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Kitchen Pests – Beetles, Mites, Moths, Cockroaches, Silverfish, Book Lice  
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Household insect control number 5:

# KITCHEN PESTS

BETTER  
MITES  
MOTHS  
COCKROACHES  
SILVERFISH  
BOOK LICE

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COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

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Extension Specialist in Entomology

SEVERAL TYPES of insects and mites infest kitchens. Of these, probably the cockroaches are hardest to control. However, once any are found in the home, do not treat the problem lightly. Vigorously attack to rid the entire premises.

Control measures are given for all types. To rid your home of a particular pest, follow the house cleaning instructions carefully before using an insecticide. When using the chemical, read the information about it in this bulletin and on the package label. The careful use of the instructions is a "must" if good control is to be obtained, and the poisonous hazards of the insecticide kept to a minimum.

## BETTER, MITES AND MOTHS

Beetles, mites and moths may infest in large numbers. These common pantry or kitchen pests infest all grain products, including prepared cereals, and oc-

asionally get into spices and other stored items. Several beetles, two moths, and at least one mite fall into the category. (See illustrations).

Adult beetles range from about 1/10 to 1 inch long. The larger are usually black and the smaller generally red, reddish-brown, or brown.

Adult moths are about 1/2 to 3/4 inch long when the wings are folded over the back. The Indian meal moth is reddish-brown and wings are grayish-white



CADELLE BEETLE  
larva, left; adult, right

SAW-TOOTHED GRAIN BEETLE  
adult, left; pupa (center view); larva, right



INDIAN MEAL MOTH

near the base. The Mediterranean flour moth is pale gray throughout with wavy black lines across the upper wings. Its head is raised slightly when standing still, giving the body a sloping appearance.

Both beetles and moths exist as worms while immature. These tiny worms feed throughout cereals and other grain products.

Adult beetles feed in the same way as their young, and both are usually found together on the same food. Only the worms of the moths do damage since the adults have sucking type mouth parts unsuited for feeding on grain. The moths often leave the infested grain products to fly throughout contaminated buildings. Worms of both beetles and moths are usually small, requiring magnification to identify them.



CHEESE MITE  
1/32 inch long

Mites also infest grain products. They are transparent, only about 1/25 inch long, and are extremely hard to see. A vibrating movement of infested grain products usually denotes their presence. Placing infested products in strong light will also help identify them.

**NOTE:** Meat, especially home-cured, may become infested with larder beetles, the ham or cheese skipper (a fly maggot), and the cheese mites (see illustration). Meat stored in a tight, clean and well-ventilated smokehouse or other suitable storage place at 45°F. or less is not apt to become contaminated. For further instructions, secure Folder AIS-52 from the U. S. Department of Agriculture, Washington 25, D. C., or Michigan State University, East Lansing, Michigan.

The adult larder beetle (about 1/3 inch long) is generally black, except the wing covers are brownish-

yellow on the end where they attach to the body. On each wing, this brownish-yellow area contains 3 black dots in the form of a triangle. The larva is brown, exceptionally hairy, tapering at each end of the body.

These insects eat a large number of foods, including: dead insects, dog biscuits, stored tobacco, carrion, ham, bacon, cheese, feathers, and have been known to attack newly hatched chickens.



HIDE BEETLE  
Larva 1/3 inch long

LARDER BEETLE  
Larva Adults 1/3 inch long

In the last two years, the larder beetle and other similar types (see the picture of the hide beetle larva which is about 1/3 inch long when mature) have increased noticeably in numbers in Michigan. Infestations have occurred in homes with modern refrigeration and food storage. Consequently, sources of infestations must be sought in basements, attics, even walls of buildings: that is, in places where dog food may be stored (basements), where dead or hibernating insects are apt to occur (attics), or where rodents may have been killed (outside walls).

### Controls

For good control of larder beetles in situations as mentioned above, infested areas must be found AND TREATMENTS APPLIED THERE. For insecticides, use those suggested on page 4 for cockroaches and follow the same application methods and warning instructions.

When larder beetles, other beetles, mites and moths infest food products (including dog food), solve the problem as follows:

### Cleanup

1. Remove and destroy all infested cereals and other products, including spices.
2. Remove spilled cereal and grain products from behind cupboards and bins and other out-of-way places. If possible, use the vacuum cleaner.
3. Clean the kitchen and cupboards thoroughly, preferably with soap and water.
4. Do all these things BEFORE USING A CHEMICAL.

