SCHOOLS INTEGRATED PEST MANAGEMENT (IPM) FOR ANTS

Important Note

According to the Virginia Pesticide Control Act (Section 3.1-249.53), in order to apply ANY pesticide (including Raid®, Round-Up®, and other over-the-counter pesticides) in public areas of ANY educational institution, the applicator must first be certified by the Virginia Department of Agriculture and Consumer Services. In other words, it is illegal for uncertified teachers, staff, administrators, or contractors to apply pesticides on school grounds.

INTRODUCTION

Ants are one of the most common urban pests in Virginia public facilities. Ants are pests for two main reasons. First of all, ants, in their search for nourishment, invade human food resources. By invading human food, ants become possible vectors for food borne illnesses, like *Salmonella*. Secondly, some ant species bite and/or sting. Bites and stings are painful and may cause serious allergic reactions in sensitive people.

Although ants can be pests in certain situations, it is important to recognize that ants play an important role in the outdoor environment. Many ants are natural predators and help control other pests, including fly larvae, crickets, and termites. Some species of ants are important for improving soil quality by aerating the soil and recycling dead organic material.

BIOLOGY AND IDENTIFICATION

Ants are "social" insects. This means they live in large cooperative family groups called colonies. Within the colony, ants are divided into specific groups, or "castes", that perform different functions. Ants have three castes including workers, queens, and males. The queen's job within the colony is to produce eggs, and the male's job is to simply mate with the queen. All workers are female and perform the colony work. Workers are responsible for foraging for food, feeding other colony members, caring for the brood, defending the colony, and maintaining the nest.

Ants experience "complete metamorphosis". This means that they pass through four different life stages: egg, larva, pupa, and adult (see Figure 1). Individuals that are newly hatched are termed "larvae". Larvae are blind and legless and are cared for and fed by adults. After the larval stage, they become pupae. The pupal stage is a non-feeding, immobile stage wherein the larvae transform into adults. Finally, the ants emerge from the pupae as fully developed adults.

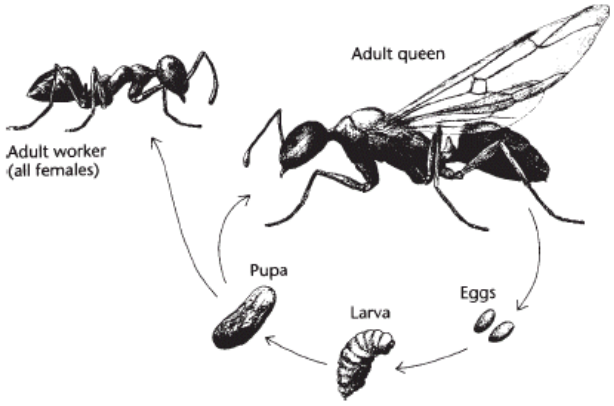

Figure 1. The Life Cycle of the Argentine Ant

Adult ants can be winged or wingless, depending on their assigned caste. Workers comprise the wingless caste while queens and males emerge from the pupal stage with wings. After participating in nuptial flights and after mating, queens lose their wings and initiate new colonies. Males die soon after mating.

Winged ants are often confused with termites (see Figure 2). However, ants are distinguished from termites by three distinct features. First, ants have elbowed antennae while termites have non-elbowed antennae. Second, ants have a thin or thread-like "waist" between their abdomen and thorax

while termites lack a "waist". Finally, if you are comparing two winged adults, you can differentiate between ants and termites by looking at their wings. In ants, the second pair of wings in is smaller than the first, while in termites both pairs are equal in size.

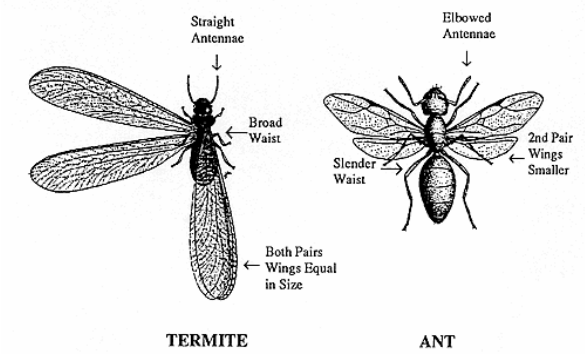

Figure 2. Winged Termite and Ant

There are many ant species that invade structures. Identifying the correct species of invading ant and understanding that particular species' biology is helpful in making correct pest management decisions. Each species varies in its food preferences, foraging habits, and nesting behavior. Use Table 1 to assist in identifying the species of ants invading your facilities and to help you become familiar with their habits.

