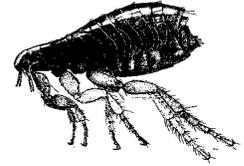




Integrated Pest Management for Fleas

*Ecology Publication #97-421
Revised July 1998*



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 Outdated, unused, misapplied and discarded pesticides are a significant source of environmental contamination.

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.

Key Sections

What Is Integrated Pest Management? 1

IPM Steps 1

About Fleas 3

How Fleas Get Into Schools 4

The Keys to Controlling Fleas 4

IPM Methods for School Personnel 5

IPM Methods for Pest Control Professionals ... 9

Where to Go for More Help 11

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 Fleas

Fleas are very small (1/8 in. or less), brown, wingless insects that are flattened from side to side. Their legs are well developed for jumping. They are parasites of birds, animals and humans. The fleas most likely to be found in a school are the cat flea, dog flea, and oriental rat flea. Despite their names, these fleas will readily infest other host species. The cat flea is most common on both dogs and cats in homes. This document covers Integrated Pest Management (IPM) techniques for control of fleas.

How to identify a flea problem.

Complaints about fleabites received at the school may actually be caused by other sources. These could be environmental irritants, static electricity, irritated skin or a bite received at home but not noticed until the victim is in the school building.

It is important to catch and identify fleas to verify that they are actually present before beginning a treatment program. Two of the easiest ways to find fleas are to use a monitoring trap or to walk around a suspected area wearing white, athletic style socks pulled up over the pants legs. Fleas will stick to the trap or socks and can be identified with a hand lens. It is generally not important to try to identify the species of fleas.

Hazards of fleas

Bites

Fleabites can result in a range of reactions from local skin irritation to a systemic allergic response. Some people and pets are very allergic to fleas.

Diseases

Some diseases that fleas transmit to humans through bites include:

- Murine typhus
- Tularemia
- Bubonic plague

Parasites

Fleas are the intermediate hosts of several species of **tapeworm** that live in dogs, cats and humans.

Flea food

Adults live only on the blood of a host animal. Larvae feed on dried host blood defecated by the female flea, flakes of skin and other organic debris found on floors and in carpets.

Preferred hiding locations

Eggs usually drop off the host onto carpets, dust, soil and in floor cracks.

Larval cocoons in protected cracks or carpet fibers are camouflaged with dust

and debris. Fleas do not like temperatures over 95 ° F or dryness. Optimal conditions are temperatures of 65 ° to 80 ° F and a relative humidity of 50 percent or more. Populations often explode in the late summer and fall. Most fleas jump on and off the host animal to feed, but cat fleas tend to stay on their host.

The flea life cycle

Fleas have four life stages. **Eggs** hatch in 10 days and become **larvae** for a week to several months. Larvae make a cocoon and transform into **pupae** for a week to a year. Fully formed fleas can live in their pupal cocoons up to a year or more until emergence is stimulated. **Adults** emerge when they are stimulated by physical pressure, vibrations, carbon dioxide exhaled by a host (mammals or birds) or a sufficient number of warm, humid days. Adults can survive for long periods without food. Females lay up to 12 eggs after each blood meal.

How Fleas Get Into Schools

Fleas may be living on classroom pets and/or urban wildlife, such as rats, mice, opossums, raccoons, chipmunks, squirrels, birds and feral cats. Another source of adult fleas is the clothing of staff and students who have fleas at their homes.

The Keys to Controlling Fleas

The keys to successful control of fleas are:

- managing the habitat of the host animal, and
- destruction of the resident population.

IPM Methods for School Personnel:

Identify fleas and verify that they are causing the pest problems:

It is important to **trap and make certain you have fleas** before beginning a treatment. Skin irritations and sensations that are thought to be caused by fleas from the school are often caused by something else. A bite received at home may not be noticed until the victim is in the building. Static electricity, dry winter skin, soap and cosmetic irritations can all cause a sensation similar to fleas crawling on the skin.

- A fast way to verify flea presence is to scrape the edge of a rat glue board across the carpet in the area where bites were reported. The pressure from the edge of the board causes the fleas to jump up and get caught in the glue.
- Another type of trap uses a low watt light bulb suspended six inches or so above an insect sticky trap to attract and catch adult fleas.
- To determine how high the population is without being bitten, you can walk around an area with suspected flea activity wearing white athletic style socks pulled up over the lower pants leg. Adult fleas that jump up to bite get caught in the fabric and can more easily be seen and counted against the white background. This is a very quick method that will not result in bites as long as you cover up your legs and ankles. Don't put an insect repellent on your legs first!
- Fleas are usually not a problem on school grounds in Washington because of the lack of animals living on the school grounds. **However, wild or domestic animals** living in or near the building may become a source of flea problems and should be referred to a pest control professional.

Establish a school policy to prevent and manage flea problems.

