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# CHAPTER 5

## IPM FOR ANTS IN SCHOOLS

### INTRODUCTION

Ants become pests when they invade buildings searching for food or when they protect plant-feeding insects like aphids and scales from attack by their natural enemies. It is neither desirable nor practical to try to eliminate most ants from their outside habitat, so management efforts should aim to keep them out of structures and to prevent them from tending plant-feeding insects.

Regardless of the damage they produce directly or indirectly, it is important to recognize that an ant species can be both pestiferous and beneficial. Ants kill numerous other pest insects, including fly larvae and termites, and they aerate the soil outdoors and recycle dead animal and vegetable material. From that point of view, ants provide an ecological cleansing and fertilization service of considerable importance.

Note that it is not within the scope of this project to address either carpenter ants or fire ants.

### IDENTIFICATION AND BIOLOGY

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

Ants pass through four stages of development: egg, larva, pupa, and adult (see Figure 5-1). Queens mate

with males and 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. Eventually, the adult ants that we recognize emerge from the pupal cases.



It is important to identify your problem ant before you design your management program because ants differ in their habits and food preferences. Use Box 5-A and Table 5-1 to assist you.

### DAMAGE

Certain species of ants, such as thief, Pharaoh, and Argentine ants, are particularly prone to getting into food. Inside buildings, these ants are mainly a problem of nuisance since they almost never sting or bite.

Since ants walk over many different kinds of material and sometimes feed on dead animals and insects, it is possible that they can carry disease-causing organisms to human food. At the very least you should assume that food they have swarmed over has been exposed to organisms that can cause spoilage, and the food should be thrown away.

### DETECTION AND MONITORING

Visual inspection is the most useful monitoring technique for ants, and can be very useful in preventing an incipient ant infestation. Often it takes detective work and ingenuity to discover where the ants are coming from.

- Begin by constructing a map of the school on which you can note problem areas and areas needing repair.
- Kneepads, a mirror, and a good flashlight will be helpful.
- Carry a caulking gun and seal all small holes found during the inspection.
- Keep accurate records during the monitoring program to help formulate an IPM plan and evaluate its effectiveness.

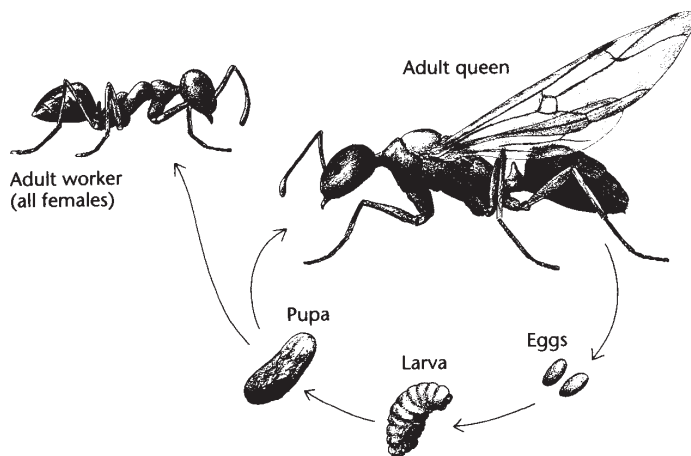


Figure 5-1. The Life Cycle of the Argentine Ant

- Ants are most likely to be pests indoors, especially 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 access for ants. Note how food and food wastes are stored in the area, and whether refuse containers are emptied and cleaned regularly. Check recycling bins to see if recyclables have been cleaned before storage.
- Speak to the kitchen staff and custodians to learn more about the problem from their perspective.
- Ants can be attracted to snacks kept in classrooms or the teachers lounge, or to something like a sweet drink accidentally spilled on the floor.

## MANAGEMENT OPTIONS

### Habitat Modification

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

### Caulking

- Caulk actual and 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.
- Weather-strip around doors and windows where ants may enter.

