WASHINGTON STATE DEPARTMENT OF ECOLOGY

INTEGRATED PEST MANAGEMENT FOR NUISANCE ANTS

Ecology Publication #97-428, Revised July 98

The Department of Ecology originally developed this document for use in an Integrated Pest Management for Schools project. Although the document was in a reference binder given to school district custodial and maintenance supervisors and their staff, much of the information is useful to anyone making decisions about how to control pests in or near buildings.

What Is Integrated Pest Management?

Integrated Pest Management (IPM) is an effective and environmentally sound approach to controlling pests. Pests are living things (plants, animals or insects) which can damage human health or property, or cause a significant nuisance. IPM is a decision-making process that uses a variety of methods (physical, mechanical, cultural, biological and chemical) to hold pests at acceptable levels. Some IPM techniques have been in use for centuries, but IPM as a process was not formally recognized until the 1920's (in agriculture) or formally applied to pest control in urban settings until the 1970's.

The Department of Ecology promotes IPM because it reduces the risk of pesticide mismanagement and human and environmental exposures to pesticides. Outdated, unused, misapplied and discarded pesticides are a significant source of environmental contamination.

Key Sections

IPM Steps

1) Identify pest problems:

Correct identification of the pest needs to be done before making any pest management decisions. Knowledge of the life cycle and behavior of the pest as well as the site conditions is required before choosing an effective management strategy. Pest management decisions are facility management decisions and are influenced by economic, environmental, human and social factors.

2) Prevent pest problems:

Deprive pests of food, water and shelter. Keep food in pest-proof containers. Eliminate leaks and other water sources. Reduce clutter and places where pests may hide. Perform repairs to exclude pests from the building. Choose practices for landscape management that promote “plant health care”. Healthy plants that are well suited to their location have fewer problems with pests.

3) Monitor for the presence of pests and pest damage:

Monitor the building and grounds for pests, signs of pest activity and conditions that are known to contribute to pest problems, using traps and making regular observations.

4) Set a tolerance and action level for each pest population:

Decide how many of each kind of pests are tolerable using economic, safety, and appearance considerations. Some pests are relatively inconspicuous and harmless while the presence of others requires action. Many insects such as spiders, beetles and ants are only considered pests indoors and are very valuable for control of other insect pests in their natural environment. While tolerance levels for indoor pests are usually low, tolerance levels for outdoor pests should be balanced with the economic and environmental costs of treatment options. Actions should not be taken until the tolerance level is reached.

5) Manage pest problems:

Many methods are available for preventing as well as removing pests, including appropriate plant selection and care, mechanical and biological pest controls, and least-toxic chemical use. An on-going prevention program is usually the best “treatment”. Most IPM tactics provide long-term or permanent control of pests and most do not rely on pesticides. When pest populations or pest damage has reached a predetermined level of action, treatment methods are chosen that will be effective against the specific pest in that particular site. The method chosen should be the least-toxic formulation that is effective against the pest.

6) Evaluate the effects and success of pest management efforts:

Keep a log with information from your pest monitoring, the strategies for prevention as well as corrective treatments you used, and the results. A log also helps to identify seasonal trends in pest activity. Periodically review the log to help evaluate effectiveness of your methods. IPM should be a continuing program and not intermittently used to solve a single pest problem. Use your evaluation to adapt and modify the practices based on the results.

About Nuisance Ants

There are many species of ant in Washington, but most of them never cause problems for humans and do not require pest controls. The exceptions are a few species that can become serious pests when they damage wood or enter school buildings in large numbers, and when they protect plant damaging aphids or other harmful insects.

Problem ants in school buildings are most likely to be either wood-damaging carpenter ants or one of the several nuisance or food infesting ant species. The most troublesome nuisance ants in Washington are the odorous house ant and the pavement ant. Other pest species found in Washington are the moisture ants (yellow ants and cornfield ants), the Argentine ant, and the Pharaoh ant. Thatching ant species, which build mounds of small sticks outside, occasionally become pests inside buildings. This document covers general Integrated Pest Management (IPM) techniques for management of nuisance ants. Carpenter ant control techniques are addressed separately in "Integrated Pest Management for Carpenter Ants" Ecology publication # 97-420, Revised July 98.

