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Kitchen Pests – Beetles, Mites, Moths, Cockroaches, Silverfish, Book Lice, Ants
Michigan State University
Cooperative Extension Service
Home and Family Series

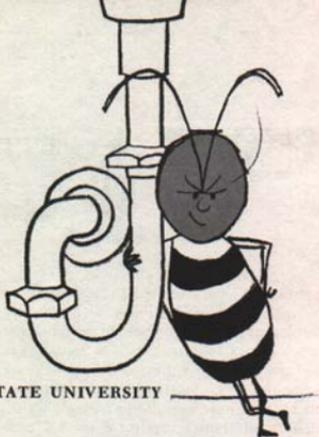
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8 pages

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KITCHEN PESTS

BEETLES
MITES
MOTHS
COCKROACHES
SILVERFISH
BOOK LICE
ANTS



COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

by Donald C. Cress
Extension Specialist in Entomology

Several types of insects and mites can infest kitchens. Of these, cockroaches are probably hardest to control. But, once any pests are found in the home, do not treat the problem lightly. Attack vigorously to rid the entire premises of the nuisance.

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

The beetles most frequently found include the saw-toothed grain beetle, flour beetles, drug-store beetle, cigarette beetle, larder beetle, and possibly the cadelle and hide beetles. The adult beetles range from about 1/10 to 1 inch in length. The larger ones are usually black while the smaller ones are generally red, reddish-brown or brown.

In recent years, the hide and larder beetles have increased noticeably in numbers in Michigan. Hide beetle larvae are about 1/3 inch long when mature.

BEETLES, MITES AND MOTHS

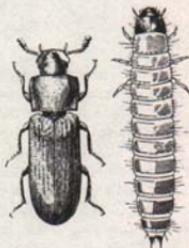
Beetles, mites, and moths may infest the kitchen and pantry foods in large numbers. These common household pests feed on a wide variety of foods, including: flour, pancake mix, corn meal, cereals, breakfast foods, red pepper, macaroni, dried fruits, nuts, dried meats, sugar, chocolate, tobacco, birdseed, drugs, etc. Several beetles, two moths and at least one mite fall into this category (see illustrations).



DRUG-STORE BEETLE
Adult (left), larva (right)

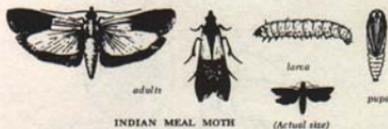
CIGARETTE BEETLE
Adult (left, center), larva (right)

CONFUSED FLOUR BEETLE
Adult (left), larva (right)



CADELLE BEETLE
larva, left; adult, right

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



INDIAN MEAL MOTH

(Actual size)

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), were dead or hibernating insects are likely to be found (attics), or where rodents may have been killed (outside walls).

The adult larder beetle (about 1/3 inch long) is generally black, except the wing covers are brownish-yellow on the end where they are attached to the body. In this brownish-yellow area on each wing are three 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,



CHEESE MITE
1/32 inch long

ham, bacon, cheese, and feathers in addition to some of those foods mentioned above.

The immature stages of the beetles and moths exist as worms (larvae). These tiny worms feed throughout the cereals and other food products. Adult beetles feed in the same way as their young, and both are usually found together in the same food.

The two moths most commonly found 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 the wings are grayish-white near the base. The Mediterranean flour moth is pale-gray throughout with wavy black lines across the upper wings. (See illustration.) Its head is raised slightly when standing still, giving the body a sloping appearance.

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 the beetles and moths are usually small, requiring magnification for identification.



MEDITERRANEAN FLOUR MOTH

Mites also infest grain products. They are transparent, only about 1/25 inch long, and are extremely hard to see. They can sometimes be spotted by a vibrating-type movement of infested grain products in the presence of strong light.

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.

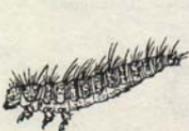
Controls

For good control of *hide and 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 these and 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.



