

# Fumigants & Pheromones

Digital Newsletter Delivered by Insects Limited, Inc.

Issue 172

## Black Carpet Beetle, *Attagenus unicolor*: A Pest of Carpets and Dried Food



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When the common name of an insect includes what it likes to eat, (think **clothes** moths, **flour** beetles, saw-toothed **grain** beetles, etc.) you know that those items are particularly at risk of being eaten by that specific species.

While carpets made from wool are a fond food source for black carpet beetle larvae, carpets are only one menu item in a long list of potential foods for this pest. Somewhat surprising to many is that black carpet beetles are a common pest on grain-based, dried food goods. A 2001 University of California publication on carpet beetles went so far to say that in California and other arid regions, black carpet beetles are a greater stored food pest than they are a textile pest.

[Black carpet beetles](#) have plenty of close relatives that eat animal fibers (wool, feathers, fur, etc.) as well as stored food products containing grains and seeds. Black carpet beetles are a proud member of the insect family Dermestidae. Dermestids are a group of approximately 700 – 1000 species of beetle that includes textile pests such as; [varied carpet beetle](#), *Anthrenus verbasci*, and furniture carpet beetle, *Anthrenus flavipes*, as well as food pests such as; [warehouse beetle](#), *Trogoderma variable* and khapra beetle, *Trogoderma granarium*.



Black carpet beetle larvae can feed on either side of the textile/dried food divide, making them difficult to control through food source elimination

Black carpet beetles and varied carpet beetles both, can feed on either side of the textile/dried food divide. This wide variety of acceptable food sources makes them particularly hard to control through food source removal alone.

In an attempt to know our enemy better to assist us in eliminating it, let's take a look at this insect's biology. The adult beetles are attracted to sunlight and will feed on the pollen from flowering plants like spirea, crape myrtle and buckwheat. Outdoor areas around these flowering plants are where the adults typically find a mate. Black carpet beetles exhibit sexual dimorphism, meaning that adult males and females have distinct differences in their appearance. The adult male can be distinguished from the female by looking at the tip of the

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antennae. The tip of the male's antenna (see below) is twice as long as the tip of the female's antenna. The adults range in size from a little less than 3 mm up to 5 mm (1/8 in – 3/16 in) in length. The shiny black or dark brown adults with brownish legs will live for approximately 1 month. Adult females can lay up to ~50 eggs in their adult life span and those eggs will hatch in 6 – 10 days.



**Black carpet beetle male antenna**



**Black carpet beetle female antenna**

*Comparison of male and female antenna of the black carpet beetle, *Attagenus unicolor**

The larval stage is the damaging stage of this insect regardless of if they are feeding on textiles or dried food goods. Adults will only feed on pollen or nectar and do not damage materials. Some of the materials that larvae have been known to feed on are; woolen rugs and other woolen materials, dried animal carcasses, felt, fur, animal hides, debris in bird nests, milk powder, dried peppers, spices, seeds, grains and flour. The carrot-shaped larvae can range in color from light brown to nearly black and can be as long as 13 mm (1/2 in) (See image below). The larvae have a long tuft of hairs that extends away from their tail end which makes them distinct from other dermestid beetle larvae. The larvae will scatter into dark areas when exposed to light.

Copious amounts of shed skins that resemble the live larvae that are deposited on the materials damaged by black carpet beetles makes the job of the pest technician a bit easier when trying to identify what caused the damage.

[Black carpet beetles](#) and [varied carpet beetle](#) adults and larvae can be monitored using Insects Limited's All Beetle AA Carpet Beetle Kit: <https://www.insectslimited.com/store/p/all-beetle-aa-carpet-beetle-kit>

This monitoring kit uses a combination of sex pheromones for the adults and food attractants for adult females looking to lay eggs and for hungry larvae of either sex that are looking for food to eat.

The "AA" in the kit name stands for the carpet beetle's scientific names of *Anthrenus* and *Attagenus*.

Locating the source of this pest beetle with these monitors can help you remove the source and can verify that you have solved the issue after removing the source.

