

## IPM for Fabric and Pantry Pests



### Introduction

Dermestid beetles, such as carpet and hide beetles, are sometimes referred to as fabric pests. They can digest keratin, the “hard” protein of which hair, horns, nails, claws, hooves, feathers, and reptile scales are formed. These insects can also attack a wide variety of other natural materials and even some synthetic ones.

### Identification and Biology

Adult beetles are small and have short, clubbed antennae but are otherwise

varied in appearance (see Table 9-1). Their bodies are covered with small scales or hairs, which are visible with a magnifying glass. Larvae are brownish, 1/8 to 1/2 inch long, and characteristically hairy or bristly.

The larval stage is the most damaging. Females lay eggs throughout the year, and the eggs hatch after less than two weeks. The larvae feed for varying periods, depending upon the species and the environmental conditions. When ready to pupate, the larvae may burrow farther into the food or wander and burrow elsewhere.

### Damage

Dermestid beetle holes are usually concentrated in a few areas and can be quite large. Carpet beetles damage materials made from wool such as sweaters, uniforms, felt, wool yarn, etc. They can also destroy insect collections, furniture, and carpets. Hide beetles feed on animal carcasses and hides, and also damage furnishings, carpets, and fabrics. Some species also infest stored, dried foods such as cereal (Table 9-2 provides more detailed information on the food preferences of both hide and carpet beetles).

**Table 9-1. Important Carpet or Hide Beetles (Dermestids)**

Common Name(s)	Scientific Name	Description of Adults
Furniture carpet beetle	<i>Antbrenus flavipes</i>	<ul style="list-style-type: none"> <li>• 1/10 inch to 1/5 inch long</li> <li>• definite cleft at rear</li> <li>• mottled with black, white, and yellow scales</li> </ul>
Varied carpet beetle	<i>A. verbasci</i>	<ul style="list-style-type: none"> <li>• 1/10 inch to 1/8 inch long</li> <li>• mottled with white, brownish and yellowish scales</li> </ul>
Black carpet beetle	<i>Attagenus megatom</i>	<ul style="list-style-type: none"> <li>• 1/10 inch to 1/5 inch long, oval</li> <li>• Shiny black and dark brown with brownish legs</li> </ul>
Black larder beetle	<i>Dermestes ater</i>	<ul style="list-style-type: none"> <li>• 3/10 inch to 2/5 inch long</li> <li>• black with yellowish gray hairs</li> <li>• black rounded and hook-shaped spots on underside of abdomen</li> </ul>
Larder beetle	<i>D. Lardariu</i>	<ul style="list-style-type: none"> <li>• 3/10 inch to 2/5 inch long</li> <li>• dark brown with pale grayish yellow hair</li> <li>• yellow band at base of wing covers with about six black spots</li> </ul>
Hide beetle	<i>D. Maculatus</i>	<ul style="list-style-type: none"> <li>• 1/5 inch to 2/5 inch long</li> <li>• black with white hairs on sides and undersides</li> <li>• apex of each wing cover comes to a fine point</li> </ul>
Warehouse beetle	<i>Trogoderma variabile</i>	<ul style="list-style-type: none"> <li>• 1/8 inch long</li> <li>• brownish black</li> </ul>

