



HOME & GARDEN

Clothes Moths: Identification and Control in the Home

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Quick Facts...

Clothes moths are uncommon in Colorado mostly because of our dry climate.

It is the caterpillar stage of all clothes moths that damages clothing.

Caterpillars of clothes moths feed on wool, fur or feathers. They will not feed on cotton, silk or synthetic fibers.

Infested materials can be treated by temperature or by fumigant insecticides, such as paradichlorobenzene (moth crystals) or lavandin oil.

Tight-fitting containers can prevent reinfestation of clothes moths.

Very few insects have the ability to digest wool. Of these, larvae of the webbing clothes moths (*Tineola bisselliella*), casemaking clothes moth (*Tinea pellionella*), and various species of carpet beetles (*Dermestidae*) are found in Colorado. Almost all problems with clothes moths in Colorado appear to originate from insects brought in on woolen or furs from more infested areas such as Mexico or the southern Pacific.

Clothing damage more commonly occurs from carpet beetles (see fact sheet 5.549, Carpet Beetles), a common group of insects that scavenge around homes. Occasionally, field crickets (*Gryllus* spp.) may also incidentally damage woolen products.

Clothes moths develop on wool, furs and feathers. Materials that are well cleaned are less suitable than raw products or those that are soiled by perspiration, since important vitamins and mineral may be lacking. Clothes moths do not feed on clothing made of cotton, silk or any synthetic fibers.

Appearance

The adult stage of the webbing clothes moth is a small moth with a wing span of about 1/2 inch. It is uniformly pale golden in color with no unusual markings other than black eyes and a coppery tuft of hairs on the top of the head. Webbing clothes moth is a weak flier and rarely leaves dark closets or other storage areas.

The casemaking clothes moth is a slightly darker brown moth with faint dark spots on the wings. The fringe of hairs at the edge of the wing is quite pronounced on close inspection.

It is the caterpillar stage of all clothes moths that damages clothing. The webbing clothes moth is a creamy white color but often lives within a silken tube that it constructs. When full grown, it may reach 1/2 inch in length. The presence of silk and the pelleted droppings the insect produces are useful for diagnosis of clothes moths.

Clothes moths are sometimes mistaken for Indian meal moths (see fact



Figure 1. Webbing clothes moth. (Photo courtesy of Clemson University Cooperative Extension.)



Figure 2. Casemaking clothes moth. (Photo from the K. Gray Collection.)

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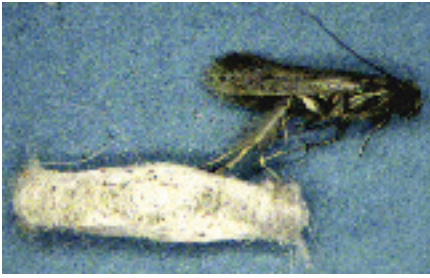


Figure 3. Casemaking clothes moth and cocoon. (Photo by W. Cranshaw.)

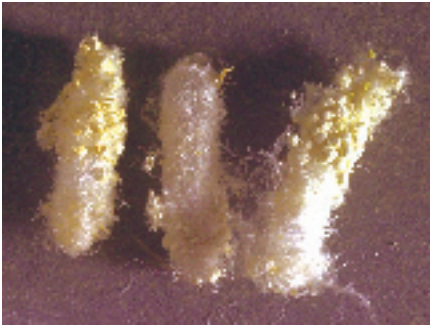


Figure 4. Cocoons of the casemaking clothes moths. (Photo from the K. Gray collection.)



Figure 5. Casemaking clothes moth larva. (Photo from the K. Gray collection.)



Figure 6. Casemaking clothes moth larva in case. (Photo courtesy of Clemson University Cooperative Extension.)

sheet 5.598, Indian Meal Moth). Indian meal moth is a common pest of pantry items and feeds on cereal products, nuts, herbs and similar items. Indian meal moth is slightly larger than webbing clothes moths but is easily differentiated from it by having a general brown coloration with darker brown wing tips.