**Literature references:**

*University of California – Pest Notes 2001:* <https://ucanr.edu/sites/ucurbanpest/files/238996.pdf>  
*Handbook of Pest Control – Mallis (2011) pp. 701 - 703*



*Black carpet beetle larva with the long tuft of hairs coming off of the tail-end, Photo: P. Kelley*



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## Clothes Moth Management



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Webbing clothes moths belong to the family Tineidae which contains over 3,000 species and is collectively known as the clothes moth or fungus moth family.

Many moth species in the Tineidae family look very similar to one another. In many cases, proper identification requires dissection of the abdomen to view the genitalia structure to determine the exact species.

Mark Metz with the USDA used this technique to determine a new species of clothes moth *Niditinea sabroskyi*, which has been historically misidentified as the brown-dotted clothes moth, *Niditinea fuscella*.

### Identification

Luckily [webbing clothes moths](#) can be identified by their appearance and without dissection. Webbing clothes moths can be identified by their single tone of creamy white to shiny gold coloration with no spots. They have a tuft of hair-like scales on their head that are usually golden to reddish brown. They vary in length from 5–8mm with a wingspan between 9-16mm. The wings are held at a tent-like angle over the abdomen when at rest. The antennae are threadlike and about three-quarters the length of the hindwing. The [casemaking clothes moth](#), *Tinea pellionella*, is another economically important clothes moth species. The casemaking clothes moth can be differentiated from the webbing clothes moth by their darker brown wings with spots. Webbing clothes moths got their name by the webbing the larvae spin. Larvae will produce crude tunnels where they mesh together food particles, fecal pellets, and cast skins with the webbing they produce. This behavior is different from the casemaking clothes moth larvae who produce a portable protective case that they carry with them.



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## Life History

[Webbing clothes moths](#) can complete their life cycle on average 50 – 150 days depending on temperature, humidity, and food availability. Clothes moths who have more favorable conditions complete their life cycle at a quicker rate which allows populations to grow exponentially causing infestations, product damage, and contamination. Conversely, unfavorable conditions slow down the clothes moth life cycle which allows some of the insect life stages to live for a longer period but reduces the risk of infestation. Webbing clothes moth adults live for 15-30 days whereupon mated females can lay 40-50 eggs individually or in groups. Eggs hatch in 4-10 days in warmer months and up to 30 days in cooler months. The larvae then feed and become mature in 35 days or as long as 30 MONTHS depending on food quality, temperature, and humidity. Pupation will occur in infested materials and emerge as adults in 8 to 40 days depending on temperature. In unfavorable conditions and poorer diets such as feathers and human hair, development can take OVER A YEAR OR TWO to be completed.

When looking for signs of clothes moth infestations, look for the granular frass the size of ground pepper or white webbing tunnels on or around items they are suspected to be feeding on such as fabric, furs, taxidermy mounts, hanging clothes in closets, wool rugs, carpets, and upholstered furniture when rips or tears expose stuffing.

[Pheromone lures and traps](#) can be used to monitor webbing and casemaking clothes moth activity. Pheromone monitors provide very useful information about insect activity, such as the detection of insects, insect species, population trends, and locations of infestations.



Ethan Estabrook, BCE



Ethan Estabrook, BCE

## Pheromones

The chemicals produced in a [clothes moth pheromone lure](#) have compounds that attract the males of both webbing clothes moth and casemaking clothes moth. This pheromone lure mimics the natural compounds that female moths emit when attracting a male mate. Because of this interaction, pheromone lures will only attract male moths and will not attract females. Pheromone lures elicit a behavioral response, and you cannot depend on that behavioral response to catch all males in a population. Some males may not be actively looking for a female to mate with, or there may be competing pheromone trails with other female clothes moths that lead a male away from the pheromone lure. Wind direction could also be interfering with the pheromone plume making it difficult for the male to find a lure. It is important to use pheromone lures as a detection and monitoring tool. Once clothes moths are detected the goal is to figure out where they are coming from. You can use pheromone lures to help identify suspect areas where more moths are captured. Once you determine a suspect area, inspect items that contain wool, fur, or feathers. These items are more than likely the food source of clothes moth larvae.