**Table 9-2. Some Food Sources for Carpet and Hide Beetles**

<b>Beetle</b>	<b>Food Sources</b>
Furniture carpet beetle ( <i>Anthrenus flavipes</i> )	horse-hair filled furniture, wool, hair, fur, feathers, bristles, horn, tortoise shell, silk, animal excreta, stained linen, cotton, rayon, jute, Softwood, leather, bags, dried silkworm pupae and cocoons, dead mice, dead insects, dried cheese, old grain, casein, dried blood, and the glue of book bindings
Varied carpet beetle ( <i>A. verbasci</i> )	nests of bees, wasps, and spiders; carpets, woolen goods, skins, furs, stuffed animals, leather book bindings, feathers, horns, whalebone, hair, silk, fish manure, dried silkworm pupae, rye meal, cacao, corn, red pepper, and dead insects in collections
Black carpet beetle ( <i>Attagenus megatoma</i> )	feathers, dead birds, birds' nests, bird manure, dry horse and cow carcasses, seeds, grains, cereals, woolen rugs, clothing, carpeting, felts, furs, skins, yarn, velvet, silk, hair-filled mattresses, upholstered furniture, wool-filled blankets, house insulation with sheep wool or cattle hair, meat, insect meal, kid leather, milk powders, casein, books, cayenne pepper, dried pupae of silkworms, pet food, spilled flours, and pollen (for adults, particularly of <i>Spiraea</i> )
Black larder beetle ( <i>Dermestes ater</i> )	mouse cadavers in walls of building; partially burned food and other kitchen wastes in incinerators; pet foods
Larder beetle ( <i>D. lardarius</i> )	stored ham, bacon, meats, cheese, dried museum specimens, stored tobacco, dried fish, dog biscuits; can tunnel slightly in wood; can penetrate lead and tin but not zinc or aluminum; pest of silkworm cultures; reported to attack newly hatched chickens and ducklings
Hide beetle ( <i>D. maculatus</i> )	prefers hides and skins; used to clean carcasses; known to survive on smoked meat and dried cheese, but cannot live on fat alone; larvae can tunnel short distances into wood
Warehouse beetle ( <i>Trogoderma variabile</i> )	prefers barley, wheat, animal feeds, grains, and pollen; also found in seeds, dead animals, cereals, candy, cocoa, cookies, corn, corn meal, dog food (dried and "burgers"), fish meal, flour, dead insects, milk powder, nut meats, dried peas, potato chips, noodles, spaghetti, and dried spices

## Detection and Monitoring

Look for holes in fabric, for larvae, cast skins of beetle larvae, or insect excreta in stored materials.

Carpet beetle larvae may be found wandering far from their food, particularly to pupate so they are sometimes encountered on materials they do not actually eat. Also, adult carpet beetles do not shun light and may be found crawling on windows. This is often the first place they are noticed.

These beetles are easy to catch: cover the insect with a jar and slowly slide a

card under the open end. Seal the jar and place it in the freezer overnight. The dead insect can be examined with a magnifying glass or taken to a professional for identification.

An inspection should include the following locations:

- around carpets or furniture covered or filled with susceptible materials; infestations may be under the slipcovers, where it is dark and quiet, or in the pads under the carpet
- around accumulations of lint and other organic debris, particularly under and behind furniture that is rarely moved, in wall and floor cracks, in cracks behind filing cabinets, shelves, or other built-in items that may not be flush with the wall, behind baseboards, moldings and window trim, and in cold air and heater ducts
- around stored animal specimens, feathers, garments, blankets, or other items made of susceptible materials
- around bags or boxes of dried milk, fish or meat meal, dog food, etc; note that carpet beetles can bore through cardboard and paper packaging

If the infestation does not appear large enough to account for the number of pests found, or if cleaning up the infestation does not seem to diminish their number, then a further search should focus on less obvious sources:

- bird, wasp, bee, squirrel, or other animal nests on, or very close to, the walls of the building
- animal carcasses or trophies, insect collections, or leather or horn goods
- cut flowers, or blooming bushes near open, unscreened windows or doorways
- incompletely incinerated garbage

In some circumstances, sticky traps placed in areas where activity is suspected may be useful for monitoring. Hang them where you suspect you might have a problem and check them daily

## Management Options

There is rarely a need to use an insecticide to control carpet beetles and other dermestids. The following physical controls should be adequate.

### Physical Controls

#### Storage in Tight Containers

If clean materials are placed into tightly sealed containers, they will be safe from infestation. The problem with closets and similar storage areas is that they are almost impossible to seal because newly hatched larvae are so tiny they can crawl through very small gaps.

All grains, cereals and other similar susceptible substances should be stored in tight-fitting containers to deny beetles access. Containers can be placed in the freezer for a few days

to help reduce the possibility of an infestation developing.

### Cedar Products

Cedar chests have long been thought to protect against fabric pests, but it has been known for many years that although cedar oil can kill very young larvae, the oil does not affect eggs, pupae, adults, or larger larvae, and that cedar lumber loses its oil in only a few years. Commercial repellents made from cedar, cedar oil, or herbs cannot be counted on to give adequate control to protect goods, either.