- Excluding furry and feathered pets from schools removes the fleas' food source (the pet) and their habitat (the cages). Classroom pets that go home for summer breaks and for holidays often return with fleas. Dogs and cats that visit classrooms from home are also likely to bring fleas into the building.
- If classroom pets are allowed, a responsible person must manage flea control as well as other pet care.
- Restrict pets to rooms without carpet or upholstery. All life stages of fleas can be washed or vacuumed from a smooth surface.
- Wild or domestic animals should be kept out of school buildings by the rodent exclusion methods discussed in the Rodent section of this notebook.

Methods to kill or remove fleas in the environment

Frequent, thorough cleaning will break the life cycle of cat fleas in a classroom if the fleas on the pet are also removed. The eggs, larvae and cocoon stages of the common cat flea all live in the pet's bedding and in nearby cracks and crevices or carpet fibers. They feed on fallen organic debris such as the skin flakes and dried blood and excrement produced by adult fleas. Remove their shelter and food sources by cleaning cages and nearby surfaces in one or more of the following ways:

Non-toxic methods

Vacuum carpets, upholstered furniture and floors frequently.

Vacuuming picks up adults and eggs, as well as much of the dried blood and debris which larvae need for food. Larvae and pupae in cocoons attach to carpet and upholstery fibers so they are very difficult to remove. Pupal stage fleas in cocoons are stimulated to hatch by the vacuum vibrations. This can make it seem like there are more adult fleas than there were before cleaning but these can be vacuumed up the next day. Crevices in floorboards and around baseboards need extra attention because they are such good hiding places for fleas. During an active flea infestation, daily vacuuming will do much to reduce the population.

- Using 1 to 2 tablespoons of cornstarch, or a piece of a flea collar helps kill the fleas in the vacuum bag.
- Always remove the vacuum bag, tape or seal the openings, and dispose of it promptly to prevent any fleas from escaping.

Launder or change pet bedding and clean the cage on a weekly basis.

- Regular detergent soap and hot water can be used on towels used as bedding. Dryer heat will kill all flea life stages. Washing and cleaning pet bedding is more effective than spraying it.
- Some of the soaps and shampoos available in stores for pet washing can also be used to wash pet bedding. Most of these products do not have any residual effect and are no more effective than regular detergent in hot water.
- To kill flea eggs, small animal cages should be washed out with a solution of 1-tablespoon bleach per quart of water.
- Cedar chip bedding harbors fleas and cannot be cleaned, so remove all of it -- not just the soiled chips -- each time the cage is cleaned.

Low-toxic methods

Insecticide spot treatment sprays

If a quick knockdown of a flea population is needed, several types of spot treatment spray are available over-the-counter for application to carpet, animal

bedding, baseboards and cracks in floors. They should not be applied to whole rooms and are not a substitute for cleaning measures. Since school pets are not free to wander around a room or to move from room to room, broadcast spraying is not necessary. The low-toxic products usually contain an active ingredient that is:

- ☑ A **pyrethrin** (natural chrysanthemum extract) or **pyrethroid** (synthetic chemical similar to pyrethrin, which attacks the nervous systems of insects);
- ☑ **D-limonene or linalool**, citrus extracts in several EPA registered pesticides available in pet stores; or
- ☑ an **insecticide soap containing fatty acids** which are fatal to adult fleas.
- ☑ Several active ingredients may be combined in one product. Some formulations contain **piperonyl butoxide**, which may pose a risk to human health. An insect growth regulator (IGR) may be included to provide long term control. Choose a spray with a short residual life so it will not persist in the room. **Caution:** people with hay fever, allergies or asthma may have reactions to the botanical products, especially pyrethrins.

Insect growth regulators (IGRs)

Growth regulators interfere with flea hormones to keep flea larvae from maturing into pupae and becoming reproductive adults. They are replacing all other types of indoor flea control. IGRs are relatively safe for humans and have long residuals so that they will affect flea eggs that hatch after they were applied. IGRs do not affect emerged adults or pupae, which must be reduced by another method, such as a pyrethrin spray.

At the present time, IGRs are available over the counter as liquid spot treatment sprays for carpets or crevices lasting about 200 days. They can be vacuumed over after they are dry.

Methods to kill or remove fleas on classroom pets

Once the fleas are removed from a classroom pet and its environment, the pet will not likely pick them up again unless it goes to a home with fleas or another animal with fleas comes in to the classroom. There are several ways to get rid of adult fleas that are on classroom pets:

Non-toxic methods

Flea combing

Flea-comb furry pets and rinse the comb with fleas into a container of soapy water. This is non-toxic, effective and safe for small or young animal pets. To reduce an infestation, combing daily or twice daily will be most effective.