HIDE BEETLE
Larva 1/3 inch long



LARDER BEETLE
Larva, Adult 1/3 inch long

Chemicals

Remove ALL items from the shelves and *lightly* 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 1/2% diazinon; or 2 or 3% malathion. Aerosol bombs may be used. Replace the dishes and food after the spray has dried (2 to 3 hours).

Shelves can be covered with waxed paper or other type coverings before using the cupboards for food and dish storage. However, this is not absolutely necessary, providing food is not laid directly on the chemically treated surface.

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 as 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.

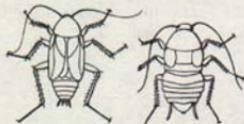
The *American cockroach*, our largest, may grow to 1 1/2 inches, is reddish-brown to brownish with light markings on top of the thorax, (the body division that bears the legs and wings) and matures in about seven months. It prefers basements, especially around pipes, and is often found in sewage systems.

The *oriental cockroach* is black, 1 1/4 inches long when mature, and has short wings, the wings of the female being only rudimentary. It may take as long



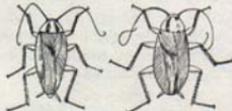
AMERICAN COCKROACH
1 1/2 inches long when mature

as 12 months to mature* and is a relatively 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, especially if the areas are damp.



ORIENTAL ROACH
male, 1 inch long; female, 3/4 inch long

The adult *German cockroach* is slightly over 1/2 inch long and is brown, with two, black, parallel lines just behind the head. (See illustration.) It likes high relative humidity and about 70°F. temperature. It is very active, wary and readily migrates from building to building, or between parts of a building. However, it prefers the kitchen where it can thrive on poor housekeeping. It can mature within 40 days and in most heated buildings multiplies throughout the year. It may get into books and destroy bindings.



GERMAN COCKROACH
male and female, 1/2 inch long

*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 skins hardens and matures. For example, the adult American cockroach is yellowish-red when it first emerges from the last molt.

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 in 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 dark brown 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°F. and will develop to maturity in 150 days or less under this condition.



BROWN BANDED ROACH

Another roach often found invading the home in the spring is the *Pennsylvania wood roach*. This creature is not as wary and fast as its house-dwelling cousins. However, if brought into the house in fire-place wood, it does enjoy the warmth of the home and crumbs in the kitchen. This roach does not nest inside.

Except for smaller size, and undeveloped wings, immature forms of all cockroach species resemble the adult.

Roaches lay their eggs in large numbers within a single capsule, which usually contains about 12 or more eggs. The several egg compartments within the capsule are indicated by rings on the outside (see

illustration). The egg capsules range in color from dark brown to reddish brown and are somewhat bean-shaped. They are usually deposited in out-of-the-way places such as: on the underside of shelves, inside cupboard corners, bottoms of drawers and similar hard-to-see places. Egg capsules which have hatched will usually float while those that have not hatched will usually sink in water.



Control

COCKROACH EGG CAPSULE
Left (side view), Right (end view)

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 comfortably in dirt, filth, and moisture.
2. Eliminate all cracks behind baseboards by calking with plastic wood, putty or other suitable materials. 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 and to keep roaches from traveling from the 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 locate their runways. Enter dark rooms with a flashlight to locate infested areas. Likely hiding places 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; or 1/2% Diazinon; or 2% malathion; or 1/2% Baygon; or 2/10% pyrethrum and 2% piperonyl butoxide in combination with 2% chlordane.



PENNSYLVANIA WOOD ROACH

See page 8 for warnings concerning the use of these materials. These materials may be applied by using an aerosol bomb.

Other refined deodorized, oil solutions (see Special Warning under WARNING SECTION for more information) for cockroach control are: Dichlorvos (DDVP), 1/2 percent and ronnel, 2%. Important limitations of all 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, and (4) See page 8 for general warnings concerning the use of insecticides.

