

Fabric Pests

Learning Objectives:

After completion of the study of Fabric Pests, the trainee should be able to:

- Identify common fabric pest groups.
- List the key features in the life cycle and habitat of some common fabric pests.
- Discuss inspection and prevention techniques for fabric pests.
- Discuss pest management procedures for fabric pests.

Fabric pests include insects that feed on natural fibers, synthetics and animal by-products. They damage clothing, upholstery, carpeting, draperies and other fabrics. Some of these pests are able to digest the animal protein – keratin – and feed on hides, furs, hair, feathers, animal horns and preserved insects and other museum specimens. Several fabric pests are also important stored-product pests (such as black carpet beetles, silverfish and firebrats).

Although these insects commonly feed on wool and other fabrics, these materials apparently do not contain adequate vitamins and amino acids (protein) to properly sustain their development. For this reason, fabric pests do not typically feed on “clean wool” but mainly attack wool and other fabrics contaminated by soil, food spills, urine or related nutrients. Contamination is frequently difficult to avoid and may be caused by perspiration, body oils and even air-borne microorganisms.

Four orders of insects have species considered to be fabric pests: Coleoptera (carpet beetles), Lepidoptera (clothes and webbing moths), Thysanura (silverfish and bristletails) and Orthoptera (crickets).

Carpet Beetles

Beetles make up the very large insect order known as Coleoptera. All beetles undergo complete metamorphosis and in the immature stage have several larval instars (stages between molts). They

pass through a pupal stage before becoming adults. Adults are winged and many species are good fliers. Adult beetles are distinctive among adult insects because their front pair of wings are modified into hard body coverings known as elytra. When a beetle flies, “the elytra are raised to expose the hind wings. Elytra are shiny and brightly colored in some species of beetles; other species have a covering of fine hairs or scales.

Carpet beetles belong to the coleopteran family Dermestidae. Four species of carpet beetles cause serious damage to fabrics, carpets, furs, stored foods and preserved specimens. These insects are pests in warehouses, homes, museums and other locations where suitable food exists.

The carpet beetles can be identified in either the larval or adult stage. Adult carpet beetles can generally be separated by body shape, coloration, and the presence or absence of a cleft at the rear of the forewings. The larvae are characterized by body shape and the arrangement of hairs and tufts of hairs on the body. Diagnostic characteristics of the larval and adult stages of the carpet beetles are presented below:

Furniture Carpet Beetle, Varied Carpet Beetle and Common Carpet Beetle

These three beetles belong in the same genus (*Anthrenus*) and are similar enough in appearance and habits that they can be considered together. The *Anthrenus* carpet beetles feed on the same type of materials as the black carpet beetle. They are omnivorous and feed on many types of plant and animal matter. Adult carpet beetles commonly feed outdoors on pollen and enter the home to lay eggs in the spring and summer months. The feeding behavior of the *Anthrenus* species is distinctly different than that of the black carpet beetle. None of these three beetles burrow in their food material. As a result, they are more frequently encountered as surface feeders. A heavy infestation will show many larvae feeding in close proximity to each other on the surface, but feeding deeply enough to penetrate woolen fabric and other materials.

Black Carpet Beetle, *Attagenus megatoma*

Adults distinctly oval, dark brown to black, about 1/6 inch long. Larvae carrot-shaped with long tail bristles. Shiny brown to black.

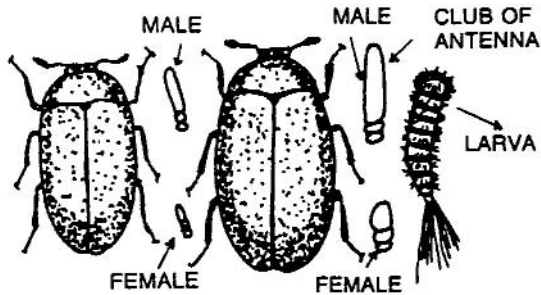


Figure 4-1. Black carpet beetle, *Attagenus megatoma*

Varied Carpet Beetle *Anthrenus verbasci*

Adults slightly oval shaped and mottled with white, brownish and yellowish scales. No cleft at tip of wings. Larval body wedge-shaped with rear broader than head. Three tufts of hair on either side of rear end.

