
CLOTHES MOTHS

Integrated Pest Management in the Home

The webbing clothes moth, *Tineola bisselliella*, (Figure 1) and casemaking clothes moth, *Tinea pellionella*, (Figure 2) can be fabric pests in California. They tend to hide when disturbed, so you might not notice you have an infestation until after the moths have already damaged your fabric, fur, or feathered items. Close examination of the objects will reveal silken webs the larvae have spun.

IDENTIFICATION

The webbing clothes moth is the most common fabric moth. The adult is gold with reddish-golden hairs on the top of its head. A row of golden hairs fringes its wings, which have a span of about 1/2 inch. Because these moths are weak flyers that aren't attracted to lights, you'll usually find them close to the infested items, such as in a dark area of the closet.

Don't confuse the clothes moth with common food- and grain-infesting moths, which frequently fly around the house. At rest, clothes moths are only about 1/4 inch long, while most food-infesting moths are about double that length. Clothes moths usually fly around only the immediate area of the house where the infestation has occurred, and their flight pattern is distinctive—they tend to flutter about rather than fly in a direct, steady manner as do food-infesting moths. Food-infesting moths also don't have the little tufts of hair on their head. To confirm you have a clothes moth, catch one and examine its head with a magnifying glass or hand lens.

The casemaking clothes moth is similar in size and appearance to the webbing clothes moth, although the wings of the casemaking clothes moth are more brownish and have faint dark-colored spots. Also, the hairs on its



Figure 1. Webbing clothes moth.



Figure 2. Casemaking clothes moth. The dark spots on the wings distinguish it from the webbing clothes moth.

head are lighter colored than those of the webbing clothes moth.

Larvae of both species are nearly identical, except the larvae of the casemaking clothes moth always carry a silken case with them as they feed (Figure 3). They never leave this silken case behind but enlarge it as they grow. They can feed from either end of the case and retreat into it when disturbed. This case takes on the color of the fabric the larvae have eaten (Figure 4). Webbing clothes moth larvae don't carry around feeding cases but may produce patches of silk webbing, which accumulate excrement and particles of fabric the larvae are feeding on (Figure 5), to create temporary feeding tubes. When webbing clothes moths move on to new feeding locations, they leave the feeding tubes and webbing behind.



Figure 3. Casemaking clothes moth with its case attached.



Figure 4. Cases from the casemaking clothes moth. Cases take on the color of the fabric being consumed.



Figure 5. Webbing clothes moth larvae with particles of excrement (frass) and other debris.

Excrement from both the webbing clothes moth and the casemaking clothes moth can contain dyes from the cloth fibers the moths have eaten, also making it the same color as the fabric.

PEST NOTES

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LIFE CYCLE

Females of both species lay an average of 40 to 50 eggs during a 2- to 3-week period and die once they've completed the egg-laying process. Males outlive females and continue to mate during the remainder of their lives. An adhesive secretion attaches the eggs to the fabric threads. Eggs hatch in 4 to 10 days during warm weather.

Larvae molt 5 to 45 times, depending on indoor temperatures and the type of food available. The larval period lasts 35 days to 2 1/2 years. Larvae are shiny white, and their head capsules are dark-colored. They spin webbing as they feed, with the webbing clothes moth creating a temporary silken feeding tube or tunnel and the casemaking clothes moth creating a permanent silken case that larvae carry with them as they move around. When larvae of the casemaking clothes moth are ready to pupate, they wander away from their food source to find crevices. With the webbing clothes moth, pupation takes place inside a silken cocoon, usually on the fabric.

Pupation lasts 8 to 10 days in summer and 3 to 4 weeks in winter. Heated buildings enable clothes moths to continue developing during winter months. Generally, developmental time for the clothes moth from egg to egg is between four to six months, and there are usually two generations a year.

DAMAGE

The webbing clothes moth is probably the most commonly encountered clothes moth in the United States. The casemaking clothes moth is less common and also of far less economic importance than the webbing clothes moth.

The larva is the damaging stage of the clothes moth. Both species feed on wool clothing, carpets, and rugs; upholstered furniture; furs; stored woolen items; animal bristles in brushes; wool felt pads in pianos; and fish meal in fish food. They will feed on synthetics or cotton blends if these fabrics also contain wool. Larvae might also use cotton fibers to make their pupal cases. Damage gener-

ally appears in hidden locations such as beneath collars or cuffs of clothing, in crevices of upholstered furniture, and in carpeted areas beneath furniture. Fabrics with food, perspiration, or urine stains are more subject to damage.

