



Guide to the control of clothes moths and carpet beetles



In nature, clothes moth and carpet beetle species perform a useful role in eating refuse matter such as feathers, hides, fur, beaks and horn, not eaten by other animals or insects. These insects become pests only when they enter homes or buildings, and feed on textile products derived from animal fibres such as wool, mohair and fur, where they may cause serious damage. Normally, long-lasting wool textiles such as carpets, blankets, upholstery fabrics and wool insulation have insect resist treatments applied during manufacture. However, some goods escape treatment, or are undertreated, and are thus vulnerable to attack by these insects. Information given below will assist in identifying textile pests, assessing the extent of infestations and controlling minor infestations.

Textile pests encountered in Australia

The clothes moth species occur most frequently in the coastal areas of the continent, where the more humid conditions are favourable for their development. Carpet beetles are widely distributed and more likely to be found inland than clothes moths. At least ten species of textile pest have been recorded in Australia, however only a few of these, mainly the introduced species, are commonly encountered.

Frequently encountered species

Case-bearing clothes moth, (Fig. 1 *Tinea translucens* and other closely related *Tinea* species)

Common or webbing clothes moth, (Fig. 2 *Tineola bisselliella*)

Variiegated carpet beetle, (Fig. 3 *Anthrenus verbasci*)

Rarely encountered species

Brown house moth (*Hofmannophila pseudospretella*)

Tapestry moth (*Trichopaga tapetzella*)

Australian carpet beetle (*Anthrenocerus australis*)

Furniture carpet beetle (*Anthrenus flavipes*)

Black carpet beetle (*Attagenus piceus*)

One species of the case-bearing clothes moth, *T. translucens*, (Fig. 1) prefers a warm climate and this insect is a major textile pest in Queensland and northern NSW. The common clothes moth *T. bisselliella* (Fig. 2) and to a less extent the other case-bearing clothes moth species are major textile pests in NSW and Victoria. The carpet beetle *A. verbasci* (Fig. 3) is widely distributed in cooler areas. *Hofmannophila* is only found in cold wet climates, while *A. flavipes*, *A. Australis* and *A. piceus* prefer hot climates.

Life cycle

All textile pests have four stages to their life cycle:



Only the larval stages of these insects feed on animal fibres. The duration of each stage varies appreciably between species, and also depends on the feeding conditions, temperature and humidity. Constant temperatures (20-30 °C) and high humidities shorten the life cycle and thus enhance the multiplication rate of the insects. Further details of the stages of the life cycle of the major textile pests are given below.

Eggs - These are small (0.5-1.0mm), of a white to cream translucent appearance, fragile and very difficult to observe except on a smooth dark background (Fig. 1 and 2). Eggs of the clothes moth species hatch in 5-10 days but those of the carpet beetles require 14-28 days to hatch.

Larvae - The clothes moth larvae (Fig. 4 and 5) are cream coloured caterpillars with a brown head. This stage is by far the longest stage of the life cycle; it may be as short as two months in a warm-humid climate (Queensland) and as long as six months in a cool climate (Victoria, Tasmania). Larvae of the carpet beetles (Fig. 6) are distinctively different from those of the clothes moth species. They appear more like beetles than caterpillars and have numerous stiff red-brown or dark bristles. They undergo several moults during growth to maturity so that cast skins are numerous in infested areas. The larval period of the carpet beetle is considerably longer than that of the clothes moth species being in the order of 9 months under favourable conditions.

The droppings of clothes moth and carpet beetle larvae are characteristic and provide a useful guide in gauging the presence and extent of infestations of these pests. The droppings are often wrongly identified as eggs. They are larger than eggs (1.0-1.5mm) being more readily visible, and are brittle, resembling coarse sand in appearance (Fig. 4 and 5). The colour of the droppings is usually similar to that of the textile material being eaten.

Pupae - This is the inactive stage of the insect where transformation from the larva to an adult (moth or beetle) occurs. The length of the pupal stage is about 8-12 days for clothes moth species and 14-20 days for carpet beetle species. Cool conditions prolong these times.

Adults - The moths and beetles emerge from the pupal cases, mate and lay the majority of eggs (on a suitable

feeding medium) within 10 days. The life span of the moths is usually less than 14 days and for the beetles in the range 20-40 days.

Descriptions of the major textile pests

To assist in identifying the more common species of textile pest some characteristics of the larvae and adults are outlined in the table. Despite their names, clothes moths can attack carpets and carpet beetles can attack clothes.

Carpet Beetles - Larvae of the carpet beetle (Fig. 6) do not construct cocoons or tubes. The larvae moult several times as they grow and their cast skins accumulate in infested areas. Adult carpet beetles usually emerge in spring or early summer. They often attempt to migrate outside before or after laying eggs to feed on pollen and may be found on window sills.

Clothes moths - The case-bearing clothes moth (Fig. 4) is easily recognised by the small sturdy cocoon or case that the larvae build and live within. They transport the case with them, the grub protruding about half-way from it to crawl and feed. As they approach the pupal stage many of the grubs migrate upwards on walls, ceilings, furniture and drapes and attach their cases so that they protrude from an elevated position. The adult, (Fig. 1) a small grey-brown moth with three spots on its forewings, emerges from the case, mates and deposits eggs back on the feeding material thus producing a new generation.