## Chemicals

Spray areas of cupboards where kitchen pests are found. Use a deodorized solution of white kerosene containing 5 percent methoxychlor plus 0.1 or 0.2 percent pyrethrum and 1 or 2 percent piperonyl butoxide, or for other materials, use 5 percent DDT alone or with pyrethrum. Remove everything from the shelves before spraying. Replace the dishes and food after the spray has dried.

Shelves can be covered with waxed paper or other type coverings before using the cupboards for food and dish storage. However, DDT and methoxychlor combinations with pyrethrum are safe enough that this is not absolutely necessary, providing food is not laid directly on the chemicals.

**NOTE:** Dog food may be infested with kitchen insects. Large supplies of it stored in out-of-way places can infest a house with Indian meal moth and other strong flying kitchen insects. Store dog food in clean places where it can be inspected occasionally.

## COCKROACHES

Except for periods in the summer when they may migrate from house to house, domestic cockroaches spend their entire life inside buildings. Usually they are found in basements, bathrooms, and kitchens where they feed upon a wide variety of foods, including cereals, sugar-containing food, meats, cheese, even beer and leather. They are more active at night. They give off an offensive odor, and are also suspected of being disease carriers.

Cockroaches have long been known by man. The old Romans called them "*lucifuga*" because of their habit of running away from light. The Latin word *Blatta* means cockroach. The name "cockroach" no doubt can be traced to the Spanish word *cucaracha*. The exact origin of our domestic species is disputed, but many are tropical forms and some, no doubt, arrived by way of slave vessels and other ships many years ago.

Many kinds of cockroaches exist and a good general description to fit all forms is hard to give. Color in different species ranges from tan to brown to brownish-black. All are flat-bodied and skinny, and generally run fast when disturbed.

*The American cockroach*, our largest, may grow to 1½ inches, is reddish-brown to brownish with light markings on top of the thorax, (the body division that bears the legs and wings) and matures in about 7 months. It prefers basements, especially around pipes, and is often found in sewage systems.



AMERICAN COCKROACH  
1½ inches long when mature

*The oriental cockroach* is black, is 1¼ inches long when mature, and has short wings, the wings of the female being only rudimentary. It may take as long as 12 months to mature\* and is a slow running sluggish insect. Living on filth, it travels along sewage systems into homes. It also enters buildings readily through ventilators, broken foundations, and under poor-fitting doors. It may also be brought inside in packaged food. It prefers damp and cool areas, especially basements and beneath well shaded porches without foundations. In kitchens, groups will cluster under refrigerators and sinks, particularly if the areas are damp.



ORIENTAL ROACH  
male, 1 inch long; female, 1¼ inch long

*The Adult German cockroach* is a little over ½ inch long and is brown, with two black parallel lines just behind the head (see illustration). It likes high relative humidity and about 70° temperatures. It is very active and wary and readily migrates from building to building, or between parts of a building. However it prefers the kitchen where it thrives on poor housekeeping. It can mature within as short a time as 40 days and in most heated buildings multiplies

\*During this period the oriental cockroach molts seven times. The newly-molted immature insect (nymph) and the adult freshly-emerged from last molt are usually lighter in color than later when the outside skin hardens and matures. For example, the adult American cockroach is yellowish red when it first emerges from the last molt.

throughout the year. It may get into books and destroy bindings.



GERMAN ROACH  
male and female, 1/2 inch long

The brown-banded cockroach is a fairly recent introduction, first collected in 1903 in Florida. It has since spread throughout the South and to some areas of the North, being fairly common in some parts of Michigan. While normally gregarious, lone roaches may travel or wander all through the house. Common hiding places are television sets, radios, pictures hanging on walls or leaning against shelves, or similar secluded locations, especially those high off the floor.

The brown-banded roach is a handsome species in appearance, resembling the fearless denizen of the insect world, the tiger beetle. A habit of standing erect on its legs, probably on the search for food, also gives it the look of a hunter. It is about 1/2 inch long when mature, slightly smaller than its cousin, the German cockroach, and varies in color from black to a light golden. Two yellow crossed bands are found on the wings of the adult, one near where the wing joins the body, the other about 1/16 inch farther back toward the wing tips. The term "brown-banded," however, describes the immature form more accurately than the adult form since the bands are more conspicuous on the nymphs. The species likes temperatures over 80 degrees F. and will develop to maturity in 150 days or less under this condition.

