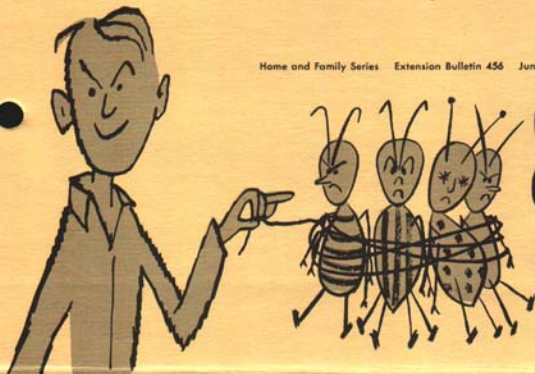


CARPET BEETLES CLOTHES MOTHS BEDBUGS FLEAS

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THIS FOLDER CONTAINS control suggestions for bed bugs, carpet beetles, clothes moths, and fleas. While these insects vary widely in the type of annoyance and damage they cause, problems of their control are similar.

Carpet beetles rank among the most damaging household pests. Fleas, while seldom damaging to household furnishings, are extremely annoying by their habit of piercing the skin to suck human blood. Bed bugs cause concern and injury by their night-time attack upon sleeping persons.

To get rid of these unwelcome guests, follow the specific insecticide control instructions given below. If added suggestions are given, FOLLOW THEM CAREFULLY FOR THEY CAN BE EQUALLY AS IMPORTANT AS THE USE OF A CHEMICAL IN SOLVING YOUR PROBLEM.

Insecticides for control of household pests are manufactured from many different chemicals—some of which may stain or discolor draperies, floor coverings, slip-covers, upholstering fabrics, bedding, and clothing made of synthetic fabrics. For your protection, always read the label on the container. Follow all instructions carefully.

BED BUGS

Bed bugs, like fleas, pierce the skin to suck human blood. They are wingless insects except for short wing pads on the adults of some species. The immature forms (nymphs) resemble the adults except for size. Nymphs molt five times and must have a feeding of blood before they can change to the next size or finally

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into the adult. The female must have at least one feeding of blood to lay hatchable eggs.

The common bed bug is ovate or egg-shaped, about $\frac{1}{8}$ inch long, and very flat. Its usual body color is reddish-brown but after a feeding of blood it appears red. It hides in the daytime behind baseboards, cracks in bedsteads and other suitable places. At night it moves out in search of mammals and birds for a feeding of blood. It is a common pest in poultry houses, but man is its best-liked host. Its sucking mouthparts pierce the skin, but the injection of saliva into the wound is more painful in most cases than the bite.

Bed bugs move readily from room to room, or from building to building, especially in summer. They leave a tell-tale odor which to some people strongly resembles fresh red raspberries, providing these have been fed upon by stink bugs. The odor is especially noticeable when large numbers of bed bugs infest a building. They can live 2 months or longer without a feeding of blood.



BED BUG 1/5 to 1/4 inch long

CONTROL

1. Calk or otherwise repair all cracks and spaces behind baseboards and other areas of the house. Wood paneling and loose wall paper of all kinds make an ideal hiding place for bed bugs.

2. Treat infested areas with either 5 percent DDT, or 5 percent methoxychlor containing $\frac{3}{4}$ percent pyrethrum and 2 percent piperonyl butoxide, or 1 percent malathion. These are usually formulated with deodorized kerosene. DDVP (Vapona), $\frac{1}{2}$ percent in liquid household spray can also be used. Five percent dusts of either DDT, methoxychlor, or malathion may be substituted for a spray of the same material. When using one of these insecticides, do the following:

- a. Thoroughly spray baseboards, closets, wood paneling, and other places that harbor bed bugs. Apply a heavy film of insecticide to board surfaces and into cracks, but avoid spray run-off because of the mess it may make.
- b. Also thoroughly treat the frame, slats and springs of beds. To treat the mattress, apply a light mist to seams, tufts, and folds, but not to the entire mattress. Allow four hours for the spray to dry before covering it with a sheet.
- c. Treat upholstered furniture in the same way as mattresses — that is — spray or dust only the edges and seams of cushions, and the inside (hidden) framework. Avoid treating sit-on or arm rest areas. Do not use sofas, etc., until they are thoroughly dry; or better still, do not use them until 72 hours after treating with an insecticide. Before allowing children on treated furniture, vacuum clean it thoroughly to remove loose and excessive amounts of chemical.