Life History and Habits

Female moths lay their eggs within one to three weeks after they emerge. Eggs are glued to woolen threads so that they are not easily dislodged. The eggs do not remain dormant for long periods, although hatching is delayed by cool temperatures. It is a myth that eggs can remain dormant for long periods and suddenly produce new infestations.

The caterpillar (larva) stage feeds on wool soon after egg hatch. Often they construct a silken tube and feed in the vicinity of this shelter. Other times the larvae may continue to move across the fabric and only produce scattered patches of silk on which it rests.

The length of time that the larva feeds varies greatly. It depends on factors such as temperature, humidity and the quality of the woolens as food. Under ideal conditions, this stage may be completed in as little as five weeks; it can take up to two years.

When full grown, the larva spins a smooth case of silk and pupates within. It emerges from this stage as an adult moth in about 2 1/2 weeks. Mating and egg laying begins almost immediately after adults emerge from the pupal case. Adult moths do not feed and die within a month.

In the heat of a home, development can occur continuously which produces overlapping generations. Development of clothes moths is slowed on clean wool. Sometimes they are unable to complete their development on completely clean wool. This is because clothes moth larvae require Vitamin B and various salts as essential nutrients, and these are lacking in completely cleaned wool. However, perspiration, and many other kinds of fabric soiling can provide vitamin B and salts. Clothes moth attacks are typically focused on such soiled patches of cloth.

Clothes Moth Control

Exclusion Strategies

Most problems with clothes moths originate from infested materials brought into the area where other woolen articles are stored. Woolen material brought in from an area where clothes moths are problematic should be carefully examined and stored in a separate location (quarantined) before being placed with other woolens objects.

Tightfitting containers are most useful to prevent or limit infestations of woolen pests. Tightly closed bags or plastic containers can largely exclude insects that might damage woolens. However, since insects can develop within the containers, the stored woolens should be checked at least once a year to detect infestations.

The egg-laden female clothes moth rarely flies and almost always only walks or runs. Therefore hanging stored wool in a manner that prevents access by the crawling females reduces the probability of infestation. However, carpet beetles are strong fliers.

Cedar chests have long been recommended for use in clothes moths control. However, claims for the repellency of cedar compounds are frequently overstated. It is true that the heartwood of red cedar (*Juniperus virginiana*) contains volatile oils that kill clothes moth larvae, when the oils are in high concentration. However, these oils do not repel adult stages nor do they affect



Figure 7. Cases of the casemaking clothes moth among woolen carpeting. (Photo by W. Cranshaw.)



Figure 8. Damage to carpeting by webbing clothes moth. (Photo courtesy of Clemson University Cooperative Extension.)



Figure 9. Carpet beetle larva. (Photo by W. Cranshaw.)



Figure 10. Pupal skins of carpet beetle larvae. (Photo by W. Cranshaw.)

other woolen pests, such as carpet beetles. Furthermore, the effectiveness of cedar declines in older chests, as the concentration of the oils dissipates due to evaporation. One study suggests that chests more than three years are practically useless for killing clothes moth larvae.

On the other hand, a well-made cedar chest can exclude clothes moths. However, the newly hatched clothes moths are very small and theoretically capable of entering very small openings greater than 0.1 mm. In reality, covers that fit tightly and do not have woolen threads exposed around the opening to attract the egg laying moths are largely safe from new attacks. Established woolen infestations within an old cedar chest can continue to develop.

Temperature and Humidity Strategies

Freezing insect-infested wool or fabrics can kill clothes moths. Freezer temperatures less than 0 degrees F will almost always be lethal to insects following a 72-hour exposure. To increase the effectiveness of freezer treatments, insects should be first acclimated to room temperatures. Abrupt change from warm to freezing temperatures is important to control insects in woolens. Insects that are slowly cooled develop resistance to freezing. During freeze treatment, wool or woolen fabrics can be kept in a plastic freezer bag but attempt to remove as much air as possible before freezing.