In contrast, the common clothes moth (Fig. 5) constructs a network of tunnels (tubes) and cocoons from silken threads and the grub moves and feeds within this structure making it more difficult to see. It rarely migrates far from the point where the egg was deposited. Pupation occurs in the general area of larval feeding and the adult, (Fig. 2) a small golden-buff coloured moth without distinctive wing markings, emerges to mate and deposit eggs back on the feeding medium. Adult clothes moths dislike light and when disturbed tend to scurry over the surface towards areas of darkness where they will deposit their eggs.

The complete life cycle of the clothes moth species is considerably shorter than that of the carpet beetle so that over a given period of time they will generate a larger number of progeny. As a result, the clothes moth species can cause faster and more extensive damage on carpets or stored woollens.

Recognising infestations in carpets

Wool carpets and wool thermal insulation that have escaped insect-resist treatment during manufacture are the main source of infestations of textile pests in homes and buildings. Because clothes moth and carpet beetle larvae feed deep in the carpet pile in dark and undisturbed areas, infestations may go undetected for years, particularly if the areas are not regularly cleaned. On carpets, significant damage usually only results if a population is able to breed and multiply over at least two generations. If an infestation is suspected it may be confirmed by the following approach:

1. Move heavy items of furniture to expose carpet underneath. Look for moths that may scurry or fly from behind or underneath furniture.
2. Part the carpet pile to expose the backing in several areas under furniture, around skirtings and in corners, and examine for the presence of insect droppings (Fig. 4 and 5).
3. Examine the surface of the carpet in the same areas for loose or eaten pile and insect debris such as silk threads, cocoons, tubes, cases and cast skins. Carpet pile will be removed on vacuuming in areas of severe infestation.
4. Examine walls, behind furniture, ceilings, picture rails, etc., for small cases that may be attached in these areas.



Recognising infestations in stored woollens

Wool textiles in frequent use and regularly washed or drycleaned are unlikely to suffer damage from textile pests unless infestations occur nearby. Untreated woollens stored unprotected in cupboards for several months are more prone to insect damage.

Unlike carpets, fabrics, blankets and knitted goods can be visibly damaged by migration of a relatively few larvae, or by the larvae hatching from eggs laid by a single female adult. Insect damage to fabrics and fine knitted goods usually takes the form of irregular shaped holes where yarns have been completely severed and eaten, much like the damage small caterpillars can do to leaves of plants. If the feeding medium is not entirely palatable, the insect may confine its feeding to the surface nap so that yarns are only partially severed and holes do not appear. In any case, the presence of textile pests will be indicated by insect debris (droppings and/or silk threads) around the damaged area.

Control measures against textile pests

Control measures for eradicating infestations from carpets and from stored woollens are quite different.

Carpets - Carpets are only seriously damaged by large numbers of larvae that have been allowed to build up over at least two generations. If detected at an early stage, the infestation is likely to be confined to a few isolated areas in one room. A serious infestation would be one in which areas of carpet pile have been visibly damaged, extending along skirtings and over larger areas, even to other rooms. A professional pest-control operator experienced in treating carpets should be consulted when an infestation is considered widespread and serious.

Good housekeeping practice is imperative in controlling textile pests. Regular vacuuming along skirtings, under furniture and in corners will discourage the insects and reveal attack at an early stage. Minor infestations in carpets or rugs may be controlled as follows:

1. Determine the areas of insect activity and thoroughly vacuum. The contents of the vacuum cleaner should be thoroughly sprayed with an aerosol insecticide before disposal.

2. Treat the infested areas, extending 15 cm beyond the boundaries of insect activity, with an insecticidal aerosol surface spray or dust following the manufacturer's directions and precautions. With the dust, apply it at the rate of 15-20 g per square metre and brush well into the pile. The aim is to get active material to the base of the pile in the affected areas. Follow with a heavy spray of an aerosol fly spray into the atmosphere of the room or around the infested area, or use a 'flea bomb' to control adults that may have moved from the main area of infestation. Close all windows and doors and vacate the room for several hours.

3. Examine the area for live larvae after 14 days and if detected, repeat the treatment. There are several precautions to take with this treatment regime. Aerosol surface sprays may cause staining of light shades, or soiling of areas of carpet that carry foot traffic. Spray lightly in these areas. Dusts do not give rise to these side effects but they are quickly removed by vacuuming. Aerosol sprays and 'flea bombs' may be extremely toxic to fish and should not be used near aquaria. Do not use sprays or dusts when there is a possibility of an allergic response.

A pest control operator, in controlling a serious infestation, is likely to apply a spray to the surface of the carpet or perform a fogging or fine dry spray treatment. In the former case a wettable powder spray is normally employed. Wettable powders are unlikely to stain or increase soiling of carpets, but they may produce a visible surface residue on dark shades which can be removed by brushing into the pile. In areas subject to regular vacuuming the durability of wettable powders is limited. Spraying with self-emulsifiable concentrates may give more durable protection, however the risk of staining or enhancing the soiling rate of the carpet is greater.

