other insects, and **plant juices**. They do not eat wood - they build nests in it. They will forage for food such as **meat, grease and sweets** inside the building. Worker ants **share their food** with other colony members.

Removing food sources will help reduce, but may not eliminate, a carpenter ant infestation. The queen and a few workers will resort to cannibalism if necessary for their survival.

Preferred nest locations

Carpenter ants prefer to tunnel into **moist wood that is infested with fungus**, but they will also inhabit **dry wood**. The main colony is usually outdoors and contains the queen, workers and immatures. Satellite colonies are often in buildings and contain workers, reproductives, older larvae and pupae.

In buildings they live in one or more nests, which are a combination of the tunnels they have excavated in either hardwood or softwood. Usually they prefer structural wood

and the spaces between boards, but they may be behind shelves or in stored furniture. Other materials they may infest are **foam and fiberglass insulation**. It is easier to detect carpenter ants than termites within a building because they will come out into the open while foraging and can be caught in sticky traps. It can be very difficult to locate their nests since they may be in areas that are physically difficult to inspect.

In the landscape they are most likely to be living in a dead tree or stump or in rotting wood in a living tree. If the school property does not have nests, the ants may be coming from a neighbor's landscape, firewood pile or other wood debris. An established colony may be spread out in satellite colony nests located in several stumps or trees connected by trails.

The carpenter ant life cycle

Ants go through four life stages over a two month period; egg, larvae, pupae and then adults, which includes female **workers** and soldiers, and one fertilized **queen** who produces all the eggs. **New reproductive queens and males** are produced at the end of the summer and spend the winter in the nest. In the spring, the new reproductives **swarm** or leave the main nest to start their own colonies. The male dies after mating with the queen. The new queen finds a nest site and starts a new colony. The spring swarming period is when carpenter ants are most likely to be seen around the school. A queen can live for many years and will not produce new reproductives for 6 to 10 years.

How carpenter ants get into schools

Ants in the building are usually coming from **nests outside**. A new colony may get started in the soil under decorative landscaping bark or debris, but it will soon move into wood through openings near the foundation.

Foraging ants follow **trails** from the nest to their entryways into the building and back to the nest again. These trails are kept clear of vegetation and are more defined closer to the nest. Ants returning to the nest will be carrying insect parts and food while ants leaving will not be carrying anything. The trails will fan out and disappear as they get further away from the nest.

Satellite colonies in buildings are started by new carpenter ant queens who enter the building for shelter after mating. Occasionally ants will be introduced in infested construction lumber. New schools in forested areas are especially prone to carpenter ant problems.

The key to controlling carpenter ants

The keys to successful control of carpenter ants are:

- elimination or repair of wet wood,
- exclusion from school buildings,
- destruction of the existing nests and the ants,
- periodic monitoring for the ants.

Methods in Integrated Pest Management: Carpenter Ant Control

Techniques for School Personnel

Verify that carpenter ants are causing a problem

Finding carpenter ants in your building does not necessarily mean that the ants are living in the building. Workers may be coming inside to forage for food and then taking the food back to a colony outside. Swarming queens will enter a building in search of a nest site. Carpenter ants are likely to enter the building or live in the building during part of the year and to move out at other times. Once you have identified carpenter ants, the next steps to take are to find out how many there are, where they are and how significant the infestation is.

Look for nest sites in buildings

Watch for ant activity in the evening near potential food sources in the food service or garbage collection areas.

- ☑ Look for more than one nest. Nests may be difficult to find since the ants may travel for some distance within the walls, floor or ceilings to reach the nest. They are most likely to be in construction voids and / or moist wood.

- ☑ Look for piles of fine sawdust kicked out of tunnel entrances and use a stethoscope to listen for rustling noises in structural spaces such as walls, floor or ceiling.

- ☑ Solid foam insulation is especially attractive to carpenter ants.

- ☑ If you cannot find any nests but you think carpenter ants are in the building, hire a pest control professional to do an inspection.

