IPM for Ants in Schools

INTRODUCTION

Ants become pests when they invade buildings in search of food or shelter. It is often very difficult and laborious to eliminate most ants from their outside habitat, so management efforts should aim at preventing ants from invading structures. Unfortunately, prevention is not always successful and management actions must be implemented.

Although ants often are regarded as pestiferous, they are beneficial in several ways. Ants are predators of numerous pest insects, including fly larvae and termites. By aerating soil and recycling dead animal and vegetable material, they aid in the formation of topsoil. Ants also are responsible for pollinating plants in some areas. Ants provide a great service to the environment, and management efforts that prevent or suppress ants are preferred over practices that aim to eliminate ants.

IDENTIFICATION AND BIOLOGY

Ants are social insects. They live in colonies whose members are divided into three castes: workers, queens, and males. The workers enlarge and repair the nest, forage for food, care for the young and the queen, and defend the colony. The queen lays eggs, and the males serve only to mate with the queens.

Ants pass through four stages of development: egg, larva, pupa, and adult. After mating with males, queens lay eggs that hatch into blind, legless larvae. The larvae are fed and cared for by worker ants. At the end of the larval stage they turn into pupae, which do not feed. After a short period of time, adult ants emerge from their pupal cases and become worker ants.

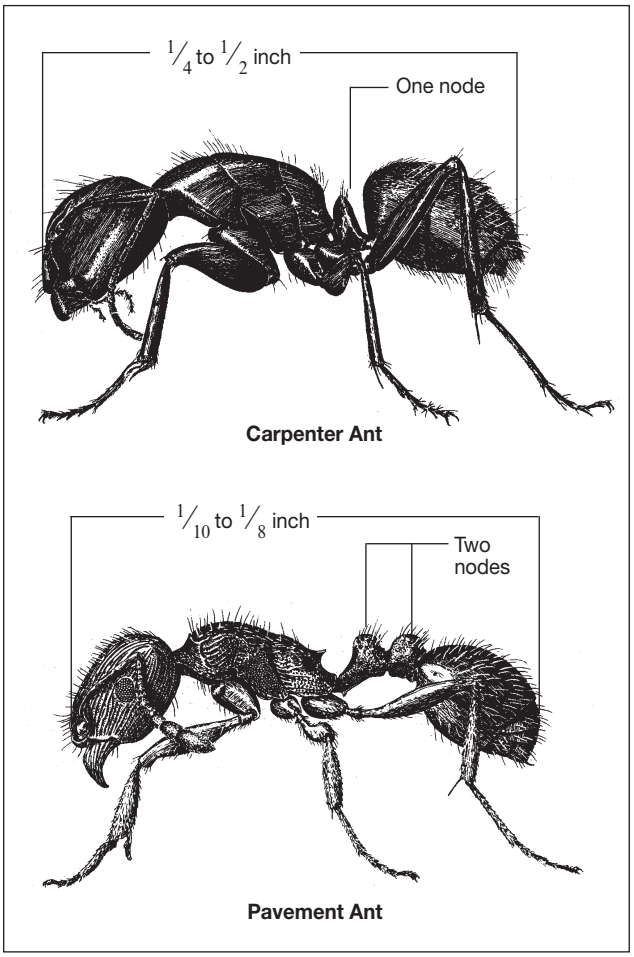
The first step in managing pest ants is proper identification, since many types of ants may invade a structure. It is critical to identify the type of ant you want to management, because most ants differ in their habits and food preferences. See Table 1, "Common House-Invading Ant Species."

DAMAGE

Many species of ants, such as pavement ants, are particularly prone to infesting food. Inside buildings, these ants are merely a nuisance, since they almost never bite. However, ants walk over many different kinds of surfaces and sometimes feed on dead animals and insects, so it is possible that they can carry disease-causing organisms to human food. Assume that ant-infested food has been exposed to organisms that can cause spoilage, and throw it away.

Carpenter ants may cause some structural damage as they excavate moist, rotting wood and other soft materials (such as foam insulation board) to make satellite nests.

FIGURE 1. Carpenter and Pavement Ants



(Illustrations from The Ohio State University fact sheet *Ants in and Around the Home*, HYG 2064-96)

Most of the information for this chapter was modified from:
IPM for Schools: A How-to Manual. United States Environmental Protection Agency. EPA 909-B-97-001. March 1997.
Bode, W. M. and S. B. Jacobs. *Carpenter ants*. The Pennsylvania State University. Entomology-HP-1. 1995.
Jacobs, S. B. *Pavement ant*. The Pennsylvania State University. Entomology-NP-11. 2000.