Stored woollens - Items requiring storage for several months should be washed or dry-cleaned and tightly sealed in plastic bags. Any infested goods can be cleared of insects and eggs by washing in hot water (50-60°C), or dry-cleaning. This will remove most insects and eggs. Insects and eggs can be killed at temperatures above 60 °C for 15 - 30 minutes. For items of clothing or rugs, this can be achieved by wrapping the item in a dark plastic bag and leaving it in direct sunshine. Use a thermometer inside the goods to check that the required temperature has been reached. It is the heat, rather than the sunlight that kills the insects. This treatment does not provide any durable protection against fresh insect attack, and it is important to seal the garment in plastic, and to search for, identify and remove sources of infestation from the area. Empty the storage area and treat shelves, floors and sides with an aerosol surface spray. Again beware of possible staining of goods. Direct use of surface sprays or other aerosol sprays onto clothing is not recommended because of the danger of discolouration or staining. Home remedies such as 'mothballs', camphor, cedarwood, lavender and other herbal agents vary greatly in their effectiveness, however all are improved when they are used in airtight containers.

Suggested insecticides

The following insecticidal formulations are provided as a guide for controlling infestations of textile pests.

Mention of a particular product does not constitute a guarantee of its effectiveness or a CSIRO endorsement in preference to other similarly formulated products. These products should only be used in minimum quantity in response to need, and in accordance with safety instructions as supplied by the manufacturer. Small sections of carpet or fabric should be tested for staining. Some of these products may be harmful to fish. It is possible to control carpet pests with minimum application of pesticides by carefully monitoring for appearance of adult insects (small golden moths, grey/brown adult beetles on window sills in spring) and then by timing applications to prevent damage.

Householder Use

Aerosol spray cans and hand spray guns are useful for controlling small infestations.

Any aerosol 'Surface Spray' containing permethrin or cypermethrin active ingredients (available in most supermarkets)

A 'one shot' fumigation aerosol spray device ('bomb') containing permethrin, preferably also containing an additional insect growth regulator (available in most supermarkets)

Protection may last up to 1-2 years depending on the application rate and efficiency of application.

Professional pest controllers

Products containing modern pyrethroids including permethrin, cypermethrin or deltamethrin should give 1-2 years of protection or more on carpets in areas out of direct sunlight. Formulations will differ in their likelihood of causing staining and soiling in wear.

Microcrystalline suspensions

Good durability

Products based on deltamethrin may be advantageous as the solid may eventually brush to the base of the pile in carpets where it will be most effective. These formulations may be less prone to soiling.

Wettable powders

May be prone to removal by vacuuming, but should provide durable protection under furniture.

Expected to be relatively non-staining and should not exacerbate soiling.

Brush powder to base of pile after the treatment has dried.

Emulsifiable concentrates

Good durability

May cause increased soiling where there is foot traffic depending on formulation

Decomposition products may produce stains on light coloured goods some time after application.



Fig. 1. Adult case-bearing clothes moth and eggs. The three dark spots on each wing are characteristic of this moth.



Fig. 4. Larvae of the case-bearing clothes moth illustrating the insect droppings.



Fig. 2. Adult common clothes moth and eggs. Wings are unmarked and have high lustre.



Fig. 5. Larvae of the common clothes moth showing insect debris and attached droppings.



Fig. 3. Adult variegated carpet beetles showing the mottled appearance of the wings and body.



Fig. 6. Larvae of the variegated carpet beetle illustrating the transverse stripes and tail bristles characteristic of this species.

Description of Major Textile Pests

	Case-bearing clothes moth (<i>Tinea</i> species, Fig. 1)	Common clothes moth (<i>Tineola bissellieta</i> , Fig. 2)	Variegated carpet beetle (<i>Anthrenus verbasci</i> , Fig. 3)
Larvae			
Length	7-10 mm	10-12 mm	4-5 mm
Appearance	Cream caterpillar with dark brown head.	Cream translucent caterpillar with dark brown head	Resembles beetle more than caterpillar. Has numerous lines of stiff red-brown or dark brown bristles protruding from its body.
Behaviour	Caterpillar lives in small case or cocoon its entire life, and carries this around with it; prefers undisturbed areas.	Caterpillar lives in network of tunnels or tubes it constructs, and is difficult to see; prefers undisturbed areas.	Does not construct tunnels or cocoons or leave silk threads.
Adults			
Length	7-10 mm	8-10 mm	2-3 mm
Appearance	Small greyish-brown moth usually dark in colour with three distinctive spots on its forewings.	Golden-buff small moth without wing markings.	Very small beetle similar to ladybird in size and shape; brown, grey and black mottled back.
Behaviour	Dislikes light and frequents dark areas. Often scurries across surface instead of flying when disturbed.	Similar behaviour to adults of <i>Tinea</i> .	Very slow moving. Usually seen in spring and early summer. Often fly to windows and attempt to get outside to pollen on flowers.
Life Cycle	3-8 months	3-8 months	9-12 months