PREVENTION

There is no reason to try to eliminate ants from their natural habitats. The goal of any ant management program should only aim to keep ants from infesting structures or other sensitive areas.

A population of ants can be prevented from infesting a structure by making the structure less hospitable. The goal is to decrease the accessibility of the resources the ants need to survive (food, water, shelter, etc.) The best way to accomplish this goal is through sanitation and maintenance. Sanitation and maintenance may require time and effort but can be a permanent fix to an ant problem if done correctly. Below are some of the most effective methods of ant prevention:

1. Trim trees and bushes away from the structure. Trimming is particularly helpful in the management of carpenter ants because branches that touch the building offer a bridge that ants can use to gain access to a structure.
2. Remove grass, plants, and mulch at least 6 inches away from the foundation of the building. Ants like to nest in these areas because mulch and ground cover retain moisture better than barren soil or concrete.
3. Remove any dependable water source by repairing dripping pipes or leaky faucets.
4. Caulk holes and cracks that can be used by ants as an entryway into the structure.
5. Weather-strip around windows and doors where ants may enter.
6. Store food in sealed containers (not cardboard boxes) and store food containers in clean, dry areas.
7. Keep food containers off the floor.
8. Always keep areas where food is handled clean. Regularly mop, vacuum, sweep, or scrub areas where food is handled.
9. Remove all garbage promptly from inside the structure.
10. Clean all recyclable materials with soapy water and store outside the structure if possible.
11. Keep clutter to a minimum.

MONITORING AND INSPECTION

Complaints about ants are usually the result of teachers or cafeteria workers detecting ants foraging in the classroom or infesting food. However, by the time the pest management professional arrives, the ants have been disturbed or removed. This makes it difficult for the pest management professional to locate the source of the problem and take care of the situation.

At the point that ants become pestiferous, monitoring becomes the key to eventually managing the ant population. The best

method for monitoring ants is a regular (monthly) visual inspection. Regular inspection can lead to the discovery of the ant nests, an important target for future management efforts. If an ant nest is found, do not agitate it, as some ant species will move or split their nest if disturbed.

The following suggestions describe certain conditions to look for when inspecting for ants:

1. Look for holes and cracks that allow ants entrance to structures.
2. Look in areas near a dependable food source. Kitchens, garbage bins, food storage areas, and break rooms are common areas where ants find dependable food sources.
3. Look in areas near a dependable water source. Bathrooms, kitchens, near leaky pipes, and under laboratory sinks are common areas where ants find dependable water sources.
4. Search outdoors in mulched landscapes. Ants often nest in mulch around the foundation then forage indoors.
5. Search in potted plants. The soil of potted plants provides a moist, protected environment for ants to build their nests.

LEAST TOXIC CONTROL METHODS

The purpose of integrated pest management is to reduce two things: the pest population and the amount of pesticides needed to accomplish that goal. With the exception of emergency situations, all other available control methods should be used prior to using a pesticide. Below are some of the most effective and least toxic methods available for ant control.

Physical Removal

Physical removal may be necessary after using preventative techniques since it may take time for sanitation and maintenance to take effect. Below are suggestions for ways ants can be physically removed.

1. Vacuum up long trails of ants. The dust in the vacuum will usually kill the ants. However, to be sure the ants are killed, vacuum up a small amount of talc or baby powder in order to suffocate the ants inside the vacuum.
2. Squash any lone ants encountered. These lone ants are scouts whose job in the colony is to find food. By destroying the scouts, you lower the chances the scout will recruit additional ants to the area.
3. If ants are using an indoor potted plant as a nesting site, place the plant outdoors. Be cautious, also, with bringing plants that have been outdoors inside as they may contain ant nests.
4. If you find an ant nest you can simply remove it. One way to accomplish this is to vacuum up the nest. If the ant nest is found in mulch, soil, or some other similar environment, it can be shoveled into a bag or other container and removed.