CLOTHES MOTHS



CASEMAKING CLOTHES MOTH
wingspread about 1/2 inch



Larval stage (in case, left)



Clothes moths, as well as carpet beetles, damage all woolen fabrics, furs, feathers, down, bristles, hair, and mohair. Since they like climates with high humidity, clothes moths are more prevalent in other states, but nevertheless present some problems in Michigan.

Adult clothes moths have a wingspread of about $\frac{1}{2}$ inch and are yellowish or buff in color. You may see them flying away from light into corners or other dark places. The adults do not chew (since they have sucking-type mouth parts) and so do not damage fabrics. It is the *larvae* (*caterpillars*) with the strong chewing mouth parts that do the damage. Larvae have a dark head, an almost hairless body, and are about $\frac{1}{2}$ inch long when full grown. They can be told from carpet beetle grubs by their short stubby abdominal legs which have small hooks or crochets of varying shapes and arrangements on the tips. Carpet beetle grubs do not have these crochets and their larval legs are mere swellings.

CONTROL

Clothes moths respond to the same treatment as that for carpet beetles and directions for both are given under the following section on carpet beetles. However special attention in regard to moths should be given to the sections on clothes storage, cedar chests and clothes closets.

CARPET BEETLES

Adult carpet beetles are small, measuring no more than $\frac{1}{8}$ inch long, and are very prevalent and damaging in Michigan. Color varies greatly among them, some being black, others a mottled red, black, and white.

Like clothes moths, they damage woolen fabrics, furs, feathers, down, bristles, hair, and mohair. The larvae (grubs) especially those of the black carpet beetles, also feed on cereals and other grain products. (See illustrations for different kinds of carpet beetles.)

The adult beetles do have chewing type mouth parts but, as with clothes moths, it is the larvae (grubs) that actually damage carpets and clothing. You can recognize carpet beetle grubs by their hairy appearance. Note that they have blackish or brownish bristles, grouped into various shapes and patterns, at the small (tail) end of the body. The grubs are longer and more slender than the adults.

Upon close inspection, the adult may be seen to have a convex (arched) body and appears to be covered with small scales which rub off readily. The adults feed on the pollen of flowers such as spiraea, and are often seen crawling in and around windows. But to destroy or discontinue growing plants visited by carpet beetles is not the real answer to controlling these insects in buildings. Directions for carpet beetle control are given below. Special attention should be given to section on carpets and rugs.



BUFFALO BUG (common carpet beetle)
Larva 3/16 inch Beetle 1/12 inch



VARIED CARPET BEETLE
Larvae 1/3 inch Beetle 1/12 inch



LONG-TAILED CARPET BEETLE
Larvae 1/3 inch Beetle 1/8 inch

CONTROL

(Use the following suggestions for control of both clothes moths and carpet beetles):

Good housekeeping is very important in preventing or controlling carpet beetle and clothes moth damage to fabrics. Regular use of the vacuum cleaner removes lint upon which the larvae feed, and also removes eggs and larvae. Usually you will find that carpet beetles are more apt to damage carpets and rugs under heavy furniture where it is hard to clean regularly and thoroughly, or where carpets fit close to walls, especially where coverings extend under the quarter round at the base of the baseboard. Keep closets and dresser drawers clean by using the vacuum cleaner or by other cleaning methods.

Before storing clothing, especially during the summer, launder or have it dry cleaned. Soiled fabrics are highly attractive to clothes moths and carpet beetles. Follow carefully manufacturer's directions for cleaning and storing furs. NOTE: There is no better way to protect in-season clothing than by wearing it every few days or so. Sunlight and wind destroy carpet beetle and clothes moth larvae. Fumigate pillows containing feathers (or wash them) to kill clothes moth infestations.

Eliminate all cracks on or behind baseboards, quarter rounds, and other places by calking with plastic wood, putty, or other suitable materials. Repair cracks and holes in plaster. Calk openings around water pipes and furnace flues. Calk any openings to keep insects from traveling from basement to upper floors, or from one room to another.