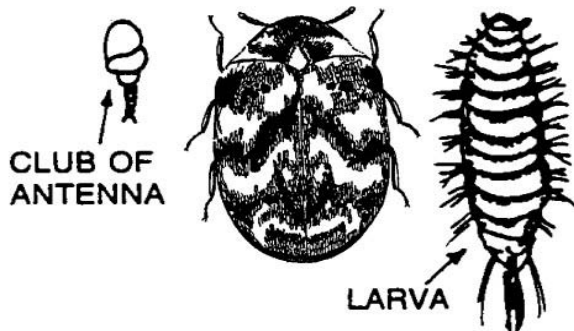


Figure 4-2. Varied carpet beetle, *Anthrenus verbasci*

Varied carpet beetle complete about one generation per year. The larvae pass through 5 to 16 larval instars. The female lays an average of 30 eggs. With only one generation per year and an average of 30 eggs per female, this species' potential capacity for rapid reproduction and infestation is limited.

The life cycle of the furniture carpet beetle may be completed in as little as three months. Under ideal conditions, this species may be completed in as little as three months. Under ideal conditions, this species may complete up to four generations per year, although two per year is the more likely

Furniture Carpet Beetle, *Anthrenus flavipes*

Adults mottled with yellow, black and white, more rounded than varied carpet beetles, cleft at tip of wings. Larvae torpedo-shaped, head wider than rear, darker than varied carpet beetle.

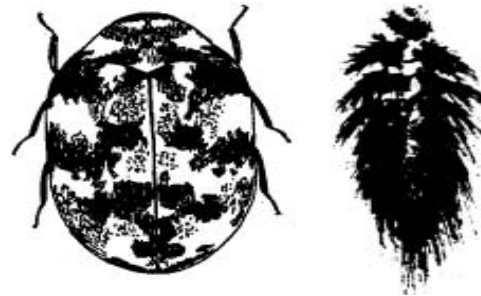


Figure 4-3. Furniture carpet beetle, *Anthrenus flavipes*

Common Carpet Beetle, *Anthrenus scrophulariae*

Adults round-oval, about 1/8 inch long, black with orange red scales. Scalloped band of orange down center of back. Larvae reddish brown, with hair extending outward from entire body.

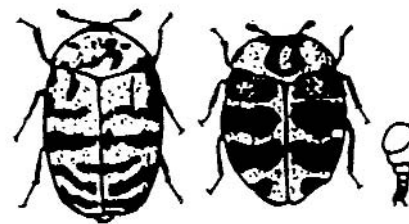


Figure 4-4. Common carpet beetle, *Anthrenus scrophulariae*

situation. Each female lays an average of 70 eggs. This species is extremely destructive to carpeting, upholstered furniture, clothing and natural fiber brushes.

The common carpet beetle, which has also been known as the buffalo bug, seems to be less common in the eastern part of the United States. The common carpet beetle is capable of completing one generation in 78 days, although the average is closer to three months. Thus, one pair of carpet beetles is capable of producing several thousand offspring in a one-year period.

Black Carpet Beetle

The black carpet beetle is a serious fabric pest in the eastern states. In these areas, it is considered the most destructive of all carpet beetles. It is also common in the western states. The larvae are extremely active feeders and will readily burrow and enter food or food containers that are not perfectly sealed. The searching habits of the larvae frequently result in their appearance in containers of non-food materials. They occasionally feed on cereal products, but dead bodies of insects are the preferred food of this species. For this reason, black carpet beetles are frequently found in cereals and grains that are infested with stored product pests.

Black carpet beetle infestations that are found in homes and industrial buildings frequently begin with a buildup of the population in bird nests, abandoned wasp or bee nests and dead rodent bodies that are located in attics, chimneys, wall voids or basements. Larvae initially located in these situations will freely migrate into the living quarters of the building and infest any suitable food materials.

Under ideal environmental conditions, this species requires about one year to complete a generation. The larvae will pass through 6 to 20 molts and may require up to 650 days to complete development under poor environmental conditions. The last larval instar typically does not pupate until encountering suitable environmental conditions. Pupation typically occurs in protected situations.

Carpet Beetle Management

Carpet beetles are among the most difficult indoor pests to control because of their ability to find food in obscure places and to disperse widely. Control success depends on integrating the use of sanitation, exclusion and, where necessary, insecticides.

Monitor for adult carpet beetles using sticky traps baited with an appropriate pheromone. Placing several traps throughout a building show the area the beetles are coming. These traps are also useful for monitoring the effectiveness of control applications. Pheromone traps can also be used to augment other control methods when used to attract adult males in small, confined areas. Check all traps once or twice a week.