All ants are social insects, living in colonies, and having castes of different workers for different tasks. They are usually first noticed in buildings when they are seen foraging for food. Moisture ants, carpenter ants and termites may not be discovered until a nest contained in damaged wood or insulation is exposed during repairs. Winged reproductive forms of certain ant species and termites swarm in great numbers and can be alarming to observers.

How to tell an ant from a termite

Ants and termites appear similar, but it is not difficult to tell them apart. Ants have a bend or "elbow" in their antennae, while termites have flexible "beaded" antennae. Ants have a "waist" while termites do not. Both species can have wings. A termite is not likely to be found in the open unless it is a winged reproductive form. For further information on termites, refer to "Integrated Pest Management for Termites" Ecology publication #97-426, Revised July 98.

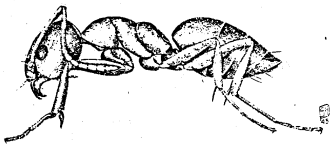
Determine the ant species

Simply determining that the insect is an ant is not enough—**you must know the species to effectively use anything beyond the basic management techniques found in this guidance**. First, you should try to determine whether or not the pest is a carpenter ant. Finding ants in wood is not enough to identify them as carpenter ants, because several other ant species will move into severely damaged wood, although they do not damage wood as carpenter ants do.

Carpenter ants are the largest size ants. Workers vary in size from ¼ to ½ inches and queens are ¾ inch long. Other ant species are usually smaller—1/8 to ¼ inches long. A carpenter ant worker's most distinguishing characteristic is a smooth, arched back when seen in profile with a magnifying glass. Other ant species have bumps or notches on their back. Piles of fine sawdust at nest openings and rustling noises in the walls, ceilings or floors are other signs of carpenter ants. If you have carpenter ants, refer to the guidance on IPM for carpenter ants.

You do not need to identify the species of non-carpenter ants to follow the basic recommendations in this guidance. **If you cannot manage the ants with the following basic techniques, seek assistance from a Washington State University (WSU) Extension agent or a pest control professional.**

Odorous House Ant



Carpenter Ant

Termite

Hazards of ants

Indoors, ants will **consume human and pet food** but do not contaminate it to any great extent. Outdoors, some species of ants will **protect and herd aphids** and other insects in exchange for the insect's honeydew (a sweet liquid excreted by plant sucking insects). Ants do not transmit any human diseases. Ant species found in Washington usually do not bite or sting unless disturbed or provoked. Exceptions are harvester ants, found in drier areas of eastern Washington and thatching ants, which usually do not come into buildings.

Benefits of ants

Ants are **natural predators of other insects** that are pests to humans. Moisture ants and some other species are also very important in the landscape for their role in the **breakdown of wood debris and the creation of soil**. Ants should be left undisturbed if they are in a location that does not bother humans.

Ant food

Primary foods for ants found indoors are the sugar and proteins found in **food debris, garbage, pet food, snacks** and **food supplies** which are not properly cleaned up or stored. Ants will also enter a structure for water if it is not available outside. Primary foods for ants outside include **insects**, the **honeydew** produced by aphids and other insects, and some **plants**, **plant juices and pollen**. Worker ants bring food to the nest to share with other colony members.

Preferred nest locations

Some ant species, such as the moisture ants, will construct permanent nests in a building. Other species prefer to be outside but will move the colony into a building during periods of heavy rain, cold weather or if food is readily available. Species that nest outdoors may only enter buildings in search of food.

It can be very hard to locate indoor nests, since they may be in areas that are physically difficult to inspect.

Outdoors, ant nests may be found in live or dead wood (especially in beauty bark), in debris, in the soil or under mounds that they have constructed. An established colony may be spread out in several inter-connected nests.

The ant life cycle

Ants go through four life stages over a period of a month or two: eggs, larvae, pupae, and then adults, which includes male **drones** and female **workers,** sometimes **soldiers**, and one or more **queens**. **New reproductive queens and males** are produced by mature colonies, which are usually several years old.