PROTECTIVE MEASURES

Cedar Chests

Suitable cedar chests are made of at least 70 percent $\frac{3}{4}$ inch heartwood of red cedar (*Juniperus virginia*). The inside of cedar chests should not be painted but they should be treated every few years or as needed with 100 percent cedar oil. If cedar oil does not maintain effective control of carpet beetles and clothes moths, then use paradichlorobenzene crystals (preferably) or moth balls to insure good protection of stored clothes. Cedar oil will kill small carpet beetle and clothes moth larvae but usually not the larger maturing ones. NOTE: Store only freshly laundered or dry-cleaned clothing in cedar chests.

Clothes Closets

Thoroughly house-clean and eliminate cracks in or behind baseboards and other areas of the closets. Treat the baseboards with a chemical (see part D, "Carpets and Rugs," for sprays and dusts).

NOTE: A paintbrush is ideal for applying kerosene solutions of chlordane, dieldrin, or malathion to clothes closets.

When a closet is used for seasonal storage of clothing, use 1 pound of paradichlorobenzene to 100 cubic feet of space (a closet 3 x 4 feet and 8 feet high contains about 100 cubic feet). Place the crystals in a shallow pan on a shelf, or hang from a clothes rod in a cloth bag or perforated container. Because the vapors of paradichlorobenzene are heavier than air, they go downward. For the treatment to work, the closet must be airtight and the door sealed with a tight-fitting gasket. Effective vapor concentration is reached only after several days of evaporation from the chemical.

An easy way to kill clothes moths and carpet beetles in a closet is to vaporize paradichlorobenzene crystals with a vacuum cleaner. Special attachments are available. This will give temporary, if not permanent, relief. NOTE: When using paradichlorobenzene in clothes closets, do not use plastic hangers. The chemical may dissolve the plastic, causing clothes to stick to hangers. Wood or metal hangers are best. Also remove plastic buttons from clothing while using paradichlorobenzene.

Trunks and Garment Bags

Any type of container for clothing storage (trunks, chests, boxes, garment bags) must be airtight before treating with paradichlorobenzene. In a container the size of a trunk, scatter 1 pound of crystals uniformly between the clothing or blankets, using more or less proportionately according to the size of container. When using paradichlorobenzene directly on clothing, follow label directions carefully.

Carpets and Rugs

Because carpet beetles damage carpets and rugs more often in Michigan and are harder to kill than clothes moths, the following suggestions are particularly for control of carpet beetles.

1. ONCE A WEEK clean carpets and rugs under all heavy furniture and around the edges of the coverings especially near baseboard and quarter round. Also clean along with the floor coverings, all fabric-covered furniture. Furthermore, oil and other stains or floor coverings, can protect carpet beetle grubs from control measures. This may result in damage to small areas on all parts of the coverings. Rotating carpets and rugs will help control these insects BUT THIS MUST NOT BE SUBSTITUTED FOR CLEANING ONCE A WEEK.

2. Clean cold and hot air furnace ducts, particularly behind the registers.

3. Store properly all wool and other clothing that carpet beetles damage. *Get rid of nonusable garments.* A pile of soiled clothing or rags furnishes an ideal breeding place for carpet beetles and clothes moths.

4. Apply an insecticide to the edges of rugs, especially near the quarter round. If rugs are laid under the quarter round, constant attention must be paid to cleaning and chemical treating of these areas, especially under the quarter round. Also treat under heavy furniture such as sofas, pianos, televisions, and book cases. Normally, good carpet beetle control does not require chemical treatment of the walked-on-areas of carpets and rugs. Use the vacuum cleaner instead.

For sprays, use either 2 percent chlordane, or 1/2 percent dieldrin, or 5 percent malathion, in deodorized (white) kerosene. Apply a good film of one of these materials, but do not over-wet the floor coverings.

For dusts, use either 5 percent chlordane, or 1 percent dieldrin, or 10 percent malathion. If there is objection to the white film of a dust, use a spray instead.

5. A building kept dark during daytime by continuously drawn drapes and blinds normally makes the carpet beetle and clothes moth problem harder to handle. Letting light into a house and proper ventilation helps control these pests. Especially dark secluded corners are more apt to harbor them than light ones.