Eliminate accumulations of lint, hair, dead insects, and other debris that serves as food for carpet beetles. Destroy any badly infested clothing, rugs, or other items. Bird, rodent or bee and wasp nests may harbor infestations, as may spider webs with their accumulation of dead insects. Cut flowers brought into a building may harbor adult beetles.

Regular and thorough cleaning of rugs, draperies, upholstered furniture, closets, and other locations where carpet beetles congregate is an important preventative and control technique. Frequent, thorough vacuuming is an effective way of removing food sources as well as carpet beetle eggs, larvae and adults. Fabrics can be protected by keeping them cleaned, because food and perspiration stains on fabrics attract carpet beetles that feed in these areas. Mounted animal specimens, such as museum specimens or trophies, should be regularly cleaned or periodically placed in a freezer for several hours. Stored woolens, linens and furs should be periodically inspected, then aired, brushed and hung in light. If infestations are found, launder or dry clean these items before storing to destroy carpet beetle adults, larvae and eggs. Be sure cleaned items are sealed in a protective plastic bag or other suitable container.

Apply residual insecticides as spot applications. Confine insecticide applications to the edges of floor coverings, under rugs and furniture, on the floors and walls of closets, on shelving where susceptible fabrics are stored and in cracks and crevices and other lint-accumulating areas. Use dust formulations, including desiccants, in attics and wall voids and other inaccessible places. Fumigation may be necessary when infestations are extensive, although success can be limited by the ability of the fumigant to penetrate all of the areas in which carpet beetles hide. Fumigants, such as naphthalene, can be used in small, tightly closed containers. Insecticide-impregnated resin strips labeled for control of carpet beetles on fabrics are usually more effective in protecting susceptible objects inside enclosed containers. These strips slowly release an insecticide vapor, providing prolonged protection. Infested furniture or similar objects can be removed from the building and treated in fumigation vaults. Some insecticides may cause staining or cause fabric dyes to run, so when in doubt, test the chemical on an inconspicuous part of the fabric before making a complete application.

Clothes Moths

The three types of clothes moths are webbing clothes moth - *Tineola bisselliella*, casemaking clothes moth - *Tinea pellionella* and the carpet moth - *Trichophaga tapetzella*. Clothes moths belong to the insect order Lepidoptera. They undergo complete metamorphosis from larvae to pupae then adults. Although many adult moths are attracted to lights, clothes moths are not. They hide when disturbed, and adults are rarely seen close to the source of infestation. Larvae of clothes moths spin silken webs, which may be the only sign of the pest's presence.

In past years, sheep treated with chlorinated hydrocarbon insecticides such as endrin, toxaphene, or DDT to protect them against external parasites, supplied insect-resistant wool. However, newly produced woolen items are more susceptible to clothes moth infestation because these persistent insecticides are no longer being used on sheep. As a result, there has been an increase in clothes moth problems, requiring other types of protective measures. Heavy reliance on synthetic fibers has helped reduce the clothes moth problem.

The larvae are the only damaging stage of these pests. Adults of the clothes moths do not feed and are short lived. Clothes moths are more limited in their diet than carpet beetles. The larvae of these moths feed mainly on contaminated wool and other materials containing keratin.

Identification

Clothes moths are small and delicate, rarely over 3/8 to 1/2 inch in length. Unlike most species, these moths are not attracted to lights, but prefer darkness, and when disturbed will rapidly conceal themselves in folds or other secluded places. Larval identification is best based on the feeding damage rather than specific morphological (body) characteristics. The carpet beetles can be identified in either the larval or adult stage. Adult carpet beetles can generally be separated by body shape, coloration and the presence or absence of a cleft at the rear of the forewings. The larvae are characterized by body shape and the arrangement of hairs and tufts of hairs on the body. Diagnostic characteristics of the adults and the larval feeding damage of lepidopterous fabric pests are presented below:

Webbing Clothes Moth, *Tineola bisselliella*

Larvae spins webs freely over feeding surface and produces tunnels or tubes for protection. Copious amounts of fecal material scattered throughout feeding area. Wings of adults are uniformly golden or buff colored.



