



Carpet Beetles

Integrated Pest Management for Homes and Structures

Carpet beetles, which belong to the family of beetles known as dermestids, are pests in warehouses, homes, museums, and other locations where suitable food exists (Figure 1). In California, three species of carpet beetles cause serious damage to fabrics, carpets, furs, stored food, and preserved specimens such as taxidermies: the varied carpet beetle (*Anthrenus verbasci*), the furniture carpet beetle (*Anthrenus flavipes*), and the black carpet beetle (*Attagenus unicolor*).

IDENTIFICATION

All three carpet beetle species have similar life cycles (See Table 1 for the tabular version of this information). Adults lay eggs on food sources such as furs, woolen fabric, and carpets. Eggs hatch in about 2 weeks under typical indoor conditions (room temperature: 25-26 C° or 77-78 F°), and the larvae feed for varying periods, depending upon the species and environmental conditions; they prefer dark, secluded places. When ready to pupate, the larvae might burrow further into the food or wander and burrow elsewhere. They might also pupate within their last larval skin if no other shelter is available.

Although carpet beetle larvae do not make webs as clothes moths do, their shed skins and fecal pellets, which are about the size of a grain of salt, make it obvious where they have been feeding.

With their rounded bodies and short antennae, carpet beetle adults somewhat resemble common lady beetles in shape but are much smaller in size.

Carpet beetle adults do not feed on fabrics but seek out pollen and nectar (Figure 2) so are generally found outdoors, often found feeding on the flowers of crape myrtle, spiraea, buckwheat, and other plants that produce abundant pollen. Carpet beetles frequently fly into homes from flowers in the landscape, but are accidentally and frequently brought inside on items such as cut flowers. They are attracted to sunlight. When carpet beetle adults are found indoors, they are typically seen near windows on sills, drapes, or window panes.



Figure 1. Carpet beetle larvae infesting a child's art project art made of yarn, noodles, and beans.

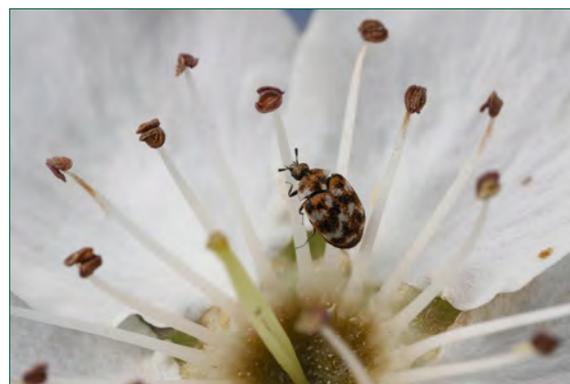


Figure 2. Adult varied carpet beetle on a flower.

Varied Carpet Beetle

The adult varied carpet beetle, *Anthrenus verbasci*, is about 1/10 inch long and black with an irregular pattern of white, brown, and dark yellow scales on its wing covers (Figures 3 and 4). In older adults, the scales that form this pattern wear off, so the beetles appear solid brown or black.

Outdoors, female beetles seek out spider webs or bee, wasp, or bird nests as places to lay their eggs. These nests and webs contain dead insects, beeswax, pollen, feathers, or other debris that can serve as larval food. Indoors, beetles deposit eggs on or near wool carpets and rugs, woolen goods, animal

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skins, furs, stuffed animals, leather book bindings, feathers, animal horns, whalebone, hair, silk, dried plant products, and other materials that can serve as larval food. Adults usually appear in spring or early summer; indoors, you'll often find them near windows.

Mature larvae are slightly longer than adults and are covered with dense tufts of hair. If disturbed, they extend these tufts upright into a round plume (Figure 5). They have alternating light and dark brown stripes and are distinguishable from other carpet beetle larvae because they are broader in the rear and narrower in front.

Varied carpet beetles typically lay 40 eggs which take 10 to 20 days to hatch. The larvae live for 220 to 630 days before pupating. They remain as pupae for 10 to 13 days before emerging as adults. Female adult varied carpet beetles live 2 to 6 weeks while the adult males live 2 to 4 weeks.



Figure 3. Two adult varied carpet beetles placed next to a U.S. penny.