FLEAS

Adult 3/16 inch



Adult fleas normally live on cats, dogs or rodents, with different species for each (that is, cat flea, dog flea). Only the adult bites, causing small reddened areas on the skin which often develop a small pustule at one side and which may itch excessively in some persons. Fleas may be found in all rooms of a building, in sleeping quarters of dogs and cats, and outdoors around buildings in the summer. When present outdoors, they are often carelessly called "sand fleas."

Flea eggs are not glued to the animal's hair as is the case with lice. When laid, they usually roll from cats, dogs, or rodents to the ground, kennel bedding, or floors. Upon hatching, the larvae (worms) feed on dust, dirt, lint, and other foods with organic material in them. This habit of egg laying and worm feeding permits fleas to spread throughout buildings.

The adults are sometimes still present two weeks or even longer after a dog or cat has been in a building. *In other words, it is not necessary for a cat or dog to be around at the exact moments you are having trouble with these insects.* Many vacationers return home to be met with a plague of hungry adult fleas. The females must have a feeding of blood in order to lay eggs that will develop properly. In the absence of dogs, cats, and rodents, they readily feed on humans for their needed blood supply.

CONTROL

There are five important steps to the control of fleas:

1. Keep rats and mice and all rodents out of the house. Repair, calk, or tighten all foundations, foundation sills, windows, doors, and other places where these animals can get into buildings. Use automatic closers on all outside doors, storm doors preferably. If you open windows in summer, have tight-fitting and well repaired screens on these places. Attached garages are especially bad for letting rats and mice into buildings. SEAL carefully all places where these animals can get from the garage to the house.

All porch foundations should be tightly constructed and when possible with footings and walls at the same depth as the main foundation.

2. If possible, keep dogs and cats out of the house. Treat cats and dogs weekly with dusts of either 1 percent rotenone, or 3/10 percent pyrethrum and 2 percent piperonyl butoxide, or 10 percent methoxy-chlor, or 4 percent malathion. Dogs over two months

of age can also be treated with 10 percent DDT, but do not treat cats with it at any age. Sprays and soaps of these same materials are available; use manufacturer's label directions.

Apply insecticide dusts or sprays especially to the back, neck, and top of head of the animals. Be sure the dusts penetrate through the hair by rubbing the fur during treatment.

3. Clean cat and dog sleeping quarters thoroughly. Treat the kennel floors with one of the materials listed in Section 2. After treating, use clean bedding. During the summer, weekly attention to dog and cat kennels may be needed to satisfactorily control fleas.

4. In the house, thoroughly vacuum floors, rugs, carpets, and overstuffed furniture before applying an insecticide. To kill fleas in the house, use either 5 percent methoxychlor containing $\frac{1}{2}$ percent pyrethrum and 2 percent piperonyl butoxide or 5 percent DDT in refined (deodorized) kerosene. Apply a light film to overstuffed furniture, asphalt floor coverings, and waxed hardwood floors. Heavier applications can be made to baseboards, carpets, and rugs but even in these places do not overdo it.

5. Treat flea-infested lawns and yards with 3 tablespoons of 50 percent wettable DDT or methoxychlor powder, or $1\frac{1}{2}$ teaspoons of 25 percent DDT or methoxychlor emulsion to 1 gallon of water. For dusting, use 5 percent DDT or methoxychlor.

Apply two gallons of spray or 2 pounds of dust to each 1,000 square feet. Repeat as needed.

INSECTICIDES

For good insect control, learn how to use insecticides (chemicals) effectively. Most are available in several formulations, each with its own use for control in and around houses.

Those discussed are the more common formulations. For others, read the label on the container for instructions on use.

EMULSIONS

Emulsions are liquids. They must be mixed with water, turning it milky. They are generally not used inside buildings. Apply them only outdoors to both plants and foundations. Be careful when applying to tender flowers and shrubs. They may injure these plants. In concentrate form, emulsions are dangerous if spilled on clothing and skin. Change clothing and wash skin immediately with soap and water. Use masks and protective clothing while spraying, especially when using dangerous materials or if you are applying them over a long time.