Figure 4-5. Webbing clothes moth, *Tineola bisselliella*

Casemaking Clothes Moth, *Tinea pellionella*

Entire larval stage spent in case, case dragged behind larvae as new feeding areas sought. Case covered with fecal pellets or bits of woolen fiber. Adults are brown with three dark spots on each forewing.

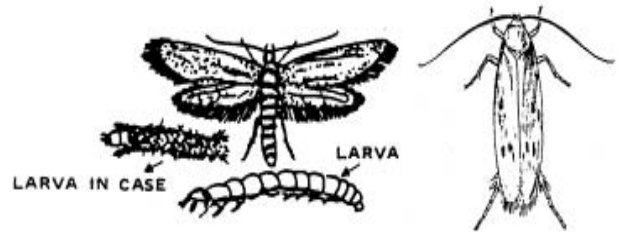


Figure 4-6. Casemaking clothes moth, *Tinea pellionella*

Carpet Moth, *Trichophaga tapetzella*



Figure 4-7. Carpet moth, *Trichophaga tapetzella*

Larval feeding damage similar to webbing clothes moth and frequently extends deeper into materials. In adults, the basal one-third of forewings is black, outer portions mottled white, black and gray.

Webbing Clothes Moth

The webbing clothes moth is the only species of clothes moth commonly encountered throughout the United States. It appears to be the most important fabric pest in the southern states. Like other moths, this species passes through four developmental stages. Under ideal conditions, it will complete one generation in 40 to 50 days. Under marginal conditions, this species may require up to one or two years to complete its development.

A newly emerged first instar larvae will wander until it finds a suitable place to feed (e.g., soiled place on woolen cloth). Unless conditions become unfavorable, it will settle down and feed at this location until approaching pupation. When the young larva finds suitable food, it spins a silken tube from which it feeds. This webbing is frequently covered with fecal pellets and cloth fibers, which is characteristic of this species.

Casemaking Clothes Moth

The casemaking clothes moth is distributed throughout nearly all of the populated areas of the world. This species is relatively rare in northern areas of the United States. The life cycle of this species is very similar to the webbing clothes moth. Unlike the webbing clothes moth, this species covers its body with a portable silken case. Once covered by the case, the entire larval period is spent within it, and it is dragged behind as new feeding areas are sought. The case is often composed of dried fibers interwoven with silk, creating a multi-colored effect. Unlike the webbing clothes moth, this species does not spin copious webbing over its food material. This species eats out well-defined, clean-cut holes. When the larval feeding is completed, it frequently crawls onto vertical surfaces to pupate. Consequently, it may be found on walls, partitions or other similar structures when pupating. Pupation occurs in the larval case.

Carpet Moth

The carpet or tapestry moth is not commonly encountered in the United States, but can occasionally become established and cause considerable damage to heavy fabrics and pelts. The larvae

normally feed in silk-lined burrows within the infested material. Damage is caused by both feeding and severing of fibers, which are used in construction of the burrows. There are usually two to three generations per year.

Clothes Moth Management

Control of clothes moths depends on preventing infestation, protecting fabrics and selectively using insecticides when necessary. Low humidity inside creates an environment unsuitable for clothes moth development. Building construction free of many tiny cracks and crevices also helps limit clothes moth problems.

Regular, thorough cleaning of susceptible clothing, carpets, closets and storage areas is an important factor in clothes moth control. Strong vacuums should be used to remove eggs and larvae. Clothing and other fabrics should be periodically shaken and brushed to remove these insects or their eggs with special attention given to seams, collars and cuffs. To avoid attracting moths, launder or dry clean soiled fabrics before storing or hanging in a closet. Whenever possible, store garments, blankets, linens and rugs in tightly sealed boxes or containers. Cold storage at temperatures between 40 and 42 degrees F, can further protect expensive clothing and furs. This is also effective in killing moths, if they are first exposed to rapid changes of temperature; for example, a sudden change from 50 to 18 degrees F before storage at 40 to 42 degrees F.

Pyrethrin insecticides provide quick knockdown of clothes moths. Most can be sprayed directly on fabrics if needed (in situations where fabrics cannot be laundered or dry cleaned). Some pyrethrin insecticides do not leave persistent toxic residues; therefore, they are especially suitable for clothes moth control. Use a residual spray along baseboards, margins of carpets, in closets and in storage areas. Also spray under furniture and other areas where moths occur. Before treating any fabric with an insecticide, test a small, inconspicuous part of the fabric to be certain the spray will not cause staining or running of dyes.