Except for smaller and undeveloped wings, the immature forms of all cockroach species resemble the adult. Roaches lay their eggs in large numbers within a single capsule, which is usually bean-shaped and contains some 12 or more eggs. The several egg compartments within the capsule are often indicated by rings on the outside.

#### Control Cleanup

1. Keep food cleaned up in the cupboards and from behind stoves and other places. Kitchens must be immaculately clean, and free of dampness. THIS IS A MUST. Cockroaches live best in dirt, filth, and moisture.

2. Eliminate all cracks behind baseboards by calking with plastic wood or putty or other suitable ma-

terials. Repair cracks and holes in plaster. Calk openings around water pipes and furnace flues. Your aim is to get rid of as many hiding places as you can; also to keep roaches from traveling from basement to upper floors, or from one room to another.

3. Keep foundations, foundation sills, cracks in outside walls, and areas around windows and doors well calked or tight fitting, and in good repair. This is absolutely necessary if you are to keep cockroaches out of your house.

#### Chemical Control Indoors

Spray or dust where cockroaches hide or have their runways. Enter dark rooms with a flashlight to locate infested areas. Some of the usual places to look are around pipes or conduits, behind window or door frames, behind poor-fitting baseboards and molding, on the underside of tables and chairs, on all kinds of shelves, inside equipment motors, inside televisions and radios, behind mirrors, and around kitchen sinks and cupboards.

For spraying in-doors use oil solutions of either 2% chlordane, 1/2% dieldrin or Diazinon, 2% malathion, or 2/10% pyrethrum and 2% piperonyl butoxide in combination with 2% chlordane or 1/2% dieldrin.

See page 7 for warnings concerning the use of these materials.

Other refined (deodorized, see Special Warning under WARNING SECTION for more information) oil solutions for cockroach control are: Dichlorvos (DDVP), 1/2 percent and ronnel, 2%. Important limitations of these materials include. (1) Do not treat entire walls or floors, only small areas of baseboards, cabinets and other places where cockroaches occur. (2) Do not contaminate water, food, dishes or utensils with them. (3) Dry all treated surfaces before allowing children or pets on or near them. (4) See page 7 for general warnings concerning the use of insecticides.

For dusting, apply dusts of either 5% chlordane, 1% dieldrin or Diazinon, 10% DDT or malathion, or 50% sodium fluoride. Chlordane, dieldrin and Diazinon are usually best for cockroach control although pyrethrum type treatments are very good if used regularly, especially if they are combined with other good cockroach insecticides.

For a bait, place 1/8 of 1 percent Kepone bait in areas visited by cockroaches. But do not use it where children or pets might be poisoned by contact with the chemical.

NOTE: Before using chemicals remove all types of food and dishes and utensils. Do not replace until treatments have dried. If desired, cover shelves with waxed paper to protect food and dishes. This, however, tends to reduce the effectiveness of the insecticide for these insects and should be avoided if at all possible.

See section on warnings for degree of poisonousness of each material. When treating dresser drawers, clean the insides thoroughly. Apply sprays or dusts only to the outside surfaces except for the front which is exposed to enough light to give little control.

#### Chemical Control Outdoors

When cockroaches are known to enter from the outside, spray foundations thoroughly with 20 tablespoons of 40% wettable chlordane powder or three tablespoons of 72% chlordane emulsion, or four tablespoons of 50% wettable dieldrin powder, or three tablespoons of 15% dieldrin emulsion, or eight tablespoons of 25% wettable lindane powder or four tablespoons of 20% lindane emulsion — to one gallon of water.

Diazinon and malathion can also be used for outdoor treatment, especially when roaches are hard to control. Mix either with any of the insecticides suggested above, or apply alone (the mixtures are preferred). Use eight tablespoons of 25% wettable Diazinon powder or three tablespoons of Diazinon emulsion containing two pounds of actual chemical per gallon, or one-half pound of 25% malathion powder or seven tablespoons of 50% emulsion, to one gallon of water.