### Vacuuming

Accumulations of lint, human and animal hair, and other organic debris in cracks and crevices of floors, baseboards, closets, and shelves provide food for fabric pests. These areas should be cleaned thoroughly and regularly to prevent infestations. It is particularly important to clean under furniture that is rarely moved (e.g., desks, bookcases, cabinets, etc.); in closets where fabric items, furs, and feather-filled materials are stored; and inside and behind heaters, vents, and ducts.

### Caulking

Caulking or otherwise repairing cracks and crevices where lint and hair can accumulate will reduce the number of fabric pests that are able to live in the environment. Areas of particular concern are the spaces inside cabinets where shelves do not meet the wall and similar spaces in drawers holding susceptible materials. These same habitats are likely to be inviting to cockroaches.

### Removal of Animal Nests

Carpet beetles can sometimes move into buildings from the abandoned

nests of birds, rodents, bats, bees, and wasps, as well as from the carcasses of dead animals. Remove nests in the eaves, in the walls, or close to the walls of the building. Problems with birds' nests usually occur after the nestlings have left.

Nests should be removed before the cold weather sets in and the beetles begin searching for sheltered hibernation spots. If there is a problem with rats and mice, these should be trapped rather than poisoned. If poisoned rodents die in inaccessible places, their carcasses can become food sources for fabric pests and flies. (See Chapter 13 for management of mice and rats.)

## Pantry Pests

Stored foods can become infested with various pantry pests. They commonly infest flour, cereals, cracked grains, baking mixes and processed foods, crackers, macaroni, cured meats, powdered milk, dried fruits, nuts, popcorn and spices. Insects that feed on these products may also infest other grain-based items such as pet foods, birdseed and ornamental corn. Dried flower arrangements may also be attacked.

### Identification and Biology

#### Indian Meal Moth (*Plodia interpunctella*)

The Indian meal moth (adult Figure 9-1) is the most common food-



Photo: UNL Department of Entomology

Figure 9-1. Indian Meal Moth Adult

infesting moth found in schools, homes, grocery stores and any place where dried pet foods are produced or stored. It feeds on a large variety of stored food products, but infestations often are started through dried pet food or birdseed. Nuts are a favorite breeding source; infestations have been found in nut caches of squirrels in attics and chimneys.

The larva (Figure 9-2) prefers coarse grades of flour, whole grains, cereal, dried fruits, seeds and spices. Foods infested with these insects will have silk webbing present, especially near the food surface.

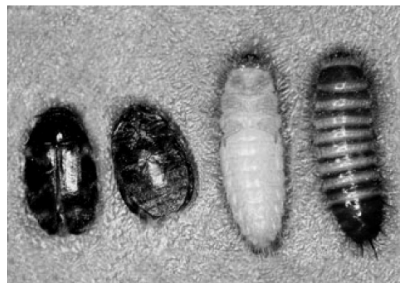


**Figure 9-2. Indian Meal Moth Larvae and Adult**

Adult moths are nearly 1/2-inch long and have distinctive wing markings. The base of the forewing is pale grey and the outer two-thirds is reddish-brown with a coppery luster. They have a distinctive way of “resting” on the wall at an angle with their wings folded. The larvae are generally dirty-white in color with shades of yellow, pink, brown or green. Mature larvae, which are about 1/2-inch long, usually move away from the feeding site before pupating within silken cocoons.

### Dermestid Beetles (Family: *Dermestidae*)

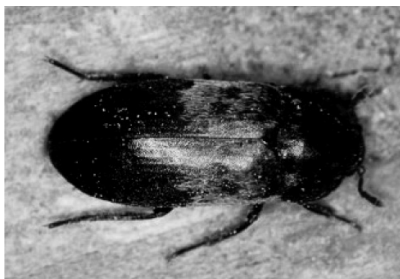
As mentioned earlier, dermestid beetles scavenge and feed on animal matter like dried meats, dead insects, hides and woolens. Some species, such as the warehouse beetle, varied carpet beetle and larder beetle (Figure 9-3 and 9-4), have expanded their diet and also feed on grain and grain-based products. They are especially common in flour and cereals but also are found in candy, cocoa, cookies, corn meal, nuts, pasta, dried spices, and many other dry foods.