## Locating the Source

I think it is important to share some of our experiences of what we have seen clothes moths feeding on. This may help you better identify where the source of [clothes moth](#) activity is coming from and ultimately allow you to manage and control these insects. I have broken down items into four different categories to be on the lookout for:



Wool, Fur, Feathers, and Miscellaneous.

For wool, inspect wool or Persian rugs and wool carpet padding. Wool clothes including sweaters, jackets, hats, suits, and socks. Wool blankets. Wool wall decorations like macrame, tapestries, and Native American artwork. Upholstered furniture containing wool especially if the furniture has tears or is damaged. Wool yarn. And even piano hammer felt on the inside of pianos.

For furs, inspect taxidermy, animal hide rugs, and fur clothing. Accumulations of pet hair and human hair especially in undisturbed areas where they have been able to accumulate over time. Horsehair plaster, which was a common practice in older, historic homes. And dead animals such as a mouse or squirrel that may have died in a wall void, crawl space, or beneath wooden floors.

For feathers, inspect taxidermy birds, feather or down comforters, pillows, sleeping bags, or quilts especially ones with tears or openings. Feathers incorporated into artwork including Native American art, contemporary art, or children's art. Bird nests or a dead bird inside wall voids, garages, crawl spaces, or ceiling voids. And organic fertilizers like feather meal, which is actually what we feed our clothes moth colonies.

And finally, for miscellaneous, inspect areas with accumulations of dead insects like windowsills or window vents. Cricket powder or flour can be suspect, which has become more popular in baking. Dried insects which are used as bird or reptile food. And pet toys that include items like horns, hoofs, and antlers.

## Treatment

Isolating and bagging an item can further help identify if clothes moth activity is present. Place the suspect item on white paper in an airtight polyethylene bag. After a couple of weeks, inspect for signs of insect activity such as live insects, cast skins, frass, or webbing on the white paper or at the bottom of the bag.



Once you identify the source of a clothes moth infestation or a suspect item they may be feeding on, there are several ways to treat it. Washing and drying clothes on high heat and then storing those clothes in an airtight or the [GreenWay Moth-Resistant Garment Bag](#), can help prevent future clothes moth infestations on clothes.



Consistent disturbance by vacuuming areas where clothes moths are suspected to be will not eradicate moths, but help reduces potential food sources like pet and human hair which will ultimately reduce populations.

Storing items in a freezer for 7 days will kill all clothes moth life stages. Products like the [GreenWay Freezer Bag](#) can help protect items during a freezing treatment. Increasing heat to 130-140 degrees Fahrenheit for 3 hours will also kill all clothes moth life stages. This could be as simple as storing suspect items in a hot car during the summer, purchasing a solar bag like ZappBug from Amazon, or teaming up with a pest management professional to bring in industrial heaters to perform a heat treatment on a room of a house.

[Anoxic treatments](#) are another option that adjusts the atmospheric gases and reduces oxygen concentrations to below 1% for 21 days. Anoxic treatments are common treatments for museum artifacts and require airtight control chambers.



Fumigation can also be used to eradicate all life stages in the shortest amount of time but is also the most dangerous and expensive means of treatment. Fumigation involves teaming up with a pest management professional and using products like phosphine at 500 -1,000 parts per million for 72 hours when temperatures are above 70 degrees Fahrenheit. Sulfuryl fluoride can also be used at around 500 – 1,000 CT for 24 hours when temperatures are above 80 degrees Fahrenheit. There are also other pesticide options such as pyrethroids, insect growth regulators, organophosphates, boric acid, or diatomaceous earth that can be used to treat clothes moths. Make sure to read and follow the label when using any type of pesticide.

It is important to [Start with the Insect First!](#) Identifying the clothes moth species and understanding their biology is the first step to an effective integrated pest management program.

Once the clothes moth has been identified, inspect areas for ideal food sources such as wools, furs, or feathers.

[Pheromone lures and traps](#) are great tools to monitor and help identify the source of infestation.

Finding and treating the source can help pest management professionals solve a difficult pest problem to help protect household items like your favorite wool sweater to museum artifacts of historical importance.

If you have any clothes moth or pheromone questions, you can contact me at [E.Estabrook@InsectsLimited.com](mailto:E.Estabrook@InsectsLimited.com).