SOLUTIONS

Solutions are also liquids. They differ from emulsions in that they are used as bought and *are not mixed with water*. They are made with refined (deodorized) kerosene or similar materials, plus an insecticide. Use them indoors to control household insects. Do not apply to plants since they cause severe injury. Like emulsions, solutions are dangerous if spilled on clothing and skin. Immediately wash off with soap and water. Change clothing. Use masks and protective clothing, particularly when using dangerous materials or if you are applying them over a long time.

WETTABLE POWDERS

These are similar to dusts (see below). They contain a higher percentage of chemical, however. For some purposes they are used as bought in place of dusts. However, wettable powders are usually mixed with water and applied as sprays. The spray is seldom used indoors, but is useful when applied outdoors. Avoid breathing or getting powder (or spray) on the skin. Use masks and protective clothing, especially when using dangerous materials or if you are applying them over a long time.

DUSTS

Dusts are dry powders which normally contain a lower percentage of insecticide than wettable powders. They are used as bought and ARE NOT MIXED WITH WATER. Use them both indoors and outdoors where effective.

AEROSOLS

Aerosols are liquids held under pressure in a container. When released, usually by pressing a button, some kinds form a gas, others a spray. Gas producing types are for control of flying insects (such as flies), liquid for those that crawl or run on floors (such as ants). Choose to fit your needs.

EQUIPMENT

The compressed air sprayer, the quart-sized sprayer, the aerosol, and the paintbrush are probably the best kinds of equipment for the home owner to use for household insects.

COMPRESSED AIR SPRAYER

The water capacity of a compressed air sprayer is usually 1 to 4 gallons. Air is pumped into the tank, forcing the spray out when the nozzle is opened. It is ideal for outdoor application of wettable powders and emulsions. Its use indoors is limited if a lot of water is applied with the insecticide. Shake the sprayer when you use wettable powder.

QUART-SIZED SPRAYER

The quart-sized sprayer is also a compressed air type, but air must be pumped into it continuously while in use. It can be used satisfactorily with emulsions but not wettable powders. Use it both indoors and outdoors for treating small areas. (Note: Where higher pressure is needed for good application, it has limited use.)

AEROSOL

Aerosols, discussed earlier, can usually be bought to fit your need, either gas producing for flying insects, or liquid types for crawling pests. Aerosol refers to a liquid held in a container under pressure, usually released by pressing a button.

PAINTBRUSH

Use an inexpensive paintbrush to apply insecticide solutions to baseboards, screens, and similar areas inside buildings. A light film is usually sufficient.

Each type of equipment has good features and disadvantages. Careful study of your insect control jobs will help you buy and use it effectively.

WARNINGS

1. Inside buildings, apply chlordane, dieldrin, and most malathion formulations to small areas only (such as baseboards). Do not apply to entire rooms or buildings. In attics separated from living quarters by solid walls or ceilings, these materials can be used over wider areas but don't overdo it. Use 40 percent nicotine-sulfate only for treating flower pot soil; *never for spraying inside the home.*

NOTE: DDT and some weak malathion preparations (those containing less than 2 percent of the

chemical) can be applied more safely over a larger area. Safer still are rotenone and pyrethrum preparations, providing when combined with other insecticides they do not contain materials more poisonous than methoxychlor and piperonyl butoxide.

2. Avoid using any material in this folder around food or where children can get into them. When large areas are treated outdoors, keep children away until 72 hours after application.

3. Avoid breathing sprays or dusts. A handkerchief fitted to the face will help prevent excessive breathing of these materials. However if there is a chance of breathing highly poisonous materials, special masks should be used. Some insecticides such as pyrethrum or rotenone may be harmful to persons with asthma, although the chemicals are generally quite safe otherwise.

4. If emulsions or concentrated wettable powders are spilled on the skin, wash immediately with soap and water.

5. Do not use insecticides in oil (kerosene) around open flames, electrical wiring, or on asphalt floor coverings. Avoid the use of insecticides which may stain or spot fabrics.

6. Outdoors, avoid heavy applications of insecticides to tender flowers and shrubs, especially emulsion type sprays. Read labels to avoid using any material specified as damaging to certain plants.

7. Do not apply an insecticide listed in this folder to vegetables, fruits, and livestock, or to garden soils unless the label or up-to-date Michigan State University Cooperative Service literature says you can safely do so.

8. Avoid careless use of any material regardless of how poisonous it is.

9. *Read the label for each insecticide used. Follow directions.*