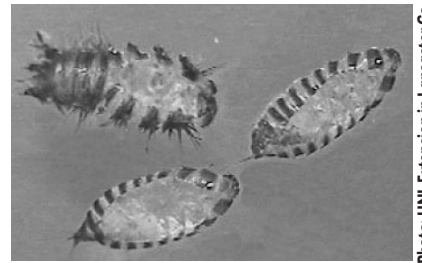
**Figure 9-3. Warehouse Beetle Adult and Larvae**

The adult beetles are small, oval and variously colored. The full grown larvae are similar in size to the adults for each species and tend to be cigar-shaped and banded with dark, long hairs. In some species, the larvae have a tuft of hair at the tail-end of the body.

Typically, only larvae will be seen in infested food because the adults feed on pollen and leave the food once they have emerged from their pupal stage. Sometimes only the larval



**Figure 9-4. Larder Beetle - Adult**



**Figure 9-5. Cast (Shed) Skins from Dermestid Beetle Larva**

“skins” will be found (Figure 9-5). Dead adults are often found in windowsills because they fly to the light, trying to get outside.

Since some of these species feed on woolens, infestations in the pantry may spread and damage valuable clothing, woolens and furs. Proper cleaning and storage of natural fabrics will help prevent damage.

### Sawtoothed Grain Beetle (*Oryzaephilus surinamensis*)

The Sawtoothed grain beetle (Figure 9-6) is another very common pantry pest. It does not feed on intact whole grains but feeds on many processed food products such as breakfast food, bran, dried fruits, nuts, sugar, chocolate, and macaroni. It is especially fond of oatmeal and birdseed. These flat beetles can even get into sealed boxes and packages of food.

Adults are nearly 1/4-inch long, slender, brownish-red and active. Their name comes from the six saw-like teeth on either side of the thorax behind the head. After finding a potential food source, the female



**Figure 9-6. Adult Sawtoothed Grain Beetle**

lays white, shiny eggs that hatch into yellowish-white larvae. There can be as many as seven generations each year, but sawtoothed grain beetles often stop breeding in the winter unless buildings are heated and moisture is sufficient. Adults are very long lived and remain active in the winter.

### Cigarette and Drugstore Beetles

These small, stout beetles (Figure 9-7) are common in locations where they can attack pet food, cereals, spices, and other packaged foods. Since they closely resemble each other, they are often confused. The heads of both beetles are tucked under the prothorax and are not visible from above. Both are brown and about the same size.

The two beetles can be distinguished by their wing covers. The wing covers of the drugstore beetle have rows of longitudinal grooves while those of the cigarette beetle are smooth. Another distinguishing feature is the



Photo: UNL Extension in Lancaster Co.

**Figure 9-7. Drugstore Beetle Adult (Left) Cigarette Beetle Adult (Right)**

antenna. The drugstore beetle has a three-segmented club while the cigarette beetle has an antenna that looks a little like a saw blade.

Both the cigarette and drugstore beetles belong to the family *Anobiidae* and can be confused with some wood-boring beetles of the same family. It is important to have the beetle identified because wood-boring beetles have greater damage potential than the cigarette and drug-

store beetle. However, if the beetles are found in food or grain products, it is most likely a cigarette or drugstore beetle.

**Drugstore beetles (*Stegobium paniceum*):** The drugstore beetle will feed on bread, but it will also feed on any dried, food-based material. It will damage book bindings. It has been found to perforate tinfoil and sheet lead and easily chews through most food packaging material.

**Cigarette beetles (*Lasioderma serricorne*):** The cigarette beetle derives its name from its serious infestations of stored tobacco. Adult beetles are about 1/8-inch long, light brown, and oval. The most common food materials include pet food, cereal, peppers, spices, raisins, and seeds.

### Flour Beetles (*Tribolium spp*)

There are a number of species of tiny beetles that infest flour, but the two most common flour beetles are the confused (Figure 9-8) and red flour beetles. These beetles are scavengers in that they cannot attack whole grains but rely on other insects to damage the kernels first. In buildings they can be found feeding on flour, cracked grains, cake mixes, beans, peas, dried fruits, nuts, chocolate, and spices.