Figure 4. Varied carpet beetle final-instar larval cast skin (left) and adults (center and right).



Figure 5. Mature varied carpet beetle larva.

Table 1. Life Cycle of Three Species of Carpet Beetle.

	Varied Carpet Beetle		Furniture Carpet Beetle		Black Carpet Beetle	
	Adult	Larva	Adult	Larva	Adult	Larva
Number of eggs laid	40		60		90	
Days before eggs hatch	10-20		9-16		6-16	
Number days for larval stage	220-630		70-94		166-330	
Days for pupation	10-13		14-17		8-14	
Weeks as an adult	female 2-6; male 2-4		4-8		4-8	

Furniture Carpet Beetles

When viewed from above, adults of the furniture carpet beetle, *Anthrenus flavipes*, are slightly larger and rounder than the varied carpet beetle (Figure 6). Coloration and markings vary, but the furniture carpet beetle generally has a mottled appearance due to the black spots that intersperse the white and dark yellow to orange scales on its wing covers. If these scales have worn off, the adults can appear solid black. Their undersides are white.

Larvae are white at first but darken to dark red or chestnut brown as they mature. In contrast to larvae of the varied carpet beetle, these larvae are broader in front and narrower at the rear. Larvae of the furniture carpet beetle feed on the same types of items as varied carpet beetle larvae.

The life cycle of the furniture carpet beetle is similar to the varied carpet beetle. Typically the furniture carpet beetle lays 60 eggs which take 9 to 16 days to hatch. The larvae live for 70 to 94 days before pupating. They remain as pupae for 14 to 17 days before emerging as adults. The adult furniture carpet beetles live 4 to 8 weeks.

Black Carpet Beetle

Adults and larvae of the black carpet beetle, *Attagenus unicolor*, are distinctly different from the carpet beetles described above (Figure 7). Adult black carpet beetles range from $\frac{1}{8}$ to $\frac{3}{16}$ inch long. They are shiny black and dark brown with brownish legs. Full-sized larvae can be as long as $\frac{5}{16}$ inch and range from light brown to almost black.

Larvae are shiny, smooth, and hard and short, stiff hairs cover their body. Their body tapers toward the rear and ends in a tuft of long hairs. In California and other arid areas, the black carpet beetle is a more serious pest for stored products (e.g., grains, flours, cereals) than a fabric pest.

The black carpet beetle usually lays 90 eggs, more than either of the other two carpet beetles. The eggs hatch after 9



Figure 6. Furniture carpet beetle larva (left) and adults (center and right).

to 16 days and the larvae live for 166 to 330 days before pupating. The pupal stage lasts for 8 to 14 days. Adult black carpet beetles live 4 to 8 weeks.

DAMAGE

Carpet beetle larvae cause damage by feeding on a variety of dead animals and animal products such as wool, silk, leather, fur, hair brushes with natural bristles, pet hair, and feathers; occasionally they feed on stored products such as certain spices and grains. They don't feed on synthetic fibers. Most of the larval feeding activities occur in dark, undisturbed locations.

It's not always possible to tell from damage whether clothes moths or carpet beetles caused it, but in general carpet beetles are more likely to damage a large area on one portion of a garment or carpet while moth damage more often appears as scattered holes. Also carpet beetle larvae leave brown, shell-like, bristly-looking cast skins when they molt. These skins and a lack of webbing are usually good clues that carpet beetles are the culprits.

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

MANAGEMENT

Carpet beetles are among the most difficult indoor pests to control because they can find food in obscure



Figure 7. Black carpet beetle larva (left) and adult (right).

places and disperse widely throughout a building. Successful control depends on a combination of sanitation and exclusion. If exclusion and sanitation are successful, insecticide treatments are not required.

Carpet beetles frequently fly into homes from flowers in the landscape. A few adult beetles indoors should not be cause for alarm. Management only needs to occur if you find larvae developing in fabrics or other areas in your home.

When carpet beetles threaten products in commercial warehouses or storage areas, a monitoring program using sticky traps baited with an appropriate pheromone (a chemical attractant an organism produces to attract others of the same species) is recommended.

Sticky traps can also be used in homes where infestations are serious. Traps placed throughout a building can show where beetles are coming from. The traps are also useful for monitoring the effectiveness of control practices. Check traps once or twice a week.