Find out where ants are getting into the school from the outside

This is especially important because the main ant colonies are most likely to be on the grounds. Ants use the same trails to travel back and forth from their nests to their foraging areas. They keep their paths open by trimming grass and removing small obstacles.

☑ Check along exterior walls and foundations for ants going into the foundation or up under the roof.

☑ Ant entrances into the building can be on utility pipes or wires through the walls.

☑ Look for evening activity or the presence of insect frass (fine sawdust) found at an entrance hole or a window or door opening.

☑ Check spider webs for carpenter ants.

☑ Look for bare dirt or trimmed foraging paths through the nearby grass or vegetation and follow the ants back to their nests. Ants are most active after dark and in warm weather.

Look for nest sites outside the buildings

If the carpenter ants are located in the landscape the school personnel should monitor for carpenter ant activity in the building and for signs that they are entering the school.

☑ Check for nest sites within 100 yards around the buildings especially in trees, stumps, roots, landscaping wood, beauty bark and under needles or other cellulose debris. They prefer wood and are less likely to be nesting in soil.

☑ Look for more than one nest in several trees connected by pathways on the ground and on the branches and trunks. It is easier to detect the trails outside and follow the ants to their nests than it is to find them inside.

☑ Wooden building debris, such as form boards left behind when concrete foundations were poured, will eventually be infested by carpenter ants. Look for remains of construction wood around the foundations and in any crawl spaces.

Habitat alterations that make your school unattractive to carpenter ants

Correction of the conditions that attract or harbor carpenter ants in your building is the best insurance to keep them from causing future problems. Carpenter ants will move their whole colony readily if conditions get too dry or cold, or if they are disturbed. Making repairs can be all that is needed to get ants to move out.

Make repairs to keep carpenter ants from finding moist wood in the building

Although carpenter ant nests are found in both wet and dry wood, the initial colony in a building is usually established in damp or decayed wood.

☑ Repair structural water leaks and drips from roofs, walls, gutters and down spouts, flashings and where paving or grading directs water toward the building.

☑ Repair any leaking plumbing, drains and fixtures.

☑ Replace damp and damaged structural wood. Use moisture meters, a screwdriver or an ice pick to find damp wood.

☑ Ventilate attics and crawl spaces. Check appliances such as dishwashers and ice makers to see if they need to be ventilated.

☑ If the structural wood and soil are in contact or the distance between them is less than 8 inches, fix it by replacing wood with cement or installing a metal or cement barrier. Use borate based wood preservatives to treat wood that cannot be moved far enough from soil level or if access makes it too difficult to replace the wood with cement or metal. Note: borates will eventually leach out of wet wood.

Make repairs in the landscape

☑ Remove infested dead wood that is near the school.

☑ Prune or trim back trees and vegetation so that branches do not reach the buildings.

☑ Aphids infesting landscape plants may be providing a significant source of carpenter ant food.

☑ In some many cases the infestations will be in structural wood or land clearing debris that is buried on site and is impossible to find and completely remove.

Prevent outside ants from entering the school

☑ Screen all opening doors, windows and vents. Woven or welded hardware cloth with a small mesh is more durable than regular window screening.

☑ Caulk gaps around screens and repair holes in screens.

☑ Look for cracks and holes around wires, pipes and other wall and roof entrances to the building and repair with paint, putty or caulk. A flexible silicone mildew resistant caulk is best. Don't try to caulk every crack - just do the ones near the ants' access points.

Methods to kill and remove carpenter ants.

Although it is essential to eliminate the ants inside the building it will not be possible to locate and destroy all of the nests in the landscape. Carpenter ants provide a beneficial service in the landscape because they help break down wood debris and create new soil.

Rather than spending time and money to treat an entire building, identify and control the locations where the ants actually are.