Chemical Management

Sometimes sanitation, maintenance, and physical removal alone may not be enough to control an existing ant problem. If ants persist or if an emergency situation warrants immediate control of an ant population, chemical pesticides may be needed. Remember that Virginia law requires that all pesticides applied on school grounds must be applied by a certified applicator. All pesticides should be applied according to labeled directions. Applicators must wear protective clothing. Pesticides should never be applied where they might runoff into storm drains or sanitary sewers.

Some pesticides are more environmentally friendly than others. Below are listed different chemically based management options. They are listed in the order of most environmentally friendly to least environmentally friendly.

1. For quick, emergency situations, use detergent that has been mixed with water and placed into a spray bottle. This solution, when sprayed onto the ants, will immobilize them, allowing you to wipe them up with a sponge or mop. You can then wash the ants down the drain.
2. Diatomaceous earth can be placed within cracks and crevices where ants enter the structure. Diatomaceous earth is a dust made up of the fossilized remains of diatoms. The dust adheres to the ant's protective cuticle, making the ant susceptible to desiccation. Silica aerogel can also be applied for the same purpose. These dusts should only be used in dry areas since moisture reduces their effectiveness.
3. Boric acid is a great tool to be used in integrated pest management. Boric acid comes in several different formulations, including bait, dust, and aerosol. These formulations are particularly effective when applied in cracks and crevices. The advantages of boric acid include its long-term residual effectiveness and low toxicity to humans and pets. Boric acid dusts can also be applied into wall voids.
4. Ant bait is the most common form of chemical management in an IPM setting. Baits are a toxicant that has been formulated with a non-toxic food source. Baits reduce the overall amount of pesticides used by allowing for precision placement where they are available to ants but not to people or pets. The goal of ant baiting is to entice foraging ants to feed on the bait. Upon feeding they return to their nest and feed the bait to other members of the colony (including the queen). The ants then die, thus destroying the colony.

   There are many types of baits. Baits differ in their formulation (paste, liquid, gel, etc.), their attractant (protein, oil, sugar, etc.), and in the toxicant (active ingredient) they utilize. Different species of ants respond differently to bait toxicants, attractants, and formulations. Proper bait selection is an important aspect of any ant IPM program.

   Below you will find several important factors to think about when using ant baits.

   - Place baits near the target ant colony, ant foraging trails, or structural entryways.
   - Ant colonies may switch their bait preferences as their nutritional requirements change. A colony may prefer a protein bait one week and then an oil bait the next. You may therefore need to make changes in the baits you are placing in the environment.
   - Watch to make sure the target ants you are trying to manage are feeding on the bait. Competitive species of ants may feed on the bait, excluding the target species.
   - Never disturb the foraging trails of ants that are feeding on the baits. This may lead to the ants leaving the area and not feeding.
   - Do not use other types of pesticides around the bait stations (e.g. sprays or dusts). The pesticides will act as a repellent, driving ants away from the bait.
   - Only use baits to control an existing ant problem. Unnecessary bait applications may actually initiate an ant problem by attracting ants to the structure.
   - Remove all bait stations as soon as the target ant population is under control. Leaving unused bait around may attract other ants and insects into the building.

5. A common ant behavior is aphid and scale insect herding. Aphids and scales exude a sweet, sugary substance. Ants will sometimes tend aphids and scales in order to collect this source of sugar. It

may be appropriate to treat outdoor ornamental plants with insecticides in order to remove this source of food for the ants. Perimeter applications of insecticides would be necessary only during spring and summer months when aphids and scales are abundant.

RECORD KEEPING

Protect yourself against liability. Record all chemicals applied in a pesticide application IPM logbook on the facility's premises. Include the name of the applicator, the date of the application, the formulation, and the brand name of the chemical used. Be sure to also document the location of the application and the specific pest problem that initiated the chemical treatment.