### Sanitation

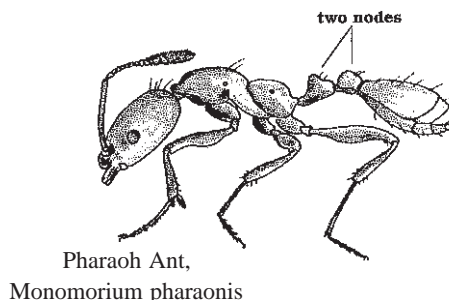
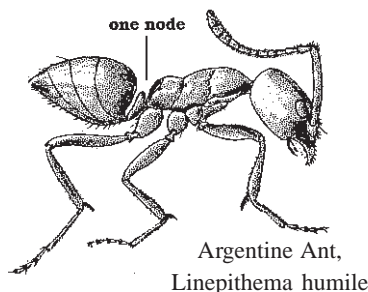
Sanitation eliminates food for ants. Thorough daily cleaning of school kitchens and food preparation areas is essential.

- 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 an all-inclusive 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 vacuum the area with a powerful vacuum.

### Box 5-A. Identifying Ants

Since ant species can differ widely in their food requirements, it is important to identify the species before choosing a bait. Like all insects, ant bodies are divided into head, thorax, and abdomen. Unlike many other insects, however, ants have a constriction between the thorax and abdomen that gives them their pinched-waste appearance. The constricted part of the abdomen is called the pedicel, and the fat, main part of the abdomen is

called the gaster. An important identification characteristic is the number of segments or “nodes” in the pedicel (see the figure below). For example, one-node ants include the Argentine ant and odorous house ant. Two-node ants include the Pharaoh ant, pavement ant, and little black ant. Final identification is made from size, color, other body characteristics, habits, or other information. Table 5-1 provides more information to help you identify your problem ant.



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**Table 5-1. Common House-Invading Ant Species**

**Please find this table at end of chapter**

<sup>a</sup> See Box 5-A.

- At the end of each day, remove from the building all garbage containing food.
- Use soapy water to wash any bottles, cans, wrappings, and other items that have food residues clinging to them 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 before it is placed into a rodent-proof dumpster (see Chapter 12) or other storage receptacle.
- Keep garbage cans and dumpsters as clean as possible to deny food to ants, roaches, flies, mice, and rats.

**Proper Food Storage**

- Food not kept in the refrigerator should be kept in containers that close tightly. Cardboard boxes and paper are not ant- or roach-proof.

- During ant invasions, you can keep particularly attractive substances, like sugar and honey, in a refrigerator.
- Although refrigerator storage is usually safe, ants sometimes get into refrigerators and freezers 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. Once ants have left, the petroleum jelly can be wiped off. Freezer storage is safe, because any ants that manage to get past the seal will die.
- Screw-top jars are ant-proof only if the lid has a rubber seal since the 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.
- As soon as they arrive in the building, transfer food packaged in paper to 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- and roach-proof containers.

### Physical Controls

Before ants become highly visible in long columns marching through a room, there have been a few “scouts” wandering around looking for food or water. It is always a good idea to kill these scouts before they have a chance to go back to the colony and summon their nest mates. Instruct teachers and staff to squash lone, wandering ants whenever they see them.

### Vacuuming

- Use a strong vacuum to vacuum up trails of ants effortlessly and quickly.
- Although the dust in the vacuum bag will usually clog the ants’ breathing apparatus and suffocate them, you can vacuum up a tablespoon of cornstarch to be sure they die.

### 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 larger,

shallow pans filled with water mixed with a small amount of detergent. Water alone is insufficient, since ants can float across using the water’s surface tension; the detergent breaks the surface tension, and the ants sink and drown.

- 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 touching anything that ants could use as a bridge.

### Flooding

Ants sometimes build nests in potted plants. Rather than disposing of the soil and the plants, water the soil until the ants are driven out.

- It is easiest to do this outside where the ants will find their way to another suitable nesting place, but if this is impractical, use a container of loose dry soil or compost to catch the ants.
- Place the infested pot in a wide and deep container, and use a stick to make a bridge from the pot to the ground or to the bucket of soil or compost.
- Water the plant heavily. As the soil becomes saturated, the ants will pick up their white pupae and look for drier ground.
- Many ants may walk out on the stems and leaves, but eventually they will find the bridge.
- When the trail of ants leaving the pot has disappeared, the plant can be drained and returned to its usual location.