MANAGEMENT

Methods for controlling clothes moths include periodic dry cleaning or laundering, proper storage, freezing, heating, fumigating with dry ice, trapping, or insecticides. Keeping humidity levels low inside buildings creates an environment that isn't favorable for clothes moth development. Buildings that don't have numerous tiny cracks and crevices will also have fewer clothes moth problems. Good housekeeping practices are important as well. It is also important to regularly monitor fabrics and closets for clothes moths and their damage so you can take action when infestations are still small.

Although most people can manage clothes moth problems themselves, some infestations are best handled by a pest control applicator, who has the equipment, materials, and experience to deal with difficult control jobs.

Monitoring

To inspect for clothes moths, look to see if there are silken tubes in the hidden portions of clothes, such as under collars, or silken mats or patches on material. Both the silken tubes and mats often have fibers and feces incorporated into them. Check to see if you can find any sign of surface grazing of fibers, any holes, or both on the fabrics. With fur, look to see if you have some hairs clipped at their base, causing loose fur and exposed hide. Fully grown larvae of the casemaking clothes moth make cigar-shaped, open-ended silken cases that are about 3/8 inch long, often with pieces of infested material incorporated into the case. The case containing a live larva is often attached to the infested material at one end.

Pheromone traps, discussed below in Trapping, are also very useful for detecting clothes moths.

Preventing or Reducing Infestations

Periodically cleaning areas in your home that can harbor clothes moths can prevent or control infestations. These areas include seldom-cleaned spots such as beneath heavy pieces of furniture; along baseboards and in cracks where hair and debris accumulate; in closets, especially those in which woollens and furs are kept; and inside and behind heaters and inside vents.

The vacuum cleaner is the best tool for most of this cleaning. After using it in infested areas, dispose of the bag's contents promptly, since it can include eggs, larvae, or adult moths.

Clothes moths might initially establish themselves on woolen garments or scraps stored for long periods. In addition to properly storing woolen items (See Protecting Items in Storage.), periodically hang them in the sun and brush them thoroughly, especially along seams and inside folds and pockets. Brushing destroys eggs and exposes larvae. Larvae don't like bright light and will fall from clothing when they can't find protection.

If the infestation is in a closet, be sure to remove and clean all clothes and fabric that were stored inside and thoroughly vacuum and wash the inside of the closet, especially all cracks and crevices, before returning the cleaned clothes. Dust insecticides containing pyrethroids or pyrethrin (e.g., 0.05% deltamethrin or 1% pyrethrin) can be applied in the cracks and crevices. Always follow the label requirements when applying these dusts.

Dry Cleaning and Laundering

The most common and effective method for killing all stages of clothes moths in clothing, blankets, and other washable articles is to thoroughly launder them for 20 to 30 minutes in water that is at least 120°F. Because many woolen items shouldn't be washed in hot water, sending your items to a dry cleaner might be the only suitable option. Keeping fabrics clean has another

advantage—insects are less likely to feed on clean fabrics than on heavily soiled ones.

Protecting Items in Storage

Clothes moths often damage improperly stored articles. When storing susceptible items, be sure they are clean and pest free, and place them in an airtight container. You can place insect repellents such as herbal oils into the storage container, but little is known about their effectiveness.

Moth balls, flakes, or crystals containing 1,4-dichlorobenzene (also called paradichlorobenzene) also are available for protecting clothes in storage. Because these materials are toxic, be sure to keep them away from children and pets. These products have other shortcomings as well. They leave an unpleasant odor on clothes and other cloth objects, and if these products come into contact with plastic buttons, hangers, or garment bags, they can cause the plastic to soften and melt into the fabric.

As these chemicals evaporate, they produce vapors that, in sufficient concentration, will slowly kill insects. The vapors build up to the required concentration only in an airtight container. If the container isn't airtight, the chemicals only somewhat repel adults, and any larvae already on clothes continue to feed.

The effectiveness of cedar chests and closet floors made of cedar is debatable. Aromatic eastern red cedar, *Juniperus virginiana*, contains an oil that can kill small larvae, but it doesn't affect large larvae. After several years, however, cedar loses this quality. Having a tightly constructed chest is more important in the long run than the type of wood used to make it.