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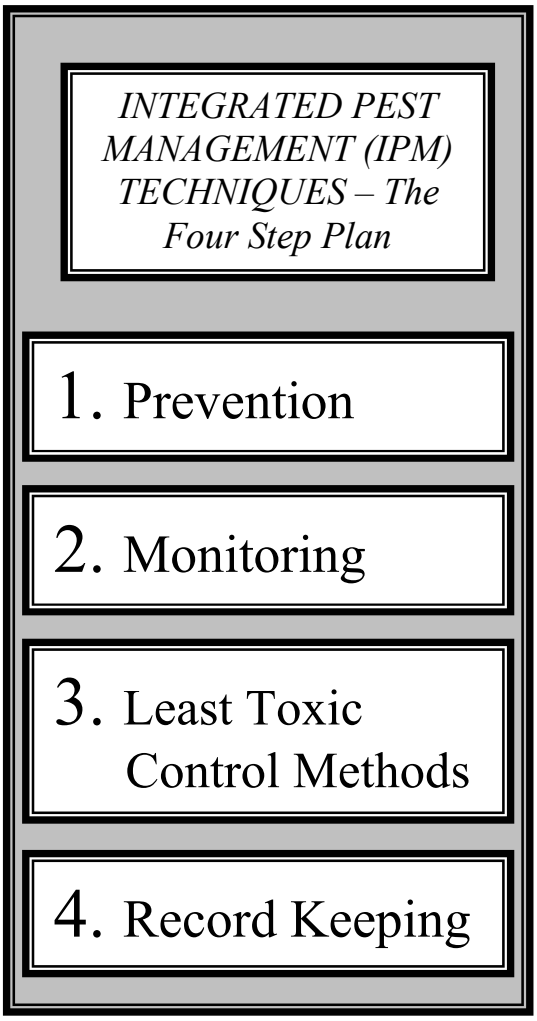

Table 1 – Common Structure-Invading Ant Species			
Species	**# of nodes in the petiole[a]**	**Description of Workers**	**Habits**
Argentine Ant *Linepithema humile* (formerly known as: *Iridomyrmex humilis)*	1	Light to dark brown; around 3/32 to 1/8 inch (2.2-2.8 mm)	Frequent structure invader; nests 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
Pharaoh Ant *Monomorium pharaonis*	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
Thief Ant *Solenopsis molesta*	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 structure invader, may nest indoors in cracks and cupboards; more likely to have an indoor nest than the Pharaoh ant
Pavement Ant *Tetramorium caespitum*	2	Around 1/8 inch (2.5-3 mm); light to dark brown or blackish; head & thorax furrowed by parallel lines	Nests under stones and edges of pavement, in winter will nest in structures 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 1/16 to 1/8 inch (1.5-3 mm); brownish to black; foul odor when crushed; darker than Argentine ant	Frequent structure 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
Carpenter Ant *Camponotus* spp.	1	Large, around 1/4 to 3/4 inch (6-19 mm); black and red or just black	Live in large galleries excavated in wood; naturally found in rotting logs and dead trees; rarely cause structural damage; labeled pests since they forage for food inside human structures; tend aphids for honeydew

a See Figure 3

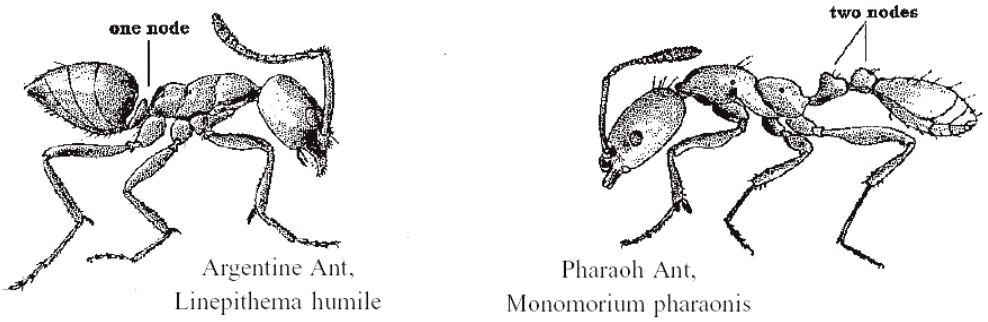

Figure 3. Graphical Representation Showing One Node Versus Two Nodes