TABLE 1.

Common House-Invading Ant Species

Species	# of nodes	Description of workers	Habits in pedicel
Pharaoh Ant *Monomorium pharaonis*	2	Small, around 1/16 to 1/12 inch (1.5–2.0 mm) long; yellowish to red; often confused with thief ant, but has 3 segments in the club-like structure at the end of the antennae.	Nests in any secluded spot; prefers temperatures between 80° and 86°F; frequent house invader; often found around kitchen and bathroom faucets, where it obtains water; feeds on sweets but prefers fatty foods; eats dead insects.
Thief Ant *Solenopsis molesta*	2	Very small, around 1/16 inch (1.3–1.8 mm) long; yellowish; often confused with Pharaoh ant, but has 2 segments in the club-like structure at the end of the antennae.	Often lives in association with other ants as predator of brood; omnivorous but prefers grease or high-protein foods over sweets; frequent house invader; may nest indoors in cracks and cupboards.
Carpenter Ant *Campontus pensylvanicus*	1	Large, 1/4 to 1/2 inch (6–12 mm) long; shiny dark brown to black; evenly rounded thorax when viewed from the side.	Nests in logs, stumps, hollow trees; may nest in moist, rotting wood and foam plastic insulation board to make satellite nests; omnivorous; common house invader.
Larger Yellow Ant *Acanthomyops interjectus*	1	Around 5/32 to 3/16 inch (4–4.5 mm) long; pale yellowish brown; when crushed, smells like citronella.	Lives in soil next to foundation, under basement floor, concrete voids, or rotting wood; feeds on honeydew of subterranean aphids and mealybugs.
Pavement Ant *Tetramorium caespitum*	2	Around 1/10 to 1/8 inch (2.5–4 mm) long; light to dark brown or blackish; head and thorax furrowed by parallel lines.	Nests under stones and edges of pavement, in winter will nest in houses in crevices adjacent to a heat source; slow-moving; tends aphids for their honeydew; feeds on seeds, insect remains, and greasy materials.
Odorous House Ant *Tapinoma sessile*	1	Around 1/10 to 1/8 inch (2.4–3.25 mm) long; brownish to black; emits foul odor when crushed.	Frequent house invader; nests in a wide variety of places outdoors and inside; multiple queens; colonies are localized; prefers honeydew from aphids, scales, etc., but is an opportunistic species and will feed on other sweets, protein, and grease.

(Chart adapted for Pennsylvania schools by J. Kenneth Long, Jr., PA IPM program assistant, October 1999, from the University of Florida School IPM Web site article Common House-Invading Ant Species at **schoolipm.ifas.ufl.edu/tp6b.htm**)

DETECTION AND MONITORING

Visual inspection is the most useful monitoring technique for detecting ants, and can be very useful in preventing a developing infestation. A thorough inspection and prevention program is required to locate the ant source.

- Make a map of the school on which you can note problem areas and areas needing repair.
- A bright flashlight, kneepads, and a mirror are helpful.
- Carry a caulking gun to seal holes and cracks during inspection to prevent ants from gaining entry to the structure.
- Keep accurate records during the monitoring program to help formulate an IPM plan and evaluate its effectiveness.
- Ants are most likely to be indoor pests in kitchens and food preparation areas.
- An ant infestation may indicate that there has been a change in the methods of storing food or food waste that allows increased food sources for ants. Note how food and food wastes are stored in the area, and whether refuse containers are emptied and cleaned regularly. Inspect recycling bins to ensure that recyclables have been cleaned before being placed in bins.
- Talk with kitchen staff and custodians to learn more about the problem from their perspective.
- Ants can be attracted to snacks kept in classrooms or teachers' lounges and to sweet drinks accidentally spilled on the floor.
- Glue boards or sticky traps placed in areas ants are likely to be found can be useful in monitoring.
- Carpenter ants are attracted to moist areas. Check any areas where there might be a water leak, or moist or rotting wood (including firewood, logs, or stumps outside).

MANAGEMENT OPTIONS

Habitat Modification

The environment should be modified to reduce ant entryways and access to food. With quality materials and careful work, the alteration will be permanent and will make a long-term impact on the number of ant invasions.