Freezing and Heating

You can also control clothes moths by heating the infested item in an oven for at least 30 minutes at temperatures higher than 120°F, enclosing the item in a plastic bag and placing it in a

freezer for several days at temperatures lower than 18°F, or fumigating the item with dry ice. Before using any of these methods, consider if cold or heat will damage the fabric. For more information, see the Household Furnishings section.

Trapping

Trapping is a relatively easy-to-use technique that helps to detect and reduce a webbing clothes moth infestation. Pheromone traps are available to trap both the webbing clothes moth and the casemaking clothes moth. Pheromones are chemicals an organism produces—in this case a sex attractant—to affect the behavior of other members of the same species. The sex pheromone attracts male moths into the trap where they get stuck on the sticky sides. Because the pheromone specifically attracts clothes moths, it won't attract other moth species. Conversely, pheromone traps for other species such as grain-infesting moths won't attract clothes moths. Pheromone traps for clothes moths are available at major hardware stores.

Place traps in closets and other clothes-storage areas. Trapping not only enables you to detect the presence of clothes moths but provides some control, because trapped males can't mate. However, if you trap moths, you should also take other measures, such as dry cleaning or laundering, to protect clothes exposed to moths.

Using Insecticide Sprays

If you have clothes moths but the articles can't be dry cleaned, laundered, heated, frozen, kept in cold storage, or fumigated with dry ice, you can spray them with an insecticide. Find a product that lists clothes moths on its label, and follow the directions exactly. Insecticides for clothes moths usually contain pyrethrins, which provide quick knockdown of clothes moths. You can spray most of these products directly onto fabrics. Always follow the instructions in the product

label. Pyrethrin insecticides don't leave persistent toxic residues, which makes them more suitable for clothes moth control in many cases than a lot of other products.

Some insecticide sprays have an oil base, so don't spray them on silk, rayon, or other fabrics that stain easily. Also, don't use them around open flames, sparks, or electrical circuits, and don't spray them on asphalt tile floors.

For surfaces you suspect might stain, first spray a small, inconspicuous area and let it dry to see if staining occurs. Widespread or heavy infestations often require the services of a professional pest control applicator.

Special Situations

Rugs, carpets, furs, and household furnishings require special attention to protect them from clothes moths. However, rugs and furnishings made entirely of synthetic fibers aren't affected; this includes most wall-to-wall carpeting.

Wool Rugs and Carpets. Closely inspect beneath heavy furniture and along carpet edges for infestation. You can dry clean area rugs or hang them out in the sun and then vacuum them. Pull back the edges of infested wall-to-wall carpets, so you can apply an insecticide to both sides. Spray the upper surface of the carpet lightly to reduce the possibility of staining. If the rug pad contains animal hair or wool and hasn't been treated by the manufacturer, spray it as well. It is better to wait until the rug has dried before putting any weight on it.

Fur. Applying protective sprays to furs isn't recommended. If you store furs at home during the summer, protect them with moth crystals, flakes, or balls, or frequently shake and air the items. Furs in commercial cold storage receive professional care, and you can insure them against damage.

Household Furnishings. Some furniture, mattresses, and pillows are stuffed with animal products such as

hair or feathers. When clothes moths get into the stuffing, you won't be able to control them simply by spraying the outside surface of the item. The best way to eliminate the moths is to fumigate the item with dry ice or have a pest control or storage firm treat the infested item with lethal gas in a fumigation vault.

To fumigate an object with dry ice, place the item and the ice into a thick (4 mil) plastic bag. Don't handle dry ice with your bare hands, because it will quickly freeze your skin. If you use a plastic bag with a 30-gallon capacity, a 1/2- to 1-pound piece of dry ice should be adequate. Seal the bag loosely at the top until all of the dry ice has vaporized; this will allow the air to escape and keep the bag from bursting. When the dry ice is gone, tighten the seal, and let the bag sit for three or four days. Proper fumigation gives quick, satisfactory control and kills all stages of clothes moths, although it doesn't prevent reinfestation.

Sometimes felts and hammers in pianos become infested and so badly damaged that it seriously affects the tone and action of the instrument. Contact a piano technician, who might recommend synthetic felt replacements.

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original, labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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