Low-toxic methods

Although the following methods are low toxic or can be applied in a low-toxic method, they have been developed for dogs or cats and may have different

effects on other animals. **Ask a veterinarian's opinion before using a dog or cat product on a different species.**

Insect growth regulators (IGRs)

The growth regulators fenoxycarb and methoprene are available in collars for long-term flea control on dogs and cats. At present, there are no products available for small animal pets such as rats and hamsters.

Insect development inhibitors (IDIs)

An insect development inhibitor called lufenuron can be given to dogs in pills to prevent flea eggs from hatching. At the present time it is not available for other animals.

Insecticide flea powders

Used full strength, insecticide flea powders are usually too toxic for small or young animals. Flea powder formulated for kittens can be diluted by mixing it 50/50 with cornstarch and lightly dusting a small pet every two weeks for flea and tick control. Wear gloves to apply the powder. Children should not be allowed to handle a pet treated with flea powder.

Insecticide soaps

Flea shampoos, dips and pet sprays are now available that contain citrus extracts such as D-Limonene and linalool or pyrethrins. They can be used on pets, in their bedding, or on carpets. They biodegrade rapidly, do not have any residual effect and are only active while the animal is wet. Some species of animal such as cats are very sensitive to strong concentrations of these chemicals.

Methods not appropriate for schools

Insecticide flea collars

Flea collars with pesticides are usually too toxic for small or young animals. Flea collars work by continuously releasing vapors that the pet and nearby humans will also inhale. For this reason they should be kept on a pet for only a short time (a few days) and should be stored in a labeled glass jar when not in use. Children should not handle a pet wearing a flea collar.

Insecticide room foggers

Room foggers are only effective against some adult fleas. They spread pesticide fumes and residues all over a room, although fleas will only be located in specific spots within the room. Fleas that are deep in carpet or crevices will be unaffected. People and animals must stay out of the room for a specific period of time, but chemical residuals remain present and active for a very long time after re-entry is permitted. Because of the resistance of larvae in carpets, pesticides in room foggers for fleas are higher in concentration than the same pesticides would be for spot treatment sprays.

Ineffective methods

Herbal flea controls

Collars and powders with pennyroyal, eucalyptus, rosemary and citrus extracts are advertised as a non-toxic way to repel fleas from pets. There is no evidence that they work, and they would not affect fleas in bedding or in cracks in the cage.

Vitamin supplements

Vitamin B₁, either by itself or in the form of brewer's yeast, is reputed to reduce either fleabites or the irritation caused by fleabites. There is no evidence that it is effective and it does not affect the source of the problem - the flea population.

Ultrasonic Devices

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

Impractical methods

Heat treatment

Pest control companies can wrap buildings in plastic and heat the air inside to over 120 degrees F, destroying drywood and powder post termites, cockroaches, ants, fleas and wood boring beetles. Heated air can also be forced into spaces. This is non-toxic and very effective, but it is very expensive and disruptive, since all heat-sensitive valuables must first be removed from the building. It is neither practical nor necessary if done just for flea control, since a school can control fleas by limiting animal access, sanitation and the use of Insect Growth Regulators and low-toxic spot treatment of pesticides.

IPM Methods for Pest Control Professionals

Pest control professionals should be called when Fleas persist despite following the IPM methods.

A professional can do a more thorough investigation and identification of the problem than the school staff. Fleas can be confused with other small insects. There may be places in the building that need flea treatment but are not apparent to school staff. Cat fleas cause most flea problems but other species of fleas may be living on a wild animals in or near the building.

Staff or children are allergic to flea bites.

A professional can use spot pesticide treatments combined with an insect growth regulator to provide quicker results than sanitation and pet flea management reductions alone. The age of children at the school, and any allergies, asthma or chemical sensitivity problems of students and staff must be considered in the choice and timing of treatment. Younger children are more susceptible to chemicals and a low toxic pesticide, such as a pyrethrin, can cause allergic responses in some people.

Wild or feral animals are living in or near the building.

When animals are removed or excluded from their burrows or nests in a building their fleas will seek a new host. Pest control professionals should look for fleas whenever host animals are living in or near a structure.

Raccoons, opossums, chipmunks and ground squirrels, as well as mice and rats should all be considered potential hosts.

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	<i>Integrated Pest Management for Carpenter Ants</i>
#97-422 Revised July 98	<i>Integrated Pest Management for Flies</i>
#97-423 Revised July 98	<i>Integrated Pest Management for Head Lice</i>
#97-424 Revised July 98	<i>Integrated Pest Management for Cockroaches</i>
#97-425 Revised July 98	<i>Integrated Pest Management for Rodents</i>
#97-426 Revised July 98	<i>Integrated Pest Management for Termites</i>
#97-427 Revised July 98	<i>Integrated Pest Management for Yellowjackets and other Wasps</i>
#97-428 Revised July 98	<i>Integrated Pest Management for Nuisance Ants</i>

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

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