These red and confused flour beetles are very similar: both are reddish-brown and about the same size, 3/16-inch long. They can be distinguished by their antenna. The antenna of the red flour beetle ends abruptly in a three-segmented club while the antenna of the confused flour beetle gradually enlarges toward the tip, ending in a four-segmented club. In addition, the sides of the red flour beetle's thorax are curved while the confused flour beetles thorax has straighter sides.



Photo: UNL Department of Entomology

**Figure 9-8. Adult Confused Flour Beetles**

The biology of these two beetles is very similar. The primary difference is the red flour beetle flies and the confused flour beetle does not. If you see a red flour beetle crawling on the counter, the breeding source is probably nearby, but not necessarily. A confused flour beetle crawling on the counter is almost certainly from a nearby food source.

### Granary and Rice Weevils (*Sitophilus spp*)

These insects (Figure 9-9 and 9-10) damage whole grains or seeds. They generally do not feed on flour or cereals unless it has become caked.

Adult weevils are very similar. Both are dark reddish-brown and range in size from 1/8 to 3/16-inch long. They have a long snout projecting from the head and wing covers with distinct ridges.



**Figure 9-9. Granary Weevil - Adults**



Photos: UNL Department of Entomology

**Figure 9-10. Rice Weevil - Adults**

Females lay eggs on seeds, kernels or other suitable foods. The larvae chew into the seed and feed on the inside of whole kernels/seeds. Pupation normally occurs within hollowed-out kernels or seeds. There can be as many as three to five generations each year. Weevil-damaged grains are typically hollow and have small round emergence holes.

Since they feed on whole grains, these insects are more likely to be a problem in grain bins and warehouses, but it is possible to have infestations in other facilities. Most common sources are popcorn, birdseed, decorative Indian corn, and nuts.

### Bean Weevil (*Acanthoscelides obtectus*)

The most common pest of stored legumes, such as beans, cowpeas, and peas in Nebraska is the common bean weevil (Figure 9-11). The bean



Photo: Kansas State University

Figure 9-11. Bean Weevil - Adult

weevil is not a true weevil, like the granary and rice weevils, discussed earlier. They are members of the closely related seed beetle family. Their body shape is more round than the rice and granary weevils, and they do not have the slender protruding snout of these true weevils.

Bean weevils are common in the field. Sometimes, gardeners harvest beans from the garden that look perfectly good but can be infested. People may notice bean weevils for the first time on windows and doors as they emerge

from stored seeds. They are attracted to light and are attempting to escape. Usually, there is little concern for their presence until a sack of dried beans or peas, especially homegrown, is emptied and found full of holes. Occasionally, one may take a package of dried beans or peas out of storage to find it infested with small, stout beetles with a short, broad snout.

The adult bean weevil is a short chunky beetle, about 1/8 inch in length. It is olive-brown with darker brown and gray patches on the wing covers. The elytra are shorter than the abdomen leaving a few segments exposed. Legs are reddish.

With beans stored indoors at warm temperatures, bean weevils breed continuously as long as there is food left in the beans. Populations can become very high.

### Spider Beetles (Family: *Ptinidae*)

Spider beetles (Figure 9-12) get their name because many actually resemble small spiders in appearance with their small head, prothorax and large globular-shaped abdomen. With a quick glance, their six long legs and two long antennae look like the eight legs of a spider.

Adults vary in size from 1/8 to 1/4-inch long, are reddish-brown to black. Females lay eggs within the food mass, such as grain, seeds, cereals, dried fruits, meats, wool and hair. Mature larvae are approximately



Photo: UNL Dept. of Entomology

Figure 9-12. Spider Beetle - Adults

1/4-inch long, cream to tan in color and curved. Larvae usually curl their bodies when disturbed. Most spider beetles have two or three generations each year.

Spider beetles are mainly scavengers but will infest grain-based products that are old, moist, and possibly moldy. There is often an association with spider beetles and infestations of rodents, birds, bats, or bee/wasp nests in walls or attics. These beetles will feed and breed in accumulations of animal excrement. Older buildings and warehouses tend to have more spider beetles due to the likelihood of these food sources. As infestations become severe, beetles will crawl and emerge from walls between floors, attics, basements, and crawl spaces. When associated with an animal infestation, removal of animal wastes is an essential component of managing spider beetles.