Most effective and non-toxic methods

Vacuum ants to remove an indoor nest

The most effective way to eliminate either carpenter ants or dampwood termites is to open up the damaged area and destroy the insects by using a vacuum. The moisture source and damage has to be repaired to prevent them from re-establishing the nest if they return. Insects can be vacuumed out of their nest with some cornstarch in the vacuum bag to suffocate them.

☑ Use a vacuum with a High Efficiency Particulate Air (HEPA) filter to protect workers from insect particles which can cause allergic reactions in individuals with shellfish allergies (insect exoskeletons and crustacean shells are composed of the same biological substance - chitin). HEPA filters can be purchased for conventional shop vacuums.

☑ Use a mask with a HEPA filter for personal protection.
☑ Always remove the vacuum bag, tape or seal the openings, and dispose of it promptly to prevent any living ants from escaping.

Outside nest removal

Carpenter ants nest near buildings in living and dead trees and stumps as well as in the soil under rocks and other landscape debris. The main or parent nest of several inter-connected colonies is most likely to be outside of a building. Carpenter ants often have separate colonies with different environments for different life stages.

☑ Landscape repairs such as removal of wood debris (especially beauty bark) will clean up many potential nest sites.

☑ Carpenter ants colonies within 100 yards of the infested building can be destroyed if they can be found.

Ineffective methods

Indoor poison baits

Baits in general have not been very effective against carpenter ants although they do work for other types of ant. Indoors, other food sources must be removed for ants to take a bait. Baits do not kill all individuals since the pupal stage does not share in the colony's food and colonies are usually distributed among different locations. Bait granules are not very safe or effective outdoors because they can look like seeds to birds and small children and ants tend to move them aside if other food is available.

Ultrasonic Devices

Devices that emit sound beyond the human range of hearing and are advertised as a way to repel a variety or insects or animals. In 1984 the Federal Trade Commission studied them and determined **they do not work.**

Techniques for the Pest Control Professional

Verify that carpenter ants are causing a problem

Look for nest sites in buildings

Pest control professionals may use traps, an attractive bait, or a flushing agent such as pyrethrin spray to find the colonies behind drywall and paneling. Carpenter ant experience is essential. Equipment for respiratory protection is necessary to protect the inspector from residual insecticides from previous treatments that may be present in wall voids and crawl spaces.

A limited wood destroying organism inspection can identify or verify the presence of carpenter ants, dampwood or subterranean termites, wood boring beetles and rot fungus. A complete wood destroying organism inspection will include examination of accessible parts of the substructure or crawl space, the locations of damage, and conditions conducive to the infestation such as inadequate clearance between soil and wood, earth-wood contact, cellulose debris, excess moisture and inadequate ventilation. Parts of the building may not be accessible for inspection due to construction techniques.

Pyrethrums can be used as **flushing agents** to irritate carpenter ants and drive them out of their nests so the nests can be located.

Methods to kill and remove carpenter ants

Most effective and non-toxic methods

The following methods are very effective if you need to eliminate a large carpenter ant infestation in a building, but they are not practical as a periodic control method. Unless the conditions that attract and harbor the ants are corrected, a new population of ants can move in from the grounds. There is no toxic residue or residual pest control action. Professional help and equipment are needed for these methods.

Vacuum ants to remove an indoor nest

Pest control companies use vacuums with HEPA filters and special attachments to quickly and effectively remove ants from interior nests. Carpenter ants are often driven out of the walls with a pyrethrin spray and then vacuumed up.

Thermal treatments

A heavily infested building can be wrapped in plastic and the air inside **heated to over 120 degrees F**, destroying any ants, drywood termites, cockroaches, fleas and wood boring beetles. Heated air can also be forced into spaces such as wall voids or crawl spaces. Heat sensitive valuables must be moved out and the building cannot be occupied for several hours. This is an expensive process usually used for buildings or rooms with valuable stored materials.