New colonies are started in one of two ways. In some species, the new reproductives **swarm** or leave the main nest in spring or early summer. After mating, the male dies and the queen finds a nest site and starts a new colony. The swarming period is in progress when large numbers of winged ants are visible. Alternatively, colonies **bud** when there are several queens and the extra queens move to new locations with some of the workers to start another nest.

How Ants Get Into Schools

Ants **enter buildings through openings and cracks** along the foundation, gaps in exterior sheathing panels, trim, or around windows and doors, and by climbing exterior pipes or wires that lead into the structure. Ants generally leave **chemical trails** to mark the way to their food sources.

Outside trails are often kept clear of vegetation and are more defined closer to the nest. The trails will fan out and disappear as they get further away from the nest. Ants returning to the nest carry food, such as other insects or plants, while ants leaving the nest carry nothing.

Ants are most active and persistent about getting inside to forage for food in warm weather.

The Keys to Controlling Nuisance Ants

The keys to successful control of nuisance ants are:

- cleaning up sanitation problems to eliminate food, water and habitat;
- storing food and organic wastes properly to eliminate access to food;
- eliminating or repairing wet wood;
- trimming trees and shrubs so that branches do not touch the building;
- avoiding landscaping materials that can lead to nests near buildings;
- destroying the existing interior nests and ants; and,
- excluding ants from school buildings.

IPM Methods for School Personnel:

Identify nuisance ants and verify that they are causing the pest problems:

Many nuisance ant problems can be managed in the following basic ways. If your efforts are not successful, request assistance from an Extension agent or a pest control professional with knowledge of the local ant species. Different species of nuisance ants have different behaviors, habitats and food preferences. More than one species can be in a building at the same time.

- ☑ To catch specimens for identification, use several insect sticky traps with a dab each of a **non-toxic** sugar (jelly) and protein (cat food or tuna) bait in areas where ants are seen. If the ants do not take your bait, change the bait to whatever they seem to be eating. Remove all other food sources to make your bait more attractive. Do not use sticky traps in areas where children can get into them.

- ☑ To kill an ant (without damaging it) for identification purposes, use a pencil to gently flick it into a small plastic or other freezer-proof container and put it in the freezer. Small ants can escape from a container with a screw type lid by walking up the grooves, so use a pill bottle or film canister with a snap lid.

Locate the source of the ants

Attempt to find out where the ants are coming from and how serious the infestation is. Ant workers that are foraging within a building can usually be trailed from their food sources back to gaps in building walls or other entrances. Ants outside can generally be followed all the way to their exterior nest or to entrances to the building. Some species of ant use the same trails to travel back and forth from their nests to their foraging areas.

- ☑ If the ants are difficult to follow, use non-toxic bait, as described above, to temporarily attract more workers.

- ☑ Ants that are attracted to water will often drown in water that is left out. If dead ants are being found in plant watering containers, look for food sources and ant activity nearby.

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

- ☑ Check for ants along exterior walls and foundations.

- ☑ Look where utility pipes or electrical wires go through the building walls.

- ☑ Check spider webs for trapped ants. They indicate ants have a nest or trails nearby.

- ☑ Look for bare dirt or trimmed foraging paths through the nearby grass or vegetation.

Look for colonies indoors

Finding ants in your building does not necessarily mean that the ants are living indoors. Workers may come inside to forage and then take the food back to a colony outside. Swarming queens often enter buildings in search of a nest site.

- ☑ Moisture ants can't move into a building unless it has wood that is already softened and badly damaged by water. They are most likely to be in an area where wood is wet, in contact with soil, or where water is leaking.

- ☑ If large numbers of workers are found within the building year-round there is probably a nest inside.

- ☑ Swarming of many reproductives indoors is a strong indication that there is a nest somewhere inside or under the structure.

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

Look for colonies outdoors

When ant nests are located on the school grounds, school personnel should regularly monitor for ant activity in the building and for signs that ants are entering the school. It may be easier to detect their trails outside and follow the ants to their nests than it is to find them inside.

