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# School Pest Solutions

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## Fleas

Schools in almost every region of the country have problems with fleas. Only very dry regions are exempt from this. The cat flea (*Ctenocephalides felis*) is the most common species found in schools. In addition to feeding on humans, it also feeds on most mammals, including cats, dogs, rodents, raccoons, opossums, as well as birds. Two other species of fleas, the dog flea (*C. Canis*) and the human flea (*Pulex irritans*) are not as likely to be encountered.



### Identification and Biology

Adult fleas are small (1/8 inch) and laterally compressed, which allows it to easily maneuver through the hairs of its host. The strong hind legs are specially adapted for jumping. Adult fleas are black to reddish-brown, but young adults that haven't had their first blood meal are quite small and black in color; after feeding they expand and appear lighter brown. The hairy, worm-like, white larvae, which are 1/16 to 3/16 inches long, have a distinct brown head.

Unlike many other flea species, adult cat fleas remain on their host. After mating and feeding, adult female fleas lay white eggs. These smooth eggs easily fall from the host into cracks, crevices, carpet, bedding, or lawn covering. A mature female flea can lay up to 25 eggs daily for three weeks.

Small, worm-like larvae (1/16 to 3/16 inches long) hatch from the eggs in 2 to 12 days. They have a distinct brown head and are eyeless, legless, and sparsely covered with hairs. The larval body is translucent white and a dark-colored gut can be seen through the flea's skin. Flea larvae feed on dried blood excreted by adults. They will also eat dandruff, skin flakes, and grain particles. Larvae live in cracks and crevices or on the ground where eggs have fallen. Under favorable conditions, they take 8 to 21 days to develop, but they can take up to 200 days under unfavorable conditions.

Larval fleas metamorphose into adults within silken cocoons. The cocoons camouflage by attracting dirt and debris to their sticky exterior. New adults are ready to emerge from their pupal cocoons within two weeks under good conditions. They can, however, remain in their cocoons up to 12 months if no host is available or if climactic conditions are unfavorable. Vibrations and/or elevated temperature stimulate adults to emerge from their cocoon. Because of this ability to delay hatching, the presence of a host can result in a sudden increase of adult fleas when they emerge simultaneously from many cocoons.

As soon as the adult fleas emerge from the pupal case, they seek a host that will provide the first blood meal. Adults can live 1 to 2 months without a meal or 7 or 8 months with one. They are the only stage that lives on the host and feeds on fresh blood. The flea population builds up all year long in the form of eggs, larvae, and pupae, but rapid development into biting adults require correct temperature and humidity conditions and host signals for the adult to emerge from the cocoon.

## Associated Problems

Flea bites cause irritation to humans and animals, but also can cause serious allergies. Other more serious and less common problems are associated with the cat flea. Cat fleas (the most commonly found flea in schools and homes) can carry or transmit various organisms, such as *Yersinia pestis*, which causes bubonic plague; *Rickettsia typhi*, which causes murine typhus; and *Dipylidium caninum*, the double-pored dog tapeworm, which can live in dogs, cats, or humans. Tapeworms are transmitted to a vertebrate host when the vertebrate ingests an adult flea carrying a tapeworm cyst.

## Detection and Monitoring

Fleas can be a problem in schools even if pets do not live in the buildings. Adult fleas can be brought in on the clothing of staff, students, or visitors. Other possible sources include urban wildlife such as rats, feral cats, raccoons, opossums, chipmunks, squirrels, or birds that may live undetected in unused parts of the buildings. Detection is as simple as finding fleas or noticing bites around the ankles of people in the building. Flea dirt, the adult flea fecal material that dries and falls off the host to serve as food for larvae, may be visible. Tapeworms, transmitted to a human via ingestion of an infected flea, would also signal a flea infestation.

## Areas to Monitor

- In and around the cages of classroom pets (also check the pets themselves for signs of fleas)
- Places where animals might find harborage, such as basements, crawl spaces, attics, eaves, roof top structures, and secluded shrubbery near buildings

## Management Options

An Integrated Management Program for fleas can be designed by selecting from the following strategies and tactics.

## Physical Controls

### **Wild Animal Removal**

Wild animals can be trapped by trained animal management technicians. Consult your local Yellow Pages to find appropriate businesses. Make appropriate repairs to exclude animals.

### **Vacuuming**

- Vacuuming on a regular basis throughout the year will keep developing flea populations low by eliminating adult fleas and their eggs.
- Vibrations caused by vacuum cleaners will stimulate new adult fleas to emerge from their pupal sacs.
- These new adults will be either exposed to any residual insecticide on the floor or captured in the next vacuuming.
- Vacuuming is not very effective at capturing flea larvae in carpeting because the larvae coil themselves around the fibers. Vacuuming does, however, remove the dried blood on which the larvae feed.
- Use vacuum attachments to clean cracks and crevices. Caulk or seal these openings.
- Most fleas will be killed when dust in the vacuum bag suffocates them. To be sure they are killed, you can vacuum up a tablespoon of cornstarch.
- Vacuum badly infested areas thoroughly every day until the infestation is managed.
- When infestations are severe, you may need to supplement vacuuming with steam-cleaning or other management tactics.

### **Laundry**

Wash removable floor coverings, such as rugs, located in areas where there are known infestations. Any bedding for classroom pets should be washed regularly.

## **Heat**

Tests have indicated that cat flea larvae die after exposure to 103°F for one hour, and techniques to raise the temperature in a room to provide this exposure have been developed. The heating process uses a common heating unit modified to include special blowers and flexible ducts. Companies have been using heat to kill termites and wood-boring beetles for a number of years, and now some companies are experimenting with heat to manage fleas. One potential problem with this technique is that fleas can burrow into carpets and upholstery, and perhaps escape lethal temperatures.

## **Biological Controls**

### ***Beneficial Nematodes***

Insect-destroying nematodes (*Steinernema carpocapsae*) can be applied to the lawn as a spray. These microscopic, worm-like organisms live in the soil and kill insects by entering their bodies, feeding on their tissue, and releasing harmful bacteria. They do not affect people, pets, or plants. When the nematodes mature and reproduce, the nematode larvae leave to search for other hosts. They cannot move far (only 1 or 2 inches) and die if they fail to contact other insects. The nematodes sold for flea management are native to the United States and are found naturally in the soil nationwide. They will not adversely affect earthworms, but may attack insects other than fleas. Nematodes may not be effective in some situations, and may also require monthly applications.

## **Chemical Controls**

If nonchemical methods alone are ineffective, or only partially effective, then integrating a pesticide into your management program may be warranted. Anyone making pesticide applications on school property must be licensed by the Board of Pesticides Control. See “Standards for Pesticide Applications and Public Notifications in Schools”.

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*Information from this page can be found on the National School IPM "Fleas for Schools" web page.*

## **Photo Credits**

Joseph Berger, Bugwood.org

## **For More Information**

Kathy Murray  
Maine School IPM Coordinator  
Maine Department of Agriculture, Conservation and Forestry  
28 State House Station  
Augusta, ME 04333-0028  
E-mail: [kathy.murray@maine.gov](mailto:kathy.murray@maine.gov)  
Phone: 207-287-7616  
Fax: 207-287-7548