### Chemical Controls

If non-chemical methods alone prove insufficient to solve the problem, then integrating a pesticide into your management program may be warranted. For information on the hazards of various pesticides and on how to select an appropriate pesticide for your situation, consult Appendix G for a list of resources.

Pesticides must be used in accordance with their EPA-approved label directions. Applicators must be certified to apply pesticides and should always wear protective gear 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 when buildings are occupied, and never apply them where they might wash into the sanitary sewer or into outside storm drains.

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When treating ants, only crack and crevice treatments with dust or bait formulations should be used. See Box 5-B for tips on controlling specific ant species.

### **Detergent and Water**

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

### **Boric Acid**

Boric acid is one of the most valuable chemical control tools in an integrated program against ants. It is formulated as a dust, gel, and aerosol. It acts as a stomach poison, and because it is a general enzyme inhibitor, ants are unlikely to become resistant to this material. If kept dry, boric acid dust remains effective for the life of the building.

- 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. This is superior to dusting large, open areas.
- Boric acid is approved for crack and crevice treatment in kitchen and food preparation areas.
- Boric acid can be blown into wall voids and spaces behind and under cabinets.

### **Diatomaceous Earth and Silica Aerogel**

These are insecticidal dusts that can be used for ant control. Diatomaceous earth is made from fossilized diatoms, and silica gel is produced essentially from sand. Both kill insects by desiccation; they absorb the wax and oil from the insect's outer covering, which causes dehydration and death. Although these materials are not poisonous to humans directly, the fine dust travels freely through the air and can be irritating to the eyes and lungs; therefore, use a dust mask and goggles during application.

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

Some products combine diatomaceous earth or silica gel with pyrethrins. The pyrethrins provide a quick knock-down of the ants, and the dusts provide the long-term control.

### **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, and if the bait kills the queen, the colony will die. 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.

Always place baits out of sight and reach of children, or, if this is not possible, use baits at night or on weekends and remove when children are in school.

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 controlling your problem ant(s) with a bait, the following points may be helpful:

- It is important to correctly identify the species of ant that is invading the school since each species differs in its food preferences. Some baits use a sweet attractant and some use a protein or oily attractant, so the bait must be matched with the ant. If you cannot determine the type of attractant by looking at the label, call the manufacturer for more information. You should also 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 closely 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, ants that you are not trying to control may attack your bait more readily than the pest ant and in some cases prevent the pest ant from getting to the bait.