- ☑ Look for plants that are infested with a large number of aphids, scale insects, mealybugs or planthoppers that produce honeydew. Odorous house ants and some species protect and "herd" insects, especially aphids, in order to drink the insect's honeydew. Ants will protect "their" aphids from predators in the same way that humans protect and herd milk cows. Species that tend aphids may enter a building when aphid populations are low and then move outside after aphids appear in late spring. Follow ants found with aphids to find their nest.

- ☑ Check for ant nest sites within 30 yards of buildings, especially in soil, under rocks, bricks, and cracks in cement slabs and under plant containers.

- ☑ Look for ant nests in wood and woody debris, like vines, shrubs and trees, stumps, roots, landscaping wood, beauty bark and needles. Where structural wood or shrubs provide a bridge from building to soil, the area should be carefully checked.

- ☑ Good areas to check in buildings are window wells, water meter and storm drain manholes, any pipes or wires that penetrate the exterior walls or foundation or roof, left over construction wood, cracks around the foundations and within crawl spaces.

Prevent nuisance ant problems

An important part of keeping ants from moving into your building is to remove the shelter they are seeking and make it difficult for them to get in. Making repairs and correcting the conditions that attract or harbor ants can be all that is

needed to get them to move out or to prevent them from re-establishing an indoor nest if they return.

Find and repair water leaks and damage in the building

Interior moisture and water become more important to ants when there are no water sources outside. Some species also require water-damaged wood for nesting materials.

☑ Check for and repair water leaks and drips in:

- roofs and walls;
- gutters and down spouts;
- around flashings;
- anywhere paving or grading directs water toward the building; and
- around plumbing, drains and fixtures.

☑ Look for dampness, fungus and mold on structural wood. Wood in an area that is subject to moisture may appear dry on one side but be decayed on the other. An electronic moisture meter can be used to test wood you suspect may be damaged. If you don't have access to a moisture meter you can jab a screwdriver or an ice pick into wood to test its dryness. Moist, damaged wood will be soft and spongy whereas dry wood is firm and splinters when torn.

☑ If structural wood and soil are in contact, or if the distance between them is less than 8 inches, correct it by replacing the wood with cement or by installing a metal or cement barrier between the soil and the wood.

☑ Replace damaged wood with preservative-treated wood if access makes it too difficult to replace the wood with cement or metal. Note that preservatives will eventually leach out of wet wood and that newly cut surfaces on treated wood must be re-treated before use.

☑ Check ventilation in attics and crawl spaces. Check appliances, such as dishwashers and refrigerators, to see if they need to be ventilated.

☑ Wipe up standing water on surfaces and counters after cleaning.

Make repairs on the school grounds

☑ Remove infested dead wood that is near the school.

☑ Prune trees and vegetation so that branches are at least 18 inches from the buildings.

☑ Use a low toxicity insecticide, such as a soap or oil, that is safe for the plants and predator insects to control the honeydew-producing insects near the buildings. When guardian ants are present, natural predators of aphids are attacked and prevented from killing the aphids.

Prevent outside ants from entering the school

☑ 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—start with cracks near access points.

☑ Screen all opening doors, windows and vents to keep out the larger reproductives and workers. Woven or welded hardware cloth with a small mesh is more durable than regular window screening and will still allow airflow to reduce moisture.

Improve sanitation to remove food sources

Unless the food that supports them is removed, any ants that are destroyed will be replaced when new ants wander in on foraging trips. Pay extra attention to ant food source reduction where there are water sources that can't be dried up.

☑ Thoroughly clean floors, counters, under appliances and kitchen and bathroom cabinets.

☑ Sweep up or vacuum crumbs and food debris daily. Remember classroom pet food.

☑ Clean grease vents and drains.

☑ Rinse beverage and food residues from cans, bottles or jars before recycling.

☑ Close garbage cans tightly and wash them quarterly or when needed.

☑ Store all food in ant-proof (glass with a rubber gasket or plastic with a snap on lid) containers. This includes snacks in cupboards or desks, sugar for coffee and pet food.