Electrical treatments

A device called the **Electrogun™** shoots pulses of electricity into wood. It kills nearby insects in the wood such as carpenter ants, drywood termites and some beetles. The insects do not all die immediately but all of them will die eventually. The location of the nests must be known to avoid the expense of treating a large area unnecessarily. Once a nest is located, other methods such as vacuuming are more practical for carpenter ants.

Most effective and lower toxicity methods

"Effective" and "lower toxicity" are relative terms. A compound will have varying degrees of effectiveness or risk to the organism (insect or human) that is exposed to it, depending on the age, physical condition and chemical sensitivity of particular individuals. Different pathways of exposure for the same compound, for example by mouth, through the skin and/or by inhalation through the lungs have very different effects. In this context, "most-effective lower-risk" means the most effective compound against the pest, with the lowest toxic risk to non-target organisms.

With any pesticide or toxic substance it is essential to read and follow the label, both for self-protection and for the most effective use against the pest. The label is the law. Manufacturer's Material Safety Data Sheets must be kept on file where they can be accessed in case of an emergency or accidental exposure.

Pesticides are mixed in many different formulations designed for different pests and locations. A lower toxicity ingredient may have other higher toxicity ingredients added to it, or a product may be used or misused in a method of application or a location where it's effects are much more toxic.

Indoor crack and crevice treatments

In a school, dusts or sprays should only be used in confined spaces such as wall voids and in crack and crevice applications to prevent children from contacting the dust or any vapors. As long as dusts are kept dry and are not disturbed, they will last indefinitely in a wall void. They can pose a health risk to workers who open the wall later unless they are wearing respiratory protection. Do not stir dusts up again once they have been applied. Some products can be used in food preparation areas. They are especially useful in areas such as in and around appliances, ductwork, around electrical outlets and wiring, and in wall and ceiling voids.

Pest control professionals have power spray equipment that can correctly distribute pesticidal dusts or sprays in a very thin layer. The dessicating dusts, boric acid, pyrethrins and pyrethroids can be applied this way. The dusts must be very lightly applied because insects will walk around particles they can detect. Sprinkling little piles of dust will not be effective.

Dessicating dusts

These products work by absorbing the protective coating on an insect's cuticle (protective shell) which causes it to die of dehydration. Applicators need to use a protective dust mask and goggles. Although these dusts are almost non-toxic to mammals, they are respiratory irritants when inhaled.

Carpenter ants walk over these dusts and then spread them on their bodies when grooming. They do not work quickly; it may take several weeks to kill most insects unless they are combined with a quicker killing pesticide such as pyrethrin. The insects may become more visible before they die because they emerge from shelter to look for water

Dusts provide protection against carpenter ants, other ants, some beetles, termites, ticks, cockroaches, fleas and silverfish that are in the buildings. Insects do not seem to be able to develop a genetic resistance to them. They are not effective outdoors or in any damp area.

Diatomaceous earth

This product both absorbs moisture and ruptures the skins of insects. **Caution: never use the treated diatomaceous earth sold for swimming pool use!** - It has crystals that cause the disease silicosis in humans. Only use natural diatomaceous earth products sold for garden and animal use. Diatomaceous earth is combined with pyrethrins to provide a quicker kill in Diacide®.

Silica aerogel

This material is used to kill carpenter ants, cockroaches, other ants in a building, termites, ticks, some beetles, fleas and silverfish. It is also used in pill bottles and electrical equipment to absorb moisture. The silica aerogel used is a food grade product, not the crystalline silica which causes the lung disease silicosis. It is very toxic to fish - do not use where it can get into aquariums. Tri-Die® or Dri-Die® is one product, another product is Drione® which is silica aerogel mixed with pyrethrin.