Caulking

- Caulk all potential entryways with a silicone caulking compound.
- Use mildew-resistant caulk in moist areas.
- It is not necessary or practical to seal all cracks, but begin with the access point that the current trail of ants is using.
- Always carry caulk when making inspections, and seal as many cracks as time allows, especially those around baseboards, cupboards, pipes, sinks, toilets, and electrical outlets. Silicone caulks are flexible, easy to apply, and long-lasting.
- Use weatherstrip around doors and windows where ants may enter.
- Repair any water leaks and replace moist or rotting wood as needed.

Sanitation

Sanitation eliminates food for ants. Thorough daily cleaning of school kitchens and food preparation areas is essential.

- Sweep and mop floors.
- Drain all sinks and remove any food debris.
- If children regularly receive snacks in classrooms, these floors should be vacuumed and/or mopped daily.
- Periodically give all food preparation areas a complete cleaning, focusing on areas where grease and food debris accumulate. These include drains, vents, deep fat fryers, ovens, stoves, and hard-to-reach areas behind or between appliances. Thoroughly clean these areas with a powerful vacuum.
- At the end of each day, remove all garbage that contains food from the building.
- Use soapy water to wash any bottles, cans, wrappings, and other items that have food residues before storing them for recycling.
- If dishes cannot be washed right away, it is very important that they at least be rinsed to remove all food debris.
- Place garbage in sealed plastic bags, then place the bags into a rodent-proof dumpster or other storage receptacle.
- Keep garbage cans and dumpsters as clean as possible to deny food to ants, as well as roaches, flies, mice, and rats.

Proper Food Storage

- Food not kept in the refrigerator should be kept in containers that close tightly. Cardboard boxes are not ant- or roach-proof.
- Keep particularly attractive substances, like sugar and honey, in a refrigerator.
- Although refrigerator storage is usually safe, ants sometimes get into refrigerators even when the seals appear intact. When this occurs, a light, temporary coating of petroleum jelly on the edge of the refrigerator seal will exclude the ants.
- Screw-top jars are ant-proof only if the lid has a rubber seal, because some ants can follow the spiral ridges to get into the jar.
- Glass containers with rubber gaskets or plastic containers with tight-fitting, snap-top lids are also ant-proof.
- Upon delivery, transfer packaged food into plastic or glass containers. To prevent roach problems, do not bring shipping boxes into the food preparation area. Instead, boxes should be broken down and stored away from the kitchen in a cool area until removed for recycling.
- Advise students and teachers not to leave unsealed food items in their desks or lockers.
- Any food kept in offices or classrooms should be stored in ant-proof containers.
- Storage shelves should be far enough off the floor to facilitate cleaning and to reduce the possibility of access by insects or rodents. No supplies should be stored on the floor.

Physical Controls

At times when only a few ants are noticed foraging in an area, squashing or crushing the ants may be effective. However, foragers represent about 10 percent of an ant population, so further management efforts may be needed.

Vacuuming

- Use a strong vacuum to vacuum up trails of ants effortlessly and quickly.
- Vacuum up a tablespoon of cornstarch to kill ants in the vacuum bag.
- Carpenter ant colonies living under insulation may be removed by vacuuming.

Detergent Barrier
Temporary "moats" of detergent and water may be useful during heavy ant invasions.

- Containers of food or food waste which must remain open during working hours can be placed in large, shallow pans filled with water mixed with a small amount of detergent.
- Use this technique to protect potted plants from ants that may be attracted to nectar produced by the plant or to honeydew produced by plant-feeding insects. Elevate the pot above the detergent-and-water mixture by placing it on an overturned saucer. Make sure the plant is not in contact with anything that ants could use as a bridge. This will not manage an auxiliary colony which may already be established in the pot.

Chemical Controls

At times, nonchemical methods alone prove insufficient to solve the problem. Integrating a pesticide into your management program may be necessary to gain control of the ant problem.

Pesticides must be used in accordance with their EPA-approved label directions. Applicators should always wear protective equipment during applications. All labels and Material Safety Data Sheets (MSDS) for the pesticide products authorized for use in the IPM program should be maintained on file. Do not apply these materials in common access areas when occupied, and never apply them where they might wash into a drain or sewer unless otherwise labeled. **Pennsylvania law allows pesticide applications in schools only by certified applicators, registered technicians, or by non-certified applicators or non-registered technicians under the direct supervision of a certified applicator. Notification must be given to all staff and parents or guardians of students who request it 72 hours prior to pesticide use. Warning signs must also be posted in the vicinity 72 hours prior to and for 48 hours after the application. The law also mandates a 7-hour reentry period for common access areas whenever pesticides are applied.**

When treating for ants, use only crack and crevice treatments.