Methods to kill or remove ants.

Although it is essential to eliminate ants inside the building, it will not be possible to locate or destroy all of the nests in the landscape. Ants provide a beneficial service in the landscape because they help break down wood debris and create new soil. They also feed on many pest insects.

Rather than spending time and money to treat an entire building, try to identify the locations where the ants actually are and concentrate your efforts there. Use caution in disturbing nests without being prepared. Ants can relocate their nests very quickly.

Without knowledge of the ant species, do-it-yourself applications of pesticides can backfire and create greater problems, especially with species whose colonies can bud.

Most effective and non-toxic methods

Vacuum ants to remove an indoor nest

The most effective way to eliminate an interior ant nest is to open up the damaged area and destroy the insects by using a vacuum. Put a little cornstarch in the vacuum bag to help 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

Ants sometimes nest in soil, plants, living and dead trees near buildings. The management methods you use to remove ant colonies near a building are very dependent on the species and the location of the nest

- ☑ Landscape repairs, such as removal of wood debris (especially beauty bark); will remove potential nest sites.

Ineffective methods

Ultrasonic Devices

Devices that emit sound beyond the human range of hearing 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.**

IPM Methods for Pest Control Professionals

How school personnel can work with pest control professionals.

Pest control professionals cannot do an effective job for a school unless the school staff undertakes and maintains sanitation and habitat corrections, such as food and garbage clean-up, building maintenance and plumbing repairs. For example, a baiting program will not work if ants have access to food from garbage or student lockers.

School staff can also unknowingly sabotage the efforts of a pest control contractor if the staff uses products like bug sprays. Pest control contracts usually require school staff to notify the contractor before using any pest control methods, especially pesticides.

Pest control professionals need to identify the problem before starting management efforts.

Be sure to hire a professional who is familiar with local ant species. Pest control professionals may use sticky traps, attractive bait, or a flushing agent, such as pyrethrin spray, to find the colonies behind drywall and paneling. 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.

Pyrethrums may be used as **flushing agents** to irritate and drive ants out of their nests so the nests can be located. With certain species pyrethrum sprays can backfire because the ants can rapidly move their nest into several new locations within the building to avoid the spray.

IPM Methods to kill or remove ants

Most effective and non-toxic methods

The following methods are very effective to eliminate a large ant infestation in a building, but they are not practical as a periodic control method. There is no toxic residue or residual pest control action with these methods.

- **Vacuum ants to remove an indoor nest**
  IPM Pest control companies can use vacuums with HEPA filters and special attachments to quickly and effectively remove ants from interior nests.

- **Thermal treatments**
  A heavily infested building can be wrapped in plastic and the air inside **heated to over 120 degrees Fahrenheit**, destroying many insect pests such as 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 generally reserved for buildings or rooms with valuable stored materials.

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, including humans. By their nature, pesticides cannot be "non-toxic" because their function is to kill living things—hence, their "toxicity."

As with any pesticide or toxic substance, it is essential that the applicators 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 its effects are much more toxic.

Many of the products formulated for cockroaches can also be used against ants. Because the habitats, habits and biology of different ant species determine how effective a pesticide is, **consideration must be given to the ant species if chemicals are used**. For example, some foraging workers do not return to the nest for several days. A quick killing pesticide bait may kill the workers before they can share the bait with the rest of the colony and the queen. Other ant species, such as the odorous house ant and Pharaoh ant, must be baited because they have multiple queens and will divide the colony and move into new areas if pesticide sprays threaten them.

Pesticide baits in general

Poison baits for insects have advantages in an IPM program, because the pesticides are concentrated where the insects come to get them rather than being spread all over the building or room. As long as the bait stations are placed where children cannot encounter them, there is little chance that children will be exposed to the bait. Bait station containers can easily be moved or removed. Baits can also be applied as tiny amounts of a gel or paste in a crack and crevice treatment. Another way to apply bait is to place a small amount in short sections of a soda straw. The straws can be taped onto pipes or in a wall void with duct tape. Straws might be attractive to children, so they should not be used where children could potentially see them.