You can also use pheromone traps to augment other control methods by attracting adult male beetles in small confined areas. Sticky traps are also available without a pheromone; place these traps on windowsills to trap adults that fly to windows. Plain sticky traps are available in retail stores. Sticky traps baited with a pheromone are available from local pest control operators, pesticide supply

distributors, and on the Internet. Pheromone traps are species-specific, so it is important to use one that attracts the species causing your problems.

Eliminate the Source

Eliminate accumulations of lint, hair, dead insects, and other debris that serve as food for carpet beetles. Throw out badly infested items. Remove old spider webs and bird, rodent, bee, and wasp nests, which can harbor infestations. Examine cut flowers for adult beetles before bringing the flowers inside. Be sure that window screens, doors, and vents are secure to keep carpet beetles from flying in from outdoor sources.

Regular and thorough cleaning of rugs, draperies, upholstered furniture, closets, and other locations where carpet beetles congregate is important to both prevent and control these pests. Frequent, thorough vacuuming is an effective way of removing food sources as well as carpet beetle eggs, larvae, and adults. After vacuuming infested areas, dispose of the bag promptly, because it can contain eggs, larvae, or adult insects.

Protect fabrics by keeping them clean; food and perspiration stains on fabrics attract carpet beetles. Thoroughly laundering washable items in hot water or dry cleaning them will kill all stages of these insects. This is the most important method for controlling fabric pests in clothing, blankets, and other washable articles.

Regularly clean mounted animal specimens such as museum pieces or game trophies, or periodically place them in a freezer for 10 to 14 days. Inspect stored woolens, linens, and furs, and air these items annually in the sun, brushing them thoroughly. If you find an infestation, launder or dry clean these items before returning them to storage. Be sure to seal cleaned items in a protective plastic bag or other suitable container.

Some furniture, mattresses, and pillows are stuffed with hair or feathers. When carpet beetles get into the stuffing, you can't control these insects simply by spraying the outside surface of the item. The best way to eliminate the pests is to look for a pest control, dry cleaning, or storage firm that can treat the infested item with lethal gas in a fumigation vault. Because of the potential hazards to the person applying fumigants, only licensed pest control operators can buy and use them. Proper fumigation gives quick, satisfactory control and kills all stages of fabric pests. It doesn't prevent reinfestation, however.

Protecting Items in Storage

To properly store items that are susceptible to carpet beetles, first make sure the items are pest-free then place them in an airtight container, inserting a layer of paper every few inches. On these paper layers you can place moth balls, flakes, or crystals that are labeled for control of carpet beetles on fabrics. These products contain paradichlorobenzene (PDB), also called 1,4-dichlorobenzene, an insecticidal, repellent compound that works as a vapor.

Do not let these insecticidal products come in direct contact with plastic buttons, hangers, or garment bags, since the active ingredient can cause the plastic to soften and melt into the fabric. Also, be sure to keep these products out of reach of children and pets, and do not use them where you store unwrapped food or allow them to come into contact with food or cooking utensils.

Generally, closets are not airtight and are opened too frequently to hold in vapors. A trunk, chest, box, or garment bag makes a good storage container. Seal any holes or cracks, and if the lid does not fit tightly, seal it with tape, or wrap the entire container in heavy paper and seal it with tape.

Alternative methods for controlling carpet beetles in stored items include heating the infested object in an oven

for at least 30 minutes at 120°F or higher or enclosing the object in a plastic bag and placing it in a freezer for 2 weeks at temperatures below 18°F. Before using either of these methods, consider if cold or heat will damage the object.

For items too fragile to be treated with extreme cold or heat, anoxic treatment (removal of oxygen) can be considered as an option. First, an oxygen-impermeable bag is necessary to contain the infested items. Then, oxygen scavengers (chemicals that absorb oxygen) need to be introduced into the bag to remove oxygen. All developmental stages of carpet beetles can be controlled if atmospheric oxygen levels are maintained below 0.1-0.5% for a period of 8-21 days. However, in addition to the relatively long treatment time, this method requires a properly sealed enclosure and a rather specialized set of materials (oxygen-impermeable film, oxygen indicator, and oxygen scavenger).