### Box 5-B. Tips For Controlling Specific Ants

- Argentine Ant—Since it is practically impossible to eradicate the colony/colonies, concentrate efforts on getting rid of the present ant invasion. Sanitation is key. Although its favorite food is honeydew from aphids, scales, psyllids, etc., the Argentine ant will feed on almost anything. Outside, this ant nests under rocks and logs or in shallow holes in the ground, and it frequently moves its nest to escape unfavorable environmental conditions. Indoors it nests in wall voids, potted plants, under loose tiles, behind baseboards, etc., usually close to moisture sources. Argentine ants come indoors searching for food or looking for water when it's too dry outside, but they also come in to escape wet conditions outdoors. For control, use commercial bait stations along ant trails and around building perimeters.
  - Pavement Ant—Start inspections at the ground floor or subfloor level because even if pavement ants are on upper floors, they usually originate from ground floor and outside colonies. Follow trails of ants to locate colony/colonies. Outside, trails are usually hidden by grass or mulch next to the building foundation or the edges of pavement. Inside, you can often find trails under edges of carpets along the tack strip. Pavement ants use electrical wires, conduit, and water pipes as highways throughout the building. Performing an inspection at night around 10 or 11 PM can be useful since pavement ants are most active at night and you are more likely to find trails that will lead back to the colony. Outside, piles of soil near slabs and concrete are a good indication of underground galleries. Effective pavement ant control requires caulking cracks and crevices and placing baits in the path of ant trails near colonies. Observe carefully to ensure ants are feeding on bait. If not, change baits until you find one they will accept. Baiting is a slow control process and will take several days or longer for satisfactory treatment and will probably not eliminate the problem.
  - Pharaoh Ant—This is a tropical ant that likes inaccessible dark places with a relative humidity of 80% and a temperature of around 80°F. Workers are attracted to baits that contain protein, peanut butter oil, liquid sugars, and granulated silkworm pupae. Place the baits in door or window frames, light switches, and fuse boxes; at floor level in corners and along baseboards; near toilets, sinks, drains, heating pipes, and radiators; and in food cupboards. In warmer areas of the U.S., Pharaoh ants may nest indoors and forage outside. If you find foragers outside, place baits in areas of high activity. Use enough bait stations so that feeding will not deplete the bait before the colonies are dead. It may also be advantageous to use baits that combine 2 different attractants or use several different kinds of bait at once. A Pharaoh ant bait containing the insect growth regulator methoprene has been pulled from the market by the manufacturer in order to formulate the bait to be attractive to more ant species. Workers are unaffected by methoprene, but the queen is sterilized and no new larvae are produced. Although this kind of bait can take 10 weeks or more to kill a colony, it will be a useful ant management tool when it returns to the market.
- Do not spray pesticides when using baits. Bait stations contaminated with pesticide are repellent to ants, and sprays disperse the ant infestation, making it harder 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 enough bait back to the colony to kill nest mates.
  - Do not put out bait until you have an ant problem. 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 glued to various surfaces out of view. It is important to remove bait stations once the ant problem is under control because they are ideal harborage for cockroaches. Likewise, if there is bait left in them, it may eventually attract ants back into the building. Other baits come in granular or gel formulations that can be injected into wall voids through small holes. Gel baits can also be placed near ant trails in unobtrusive places where they will not be disturbed.

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**Table 5-1. Common House-Invading Ant Species**

Species	# of nodes in the pedice <sup>a</sup>	Description of Workers	Habits	Distribution
Argentine Ant <i>Linepithema bumile</i> (formerly known as: <i>Iridomyrmex bumilis</i> )	1	light to dark brown; around 3/32 to 1/8 inch (2.2-2.8 mm)	Frequent house invader; nests in a wide variety of places outdoors and inside; multiple queens; prefers honeydew from aphids, scales, etc.,but is an opportunistic species and will feed on other sweets, protein, and grease	MD, west to IL, TX, AZ, CA, OR, WA, HI
Pharaoh Ant <i>Monomorium pharaonis</i>	2	small, around 1/16 to 3/32 inch (1.5-2 mm); 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; also predacious on bedbugs, white grubs, boll weevils, and other insects	throughout U.S. And Canada
Thief Ant <i>Solenopsis molests</i>	2	very small, around 1/32 to 1/16 inch (1-1.5 mm); 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; more likely to have an indoor nest than the Pharaoh ant	throughout U.S.
Little Black Ant <i>Monomarium minimum</i>	2	very small, around 1/32 to 1/16 inch (1-1.5 mm ); jet black	small craters of fine soil mark nest openings throughout U.S. in ground; will also nest in the woodwork or masonry of buildings; omnivorous; occasional house invader	throughout U.S.
Big-Headed Ant <i>Pheidole spp.</i>	2	around 1/16 to 1/8 inch (1.5-3 mm); yellowish or light to dark brown; head large	nests in and around the house; prefers NY to NE, south sweets or high protein foods to FL & AZ	NY to NE, south to FL & AZ
Pavement Ant <i>Tetra.morium caespitum</i>	2	around 1/8 inch (2.5-3 mm); light to dark brown or blackish; head & thorax furrowed by parallel lines	nests under stones & 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	common along the Atlantic seaboard and in central CA; sporadic in Midwest
Odorous House Ant <i>Tapinoma sessile</i>	1	around 1/16 to 1/8 inch (2-3 mm); brownish to black; foul odor when crushed; darker than Argentine ant	frequent house invader; nests in a wide variety of places outdoors and inside; multiple queens; colonies are more localized than those of the Argentine ant; food habits are similar to the Argentine ant	throughout U.S.

<sup>a</sup> See Box 5-A