Baits work well with some species, if all other indoor food sources are removed so the ants will take the bait. Slower-acting baits are better than quick-acting baits because the workers need to live long enough to distribute the bait to the colony. The pupal stage does not share in the colony's food and colonies are often distributed among different locations, so baits do not kill all individuals.

- **Boric acid**
  Boric acid is a very effective stomach poison for insects that is relatively non-toxic to mammals in low doses—it is used in eye drops. Absorption through broken skin or the mucus membranes in higher doses are toxic to humans. Boric acid has very little odor, so it does not repel insects before they come into contact with it. It can be applied either in bait or as a dust.

  Boric acid used as bait must include a food attractant. Gel (Drax®) and paste formulations can be applied to cracks and crevices. They are not irritating to apply, so a mask or goggles are not needed. Gels must be applied thinly so that ants have room to get into a crack and eat the bait. It takes 3 to 4 weeks for the results to show. **Warning! The boric acid sold in tablet form should not be used in a school. The tablets may look like candy to children and could be eaten.**

- **Hydramethylnon**
  This insecticidal bait is a slow-acting stomach poison when eaten by ants, cockroaches and termites, but has a low toxicity to mammals. Some products are available in stores (Combat®); some are only available to commercial pest control companies (Maxforce® in a bait station). The bait stations are small and can easily be hidden from children.

- **Insect growth regulators (IGRs)**
  Insect growth regulators are hormones that keep immature ants from developing and reproducing. IGRs do not kill ants directly. They are slow acting and cannot affect insects that are already mature, so they are often used after other methods have destroyed the main population. The immature ants that hatch after the adults are killed by other methods will not be able to reproduce.

  IGRs are best applied in bait for ant control and should never be applied in a room fogger, even though they have very low toxicity to mammals.

  IGR baits (Pharoah Rid®) have been more effective than poison baits in trials when used against Pharaoh ants, because they are slow acting. The IGR can be distributed throughout the colony, but the slow-acting nature prevents the ant colony from becoming alarmed and "budding."

Pesticide dusts and sprays for crack and crevice treatments

In order to prevent children from contacting the dust or any vapors, dusts or sprays should only be used in confined spaces, such as wall voids, and in crack and crevice applications. 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 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. Boric acid, the desiccant dusts, pyrethrins and pyrethroids can be applied this

way. The dusts must be applied in a very thin layer to be effective; ants will simply walk around clumps of it. Sprinkling little piles of dust will not be effective either.

- **Boric acid**
  Boric acid is a stomach poison that can be applied as a dust as well as in food bait. The most effective way to distribute boric acid dusts in a structural void is with a special static dusting machine that gives the boric acid particles an electrical charge to prevent them from clumping together as they are blown into the wall. Ants walk over the boric acid and then swallow it when they groom themselves. They will also track it back to their nests where other ants will pick it up. Other insects, which contact it, will also die. It takes several weeks to kill most of the ants. An aerosol formulation is easier to apply in wall voids than dusts.

Desiccant dusts in general

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 not very toxic to mammals, they are respiratory irritants when inhaled.

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, like a pyrethrin. As they emerge from shelter to look for water, the insects may become more visible before they die.

Dusts provide protection against 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 in buildings to kill ants, cockroaches, 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 that causes the lung disease silicosis. It is very toxic to fish—do not use where it can get into aquariums. Products include Tri-Die® or Dri-Die® and Drione®, which is silica aerogel mixed with a pyrethrin.

- **Pyrethrin**s
  These insecticides are extracts of natural chrysanthemums that attack the nervous systems of insects and paralyze them almost instantly. When inhaled, pyrethrins can be an allergen for people with hay fever or ragweed allergies.

  They are sometimes used as a **flushing agent** to drive 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 about an hour and not to leave a pesticide residue.

  They can be designed to last for months in a wall void and can be combined with a desiccant dust to provide long term control. Some combined products are: Diacide®, with pyrethrin and diatomaceous earth, and Drione®, with pyrethrin and silica aerogel. Pyrethrin dust can be a skin irritant.