Take special care with sides and base of steps, spraying thoroughly. With the same materials, spray the grass for ten feet away from the foundation. Keep children away from these sprays, or do not apply them. Repeat treatment as needed.

NOTE: OUTSIDE treatment is suggested only to help control and possibly prevent migration from one building to another. For satisfactory control of any roach, it is absolutely necessary to apply the inside treatments and use good cleaning methods.

## SILVERFISH



SILVERFISH  
1/2 inch long

Silverfish, often called firebrats and bristletails, were known to man before the cockroach. The adults are wingless and about 1/2 inch long. The color varies from silver-gray to greenish-gray to brownish and sometimes they look faintly spotted, although this is more characteristic of the firebrats than the common

silverfish. The body tapers from head to tail end, with the head bearing two appendages or hair-like structures and the tail end three (see illustration). These appendages are nearly as long as the body.

The common silverfish likes cool, damp places, preferring 72 to 80 degree temperature and 70 to 97 percent relative humidity. (Firebrats, on the other hand, like it hotter and less humid, living best at 98 to 102 degrees Fahrenheit and 70 to 80 percent relative humidity). Silverfish and firebrats of all kinds may be found in kitchens, bathrooms, attics, and basements, and sometimes around baseboards and door casings.

They feed on carbohydrates and proteins — raw beef (especially if dried), book bindings, rayon fabrics, starched clothing, cereals (especially if sugar coated), flour, and wallpaper paste. New houses may become infested with them before the plaster and woodwork are thoroughly dry. Basement food incinerators attract them and act as a constant source of food, often making their control more difficult. The common silverfish may live as long as 3 1/2 years.

#### Control

##### Cleanup

1. Reduce their food supply by keeping kitchens, bathrooms, attics, and basements spotlessly clean.
2. Calk all cracks behind baseboards with plastic wood, putty, or similar materials. Repair cracks and holes in plaster, bookcases, and infested furniture. Calk openings around water pipes and furnace flues. This will eliminate their hiding places and also help keep them from traveling from basement to upper floors, or from room to room.

##### Chemical control

For spraying use oil solutions of either 5% DDT, or 2% chlordane, or 1/4% dieldrin, or 5% methoxychlor containing 2/10% pyrethrum and 2% piperonyl butoxide. Treat wherever silverfish are found, particularly when they are present in large numbers.

Other refined (deodorized, see special warning under WARNING SECTION for more information) oil solutions for silverfish control are: Dichlorvos (DDVP) or Diazinon, 1/2 percent and ronnel (Korlan), 1 percent.

Important limitations of these materials include: (1) Do not treat entire walls or floors, only small areas of baseboards, cabinets and other places where silverfish occur, UNLESS THE PACKAGE LABEL SAYS IT IS SAFE TO DO SO. (2) Do not contaminate water, food, dishes or utensils with them. (3) Dry all treated surfaces before allowing children or pets on or near them. (4) See page 7 for general warnings concerning the use of insecticides.

For dusting, use materials of either 10% DDT or 2% chlordane, or 1% dieldrin. Dust into cracks and behind baseboards. You can apply DDT safely to bookcases and books, especially inside the binding. Remember to dust off excessive insecticide before using them.

**NOTE:** For sprays and dusts to use in cupboards, see the section on beetles, mites and moths.

## BOOK LICE

BOOK-LOUSE  
1/25 inch long



The common book louse\* is wingless, light straw-colored, and tiny when mature—about 1/12 to 1/25 inch long. It looks somewhat like aphids (plant lice) but is much smaller and has chewing instead of sucking type mouth parts. It has a well developed head, six large legs, and feelers (antennae) nearly as long as its body (see illustration).

When present, it may be found in all parts of a house, frequently on furniture, clothing, beds, walls, in kitchen cupboards, and in or around books. It also infests libraries, warehouses, and stored foods. It likes warm, damp conditions and may be numerous in new houses.

Book lice do very little damage to household furnishings but feed on molds, which are probably their most important source of food, and on dead vegetable and animal matter. They damage the paste on book bindings and wallpaper and may even be found on cereals in the kitchen. Silverfish and cockroaches, in their extensive feeding, may damage some of the same materials as the book lice but generally their feeding is less extensive.

### Control

#### Cleanup

1. Dry out the house. Book lice are seldom found in a heated and fairly dry building. However they can live in a house with high humidity.