Temperatures that are not lethal nevertheless can greatly slow insect development. Cold storage treatment used to be widely practiced for protection of furs and other valuable clothing articles that are susceptible to carpet beetles and clothes moths. Wool or fabrics can be similarly protected by storing them in cool locations within the home or even temporarily storing them in unheated outbuildings or garages.

High temperatures can also disinfest woolen materials from insects. Temperatures of 110 degrees F to 120 degrees F are generally lethal to all insects if maintained for 30 minutes or more. Periodically brushing woolen fabrics outdoors and exposing them to sunlight is also effective.

Clothes moths are very sensitive to drying conditions as well. Optimal relative humidity (RH) is around 75 percent. In RH less than 20 percent to 30 percent clothes moths will not survive. Storage of woolens under arid conditions typical of Colorado will almost always cause infestations to die out within a few generations. Dry storage of woolens is essential to any control program for clothes moths. Blowing dry air through the relatively moist wool used in spinning/weaving should also suppress and possibly control clothes moths.

Repellents and Insecticides

There are two products most often sold as 'repellents' for insects that damage wool. Naphthalene is the active ingredient of many 'moth balls,' less commonly sold as flakes. More commonly available is paradichlorobenzene (PDB), usually sold as 'moth crystals.'

Paradichlorobenzene is generally more toxic to insects than naphthalene, particularly for carpet beetles. At temperatures above about 50 degrees F it turns into a heavier-than-air gas that kills all stages of clothes moths and carpet beetles if maintained at high concentrations for 2 to 3 weeks.

Crystal formulations release gas at a faster rate than cakes or balls, but the release rate is greatly affected by temperature. PDB should be used in tight fitting containers or well sealed rooms to allow the gas to build up to toxic concentrations. Since the gas does sink, the PDB should be applied above the articles being fumigated. After fumigating, clothing or wool may be aired out, although there is no residual effect and new insects can readily reinfest the material.



Figure 11. Larva of a black carpet beetle. (Photo by W. Cranshaw.)



Figure 12. Furniture carpet beetle. (Photo by W. Cranshaw.)

Paradichlorobenzene will react with and melt some hard plastics, such as polystyrene and Styrofoam. Other plastics may also soften and melt following prolonged contact with PDB vapors including many plastic sweater boxes. (Polyethylene storage bags are not affected by PDB vapors.) A further precaution is not to use PDB for fumigating clothing that has plastic buttons or ornamentation.

Naphthalene is most often available as 'moth balls' and is an effective fumigant against clothes moths. Carpet beetles, however, are much more resistant to naphthalene and often are poorly controlled. Naphthalene is a fumigant, and is effective only if high concentrations of the gas are produced.

Naphthalene is best used by scattering the balls or flakes in layers throughout the fabric or wool that is being treated. However, in moist conditions, naphthalene may produce a reddish-brown discoloration due to breakdown by bacteria. Therefore it should be placed within paper or applied in some other manner so that it does not directly contact the wool or fabric. Naphthalene does not react with plastic as does PDB. However, it may corrode some metals.

In 1997, a plant-derived repellent, lavandin oil, received registration. It is marketed under the trade name OFF! Moth Proofer[®]. This is sold in a sachet form. It is designed to hang between clothes in closets or placed in storage chests.

Directions indicate use on clothes after they have been dry cleaned, so use under other conditions (such as stored wool or woven goods not easily dry cleaned) is unknown. However, lavandin oil is lethal to clothes moths. Use directions also indicate that the product should be used in a closed storage area to allow the lavandin oil to be in effective concentrations.

Information is not available on how well it assists in control of other insects, such as carpet beetles. Limited availability is the biggest limitation to expanded use of lavandin oil in Colorado.



Figure 13. A lavandin oil dispensing hanger for clothes moth control.