The effectiveness of cedar chests and closet floors made of cedar is debatable. Some cedar contains an oil that does not affect large larvae but can kill small ones. However, cedar loses this oil as it ages. Having a tightly constructed chest is more important in the long run than the type of wood used to make it.

Other Chemical Methods

Cleaning is always the best strategy; however, if you have an area or article that is infested that you cannot dry clean or launder, you can apply an insecticide. Find a product that lists carpet beetles on its label, and closely follow the directions.

Sprays and dusts. Apply insecticides as spot treatments, and limit application to the edges of floor coverings, beneath rugs and furniture, on the floors and walls of closets, on shelving where susceptible fabrics are stored, in cracks and crevices, and in other areas that accumulate lint. Don't spray clothing or bedding.

When treating attics, wall voids, and other inaccessible places, use insecticidal dusts such as silica aerogel (e.g., CimeXa Insecticide Dust, active ingredient silicon dioxide). Take precautions to avoid inhaling the material. Some dust formulations can adversely affect people who have respiratory problems. Always read and follow label precautions carefully.

Closely inspect carpeted areas beneath heavy furniture and along carpet edges for infestation. If live larvae are found, spray both sides of infested carpet if at all possible, applying a lighter spray to the upper surface 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. If you are concerned that sprays might damage expensive broadloom or Oriental rugs, hire an experienced pest control operator or carpet-cleaning company. Instead of insecticide treatment, area

rugs can also be taken to dry cleaners who handle rugs.

Do not use insecticide sprays around open flames, sparks, or electrical circuits and don't spray them on asphalt or tile floors. Use only a light application on parquet floors. On linoleums, first spray a small inconspicuous area and let it dry to see if staining occurs.

Applying protective sprays to furs is not recommended. If you store furs at home during the summer, either protect them with moth crystals, flakes, or balls, or periodically shake and air them. Furs in commercial storage receive professional care, and you can insure them against damage.

Resin strips. For professional pest management operators, resin strip products containing the volatile active ingredient dichlorvos (DDVP) are available for use in residential areas to treat infested objects in airtight containers. The label directions specify that only licensed pest management professionals can use these product.

Dichlorvos evaporates from the resin strip producing vapors that, in sufficient concentration, will kill insects. The vapors build up to the required concentration only in an airtight container, thereby killing the carpet beetles.

These resin strips are not to be used in any area where people will be present for extended periods of time, specifically, more than 4 hours at a time. Dichlorvos is classified by the U. S. Environmental Protection Agency (US EPA) as a Group B2, probable human carcinogen.

Consumer products containing DDVP are available, but great precaution should be taken when using these products. Do not use these products in areas occupied for more than four hours per day. They are intended for use in closed areas not frequently visited; such as garages, sheds, and storage units. Always read and adhere to the pesticide label.



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WARNING ON THE USE OF PESTICIDES

Pesticides are poisonous. Some pesticides are more toxic than others and present higher risks to people, nontarget organisms, and the environment. A pesticide is any material (natural, organic, or synthetic) used to control, prevent, kill, suppress, or repel pests. "Pesticide" is a broad term that includes insecticides, herbicides (weed or plant killers), fungicides, rodenticides, miticides (mite control), molluscicides (for snails and slugs), and other materials like growth regulators or antimicrobial products such as bleach and sanitary wipes that kill bacteria.

Always read and carefully follow all precautions and directions provided on the container label. The label is the law and failure to follow label instructions is an illegal use of the pesticide. 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, and animals. Never place pesticides in food or drink containers. Consult the pesticide label to determine active ingredients, correct locations for use, signal words, and personal protective equipment you should wear to protect yourself from exposure when applying the material.

Pesticides applied in your garden and landscape can move through water or with soil away from where they were applied, resulting in contamination of creeks, lakes, rivers, and the ocean. Confine pesticides to the property being treated and never allow them to get into drains or creeks. Avoid getting pesticide onto neighboring properties (called drift), especially onto gardens containing fruits or vegetables ready to be picked.

Do not place containers with pesticide in the trash or pour pesticides down the sink, toilet, or outside drains. Either use all the pesticide according to the label until the container is empty or take unwanted pesticides to your local Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Hazardous Waste Collection site nearest you. Follow label directions for disposal of empty containers. 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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