### Grain Mites (*Acarus siro*)

The grain mites (Figure 9-13) are pests of food and feed products, like cereals, dried vegetable materials, cheese, corn and dried fruits. These mites proliferate under high

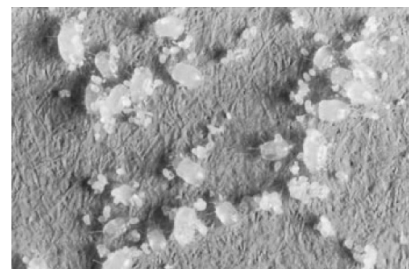


Photo: University of Idaho

Figure 9-13. Grain Mites  
Adults, Immatures, and Eggs

moisture conditions and are often found in conjunction with fungal growth. Severe infestations result in brownish tinge over the commodity, called "mite dust" because of the light brown coloring of the mite legs. This "mite dust" gives off a "minty" odor if the mites are crushed.

The life cycle from egg to adult takes only about two weeks at normal room temperatures. Overcrowding in heavily infested products will force mites to move off in search of other food sources.

## Damage

Several stages (egg, larva, pupa and adult) of these insects may be present at the same time in infested products. Since we keep our buildings warm, these insects may continually reproduce and many stored product infestations can be found nearly any time of the year.

The first indication of an infestation is often presence of small brown beetles, moths, or worms in storage areas or on counters. Upon closer inspection, insects may also be found in opened packages or containers of food and in the cracks and crevices of shelves. Unopened packages may also become infested because some of these insects can readily chew into cardboard and foil packaging. Insects can be brought into the facility along with infested food products. They can multiply and spread to other stored foods.

## Prevention

Once a pantry pest infestation is suspected, identify the pest and try to locate the source. Occasionally, the source of an infestation can be very hard to find. It may be in an unopened package. Consider the possibility that food may have been spilled next to or behind hard-to-move appliances. Mice will sometimes collect seeds or dry pet food and hoard them in walls, under cupboards or dishwashers where the infestations are nearly impossible to find.

The following tips may be useful.

- Purchase food in package sizes that can be used up in a short time. Do not store food products more than two to four months, if possible. Use older packages before newer ones and opened packages before unopened ones.
- When purchasing packaged foods, be certain containers are not damaged, and seals are intact.
- Store dried foods in insect-proof containers such as screw-top glass, heavy plastic or metal containers. This will prevent entry or escape of insects. Cardboard, paper or plastic wrapping will not prevent insect infestations.
- Keep food storage areas clean and do not allow crumbs or food particles to accumulate, as exposed food will attract insects. Cleanliness is especially important in areas where pet foods and birdseed are stored.

## Management Options

Inspection and identification of all potential food sources is essential to controlling the infestation. Control requires locating and discarding all infested items. Do not overlook intact boxes or containers because many insects can chew their way into cardboard and foil.

Infested items can be thrown away or salvaged by freezing three to four days. Food can be heated in a 140°F oven for an hour with the same result. You should empty and thoroughly vacuum cupboards or shelves holding infested items. Pay particular attention to cracks and corners.

Vacuuming picks up hiding insects and spilled or infested material. Empty the vacuum cleaner or discard the vacuum cleaner bag after use to prevent reinfestation.

**Do not use insecticides** for controlling these or other insects in pantry areas. Washing shelves with detergent, bleach, ammonia or disinfectants will not have any effect on these pests since these insects lay their eggs on suitable food. Removing infested items and thoroughly cleaning with a vacuum is usually sufficient. As a precaution against reinfestation, store susceptible foods in tightly sealed glass, metal or heavy plastic containers or in the refrigerator or freezer.

If insects continue to appear, go through stored items again and also check other rooms in the building for possible sources. Tree seeds blown into ventilators or around windows may harbor these pests. If insect problems persist, seek assistance from a pest management professional.

## Resources

For management practices and pesticide recommendations on fabric and pantry pest control, see the publications available from UNL Extension on-line at: <http://www.ianrpubs.unl.edu>.

Educational resource guides on pantry and fabric pests are available at: <http://lancaster.unl.edu/pest/resources/pantrypests304.shtml>.