Detergent and Water
When ants invade a classroom or food preparation area, the best emergency treatment is a mixture of detergent and water in a spray bottle. This mixture will quickly immobilize the ants, which can then be wiped up with a sponge and washed down the drain. Each classroom, cafeteria, and food preparation area should be equipped with a spray bottle so teachers and staff can safely deal with emergencies.

Boric Acid
Boric acid is one of the most valuable chemical tools in an integrated ant management program. It is formulated as a dust, gel bait, and aerosol.

If kept dry, boric acid dust remains effective for long periods of time. Boric acid gel baits are very effective in controlling many species of ants.

- When applying boric acid dust, wear a dust mask to avoid breathing the material.
- Use a bulb duster to apply a light dusting in cracks and crevices. Boric acid should never be applied to large open areas.
- Boric acid is approved for crack and crevice treatment in kitchen and food preparation areas.
- Boric acid can be dusted into wall voids and spaces behind and under cabinets.

Diatomaceous Earth and Silica Aerogel
These are insecticidal dusts that can be used for ant management. Diatomaceous earth is made from fossilized diatoms, and silica gel is produced from sand. Both kill insects by desiccation: they abrade the wax and oil on the insect's outer covering, leading to dehydration and death. Although these materials are not directly poisonous to humans, the fine dust travels freely through the air and can be irritating to the eyes and lungs. Use a dust mask and goggles during application.

Diatomaceous earth and silica aerogel are especially useful in wall voids and similar closed spaces. These dusts can be blown into such spaces during construction and remodeling. In finished buildings, they can be applied by drilling tiny holes in the walls. These dusts also are useful in crack and crevice treatments.

Granular Applications
Granular pesticide applications, if used appropriately, can act as a temporary barrier and prevent ants from entering the school building. The material should be directed along the foundation 2 or 3 feet out onto the soil. Use only products manufactured and approved for this purpose and carefully follow the instructions on the labels.

Ant Baits

Baits greatly reduce the amount of pesticide that must be used to kill ants. Foraging ants take the bait back to the nest to feed to other members of the colony, resulting in colony death. Fast-acting baits kill foraging workers quickly, but are less effective than those that are slow-acting and can be taken back to the nest for consumption. Even if the queen is not killed, baits will usually stop an ant invasion. If a colony has been starved by effective sanitation measures, baits will be more readily accepted.

Baits should be placed out of sight and reach of children.

Some ants are very susceptible to baits, some are less so. There are many reasons for these differences, only some of which we understand. If you are having difficulty in managing ants with a bait, the following points may be helpful:

- Correct identification of the species of ant is essential since each species differs in its food preferences. Some baits use a sweet attractant, while others use a protein or oily attractant. The attractant used must be preferred by the type of ant you wish to manage. If you cannot determine the type of attractant by looking at the label, call the manufacturer for more information. You also should ask if the company has data to support the efficacy of their product against the ant species you are dealing with.
- After setting out bait, observe to see if the target ant is taking the bait.
- Ant colonies have changing nutritional requirements that can pose problems in baiting. A colony that accepted a protein bait one week may be more interested in a sugar bait the next.
- The nesting and foraging environment can also affect bait acceptance. Ants nesting and foraging in dry areas will be more interested in baits with a high water content than will ants nesting in moist environments.
- When there are several competing ant species in one area, nontarget ants may accept your bait more readily than the pest ant and, in some cases, prevent the pest ant from getting to the bait.
- Do not spray pesticides when using baits. Bait stations contaminated with pesticide are repellent to ants, and sprays disperse the ant infestation, making it more difficult to place baits effectively.
- Place bait stations along foraging trails, but do not disturb ant trails between the nest and the bait. Killing the ants or disturbing the trails prevents the ants from taking the bait back to the colony to kill nest mates.
- Do not apply bait until an ant problem is noticed. If you use baits preventively, you may attract ants into the building.
- Some baits come packaged in plastic disc "bait stations" that come with double-sided tape so they can be attached to various surfaces out of view. It is important to remove bait stations once management is attained, because the stations may serve as harborage for cockroaches. Some baits are formulated as granules or gels that can be injected into wall voids through small holes. Gel baits also can be placed near ant trails in inconspicuous places where they will not be disturbed.