Boric acid

Boric acid is relatively non-toxic to mammals in low doses - it is used in eye drops. Ingestion through broken skin or the mucus membranes of higher doses are toxic to humans. Roach Prufe® and Roch Kill® are two products with anticaking compounds added to resist moisture. An aerosol formulation is easier to apply in wall voids than dusts.. **Warning! Boric acid tablets should not be used in a school because they look like candy to children.**

Pyrethrins

These insecticides are extracts of natural chrysanthemums which attack the nervous systems of insects and paralyze them almost instantly. Pyrethrins are often an allergen for people with hay fever or ragweed allergies when inhaled. They are sometimes used as a **flushing agent** to drive carpenter ants out of their nests. The flushing is done with special spray equipment in a crack and crevice application. As the ants run out of their nest they can be vacuumed up. The pyrethrins in a flushing agent are designed to dissipate in a hour or so and not to leave a pesticide residue.

They will last for months in a wall void and can be combined with a desiccating dust to provide long term control. Some combined products are: Diacide® with pyrethrin and diatomaceous earth, and Revenge® and Drione® both with pyrethrin and silica

aerogel. The dust is a skin irritant. Use the same precautions when applying it as the other dusts.

Pyrethroids

Pyrethroids are synthetic insecticides chemically similar to pyrethrin extracts of natural chrysanthemums. They are formulated to be more persistent in the environment than pyrethrins. Pyrethroids are less likely to cause allergic reactions than pyrethrins. They are common ingredients in "bug bombs" which should not be used in a classroom and in sprays which could be used in wall void or crack and crevice treatments against carpenter ants. Micro encapsulated formulations work well in wet or greasy conditions. The pesticide particles are the size of a dust particle but have a protective capsule around the ingredients. They are applied in a crack and crevice application with special tools. Like a dust, the particles are picked up on the insect's body and swallowed during grooming. Pyrethroids are used as fumigants for carpenter ants and in sprays which could be used in wall void or crack and crevice treatments against an ant nest.

Perimeter barriers dusting or spraying

Low toxic pesticide barriers may be necessary if the building has damp areas that can't be accessed for repair or if the school site has a large amount of buried woody debris that can't be located or removed.

Pyrethrins and micro encapsulated pyrethroids for exterior perimeter application are lower toxic when used in low amounts. They must be mixed correctly both for safety and effectiveness. Formulations are now available that have long residual periods in a outside environment.

Other methods that vary in effectiveness and are moderate to high toxicity

Higher toxicity carbamates and organophosphates are no longer the only options because pyrethroids are now formulated to be an effective barrier and an effective crack and crevice spot treatment.

Organophosphates

Organophosphates are moderately toxic to highly toxic insecticides which interfere with the actions of the enzyme cholinesterase, affecting the nervous system and thus the muscular control of vertebrates. Insects are eventually killed by paralysis of the muscles responsible for breathing. Several products that are currently used against carpenter ants are propetamphos (Seraphos® and Catalyst®) and

chlorpyrifos (Dursban®). Micro encapsulated formulations are most a least toxic method of application.

Carbamates

Carbamates are moderately toxic to highly toxic insecticides which also act by interference with the enzyme cholinesterase. Bendiocarb (Ficam®) is used in a dust or as a wettable powder and is commonly used as a perimeter barrier against carpenter ants. Propoxur (Baygon®) is in some over the counter formulations.

Related Publications

In addition to this fact sheet, staff working on the Integrated Pest Management in Schools Project have created eight other documents that describe the least toxic methods for controlling pests in a school setting. Call (360) 407-7472 to request any of the documents listed below:

Publication Number	**Title**
#97-421	*Integrated Pest Management in Schools Project: Fleas*
#97-422	*Integrated Pest Management in Schools Project: Flies*
#97-423	*Integrated Pest Management in Schools Project: Head Lice*
#97-424	*Integrated Pest Management in Schools Project: Cockroaches*
#97-425	*Integrated Pest Management in Schools Project: Rodents*
#97-426	*Integrated Pest Management in Schools Project: Termites*
#97-427	*Integrated Pest Management in Schools Project: Yellowjackets and other Wasps*
#97-428	*Integrated Pest Management in Schools Project: Nuisance Ants*