- **Pyrethroids**
  Pyrethroids are synthetic insecticides chemically similar to pyrethrin extracts of natural chrysanthemums. They are formulated to last longer in an outdoors environment than pyrethrins. Micro-encapsulated formulations work in wet or greasy conditions. The pesticide particles are the size of a dust particle but have a protective capsule around the ingredients. Pyrethroids are less likely to cause allergic reactions than pyrethrins.

  They are common ingredients in sprays, which can be used in an IPM program as crack and crevice treatments. Crack and crevice applications require special tools. Like a dust, the particles are picked up on the insect's body and swallowed during grooming. Pyrethroids are often used in combination with insect growth regulators.

  Pyrethroids are also used in "bug bombs," which should never be used in schools.

Perimeter barriers dusting or spraying

Low toxic pesticide barriers may be necessary if the building has damp areas that can not 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 can be "least toxic" when used correctly. They must be mixed correctly both for safety and effectiveness.

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

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

Once the ant harborage and feeding areas are identified and habitat and sanitation changes are made, the ant population in a school should be destroyed with the least toxic methods described above rather than with one of the carbamate or organophosphate pesticides which are often found in stores.

Where and how a pesticide is applied have a great deal to do with how effective it is against a pest and how safe it is for people who share the area. Some formulations will persist for a long time, particularly inside a building. In a school, the more toxic formulations should only be used in confined spaces, such as wall voids and in crack and crevice applications, to prevent staff and children from contacting the dust or any vapors.

- **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 insects and mammals. Insects are eventually killed by paralysis of the muscles responsible for breathing. Several products that are currently used against ants are propetamphos (Seraphos® and Catalyst®) and chlorpyrifos (Dursban®). Micro-encapsulated formulations are the 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 ants. Propoxur (Baygon®) is in some over the counter formulations.

Where To Go For More Help:

There is a great deal of information on IPM, least-toxic pest control, pesticides and their alternatives available. In addition to this fact sheet, Integrated Pest Management in Schools Project staff has 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 in the IPM series:

Ecology Publications

#97-420, Revised July 98	*Integrated Pest Management for Carpenter Ants*
#97-421, Revised July 98	*Integrated Pest Management for Fleas*
#97-422, Revised July 98	*Integrated Pest Management for Flies*
#97-423, Revised July 98	*Integrated Pest Management for Head Lice*
#97-424, Revised July 98	*Integrated Pest Management for Cockroaches*
#97-425, Revised July 98	*Integrated Pest Management for Rodents*
#97-426, Revised July 98	*Integrated Pest Management for Termites*
#97-427, Revised July 98	*Integrated Pest Management for Yellowjackets and other Wasps*

Internet Sites

www.efn.org/~ipmpa
Integrated Pest Management Practitioners Association (IPMPA)

www.ipm.ucdavis.edu/
University of California Statewide IPM project,

pupux1.env.gov.bc.ca/~ipmis.html
British Columbia IPM Information Service (IPMIS)

www.accessone.com/~watoxics or (206) 632-1545
Washington Toxics Coalition (WTC), Seattle, WA

www.efn.org/~ncap or (541) 344-5044
Northwest Coalition for Alternatives to Pesticides (NCAP), Eugene, OR

www.igc.apc.org/birc/ or (510) 524-2567
Bio-Integral Resource Center (BIRC), Berkeley, CA

Other References

Common-Sense Pest Control: *Least Toxic Solutions for Your Home, Garden, Pets, and Community.* Olkowski, William, Daar, Sheila, and Helga Olkowski. 1991. The Taunton Press: Newtown, CT. and Bio-Integral Resource Center**,** Berkeley, CA (510) 524-2567

The Washington State University Cooperative Extension Service Agents and Master Gardeners for your county are listed in your local phone book

The Department of Ecology is an equal opportunity agency. If you have special accommodation needs, or require this document in an alternate format, please call that Hazardous Waste and Toxics Reduction Program at (360) 407-6700 (Voice) or (360) 407-6006 (TDD).

All mention of companies or products in the attached document is strictly informational, and does not constitute an endorsement by the Department of Ecology.