#### Chemical control

Thoroughly dust or spray cracks and crevices or other places where they occur or are likely to be found. For a dust, use either 3/4% rotenone, or 0.2% pyrethrum, or 5% DDT, or 5% chlordane. You can use a dust on the bindings of books (preferably rotenone, pyrethrum or DDT) and then dust it off after a few days, especially if the books are needed regularly.

\*A close relative of the book louse is the deathwatch, which is similar in appearance and habits.

For a spray, use either 5% methoxychlor containing 0.2% pyrethrum and 2% piperonyl butoxide, or 5% DDT or 2% chlordane alone—all in deodorized white kerosene or other suitable oil.

Oil type sprays are usually more effective than dusts, but will generally stain books and sometimes household furnishings covered with fabric. A test sample can be made on furniture. However, a light film presents very little problem while heavy soaking may produce considerable damage.

**NOTE:** To treat beds and mattresses use either 5% DDT, or 5% methoxychlor containing 2/10% pyrethrum and 2% piperonyl butoxide, or 1% malathion in deodorized kerosene. When using one of these insecticides, do the following: Thoroughly spray the frame, slats and springs, and apply a light mist to seams, tufts, and folds. Allow 2 hours for the spray to dry before covering it with a sheet.

## 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 concentrated form emulsions are dangerous if spilled on clothing and skin. Change clothing. Use masks and protective clothing while spraying, especially if applying dangerous materials over a long period of 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. For other instructions, see *Emulsions* above.

### 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 if applying dangerous materials over a long period of 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 paint brush are probably the best kinds of equipment for the home owner to use for household insects.

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

### 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 applications 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 and solutions but not wettable powders. Use it both indoors and outdoors for treating small areas. NOTE: where high pressure is needed for good application, it has limited use.

### Aerosol

Aerosols (canned liquid under pressure) are discussed earlier and can usually be bought to fit your need. Buy as either gas producing for flying insects, or liquid types for crawling pests.

### Paintbrush

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

## WARNINGS

1. Inside buildings, apply chlordane, lindane, dieldrin, Diazinon, and most malathion formulations to small areas only (such as baseboards). Do not apply to entire rooms or buildings. NOTE: DDT and some weak malathion preparations (those containing less than 2% of the chemical) can be applied more safely over a larger area. Safer still are rotenone and pyrethrum preparations providing they do not contain materials more poisonous than methoxychlor and piperonyl butoxide. Avoid use of lindane inside buildings if you object to its odor. Some malathion formulations also have an odor.

2. Avoid using any material suggested in this folder around food or where children can get into them. Do not allow children on insecticide treated grass until 3 days after applying.

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 to tender flowers and shrubs, especially emulsions. Read labels to avoid using any material specified as damaging to certain plants.

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

8. Read the label for each insecticide used. Follow directions.

**SPECIAL WARNING:** For indoors, apply those insecticides manufactured especially for the purpose. Formulations suitable for treating livestock and plants of all kinds outdoors ARE NOT GENERALLY the best types for use in buildings (homes). For example: formulations for indoor application should contain only the purified grade of the chemical, not the commercial agricultural product. There is less objectionable odor to purified grades than to the agricultural grade. In addition to the kind of insecticide used in household preparations, the carrier (often an oil) should be specifically processed (refined) to reduce or eliminate objectionable odors.

Another point to consider: When a household pesticide is applied behind quarter round or any other like situation, or where there may be excessive heat, odor

from the chemicals may be more noticeable and consequently more objectionable.

#### **Pesticide Storage and Container Disposal**

Store all pesticide chemicals away from the reach of children (preferably locked up). A separate storage area (well marked with an appropriate sign) is recommended.

Carefully dispose empty containers. The label for each pesticide can be a source of directions for proper and safe disposal of pesticide chemicals. Your county agricultural agent also has literature concerning this problem. For still further information, get United States Department of Agriculture's publication, entitled "Safe Disposal of Empty Pesticides Containers and Surplus Pesticides."

**DO YOU READ THE PACKAGE LABEL FOR INSTRUCTIONS ON HOW TO USE INSECTICIDES SAFELY? IT IS BETTER TO READ THIS INFORMATION TODAY THAN TO WORRY ABOUT MISTAKES TOMORROW.**

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