For dusting, apply dusts of either 5% chlordane, 2% Diazinon, or 10% malathion. Chlordane and Diazinon are usually best for cockroach control although pyrethrum-type treatments are very good knock-down agents, 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 place it where children or pets might be poisoned by eating the chemical.

See WARNING section for the degree of toxicity of each type of material. When treating dresser drawers, clean the insides thoroughly. Apply sprays or dusts only to the outside surfaces, except the front, where exposure to light limits effective control.

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 and should be avoided if at all possible.

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 emulsifiable concentrate, or eight tablespoons of 25% wettable lindane powder or four tablespoons of 20% lindane emulsifiable concentrate to one gallon of water.

Diazinon and malathion can also be used for outdoor treatment, especially when roaches are very difficult to control. Mix either with any of the insecticides just suggested, or apply alone. (Mixtures are preferred.) Use four tablespoons of 50% wettable Diazinon powder or five tablespoons of Diazinon emulsifiable concentrate containing two pounds of actual chemical per gallon, or one-half pound of 25% malathion powder or seven tablespoons of 50% emulsifiable concentrate to one gallon of water.

Take special care to spray the sides and base of steps thoroughly. With the same materials, spray the grass up to ten feet from the foundation. Keep children and pets away from these sprays, or do not apply such chemicals. 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 use good cleaning methods and apply the inside treatments.

SILVERFISH

Silverfish, often called *firebrats* and *bristletails*, were known to occur before the cockroach. The adults are wingless and about 1/2 inch long. Color varies from silver-gray to greenish-gray to brownish. They sometimes 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.

All 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.



SILVERFISH
1/2 inch long

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. The bath tub and sink are most often frequented.

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 2% chlordane, or 5% methoxychlor containing 2/10% pyrethrum and 2% piperonyl butoxide. Treat where silverfish are found, particularly when they are present in large numbers. Aerosols may be used conveniently.

Other deodorized oil solutions (see Special Warning) for silverfish control are: Dichlorvos (DDVP) Baygon, or Diazinon, 1/2% and ronnel (Korlan), 1%.

Important limitations of these materials: (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, and (4) See page 8 for general warnings concerning the use of insecticides.

For dusting, use 2% chlordane or Diazinon. Dust into cracks and behind baseboards. Remember to dust off excessive insecticide before using them.

NOTE: For sprays and dusts for cupboard use, 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 an aphid (plant louse) 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.)

The common book louse 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 may damage some of the same materials as the book lice but their feeding is generally 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% chlordane. A dust can be used on the bindings of books (preferably rotenone, or pyrethrum), but should be removed after a few days, especially if the books are needed regularly.

For a spray, use either 5% methoxychlor containing 0.2% pyrethrum and 2% piperonyl butoxide; 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 in an inconspicuous place. Usually, a light film will present very few problems while heavy soaking may produce considerable damage.

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

ANTS

Ants are a problem in Michigan due to their small size and the numerous varieties—all exhibiting different eating and nesting habits. All ants, except the large, black carpenter ants, are very small (1/16" to 1" long), and may be brown, red or black, or combinations of these colors. Field ant cycles are such that the majority of species invade homes in the spring and early summer or in the fall rather than in the middle of summer. These invasions are called "swarms."

To control ants, one must first discover where the ants enter the kitchen or at least from what direction or by which path they finally reach the kitchen cabinet. Usually, this is easily determined by placing honey or bacon on the cabinet to allow the ants to reach it. Once their route is known, judicious spot treatments with a pesticide will reduce the nuisance considerably.

If an ant colony is established within the framework of your house, killing the workers that forage around the kitchen seldom gives permanent relief.

Destruction of the nest is the only satisfactory means of control. This is also necessary for removal of established colonies of carpenter ants.

Luckily, most nuisance ants nest outdoors and only occasionally invade the home. A chemical barrier is effective in this instance if applied around the outside of the house.

Chemical Control

Sprays are most effective (aerosols) and should be used rather than baits, dusts, or granules whenever possible. Chlordane 2 or 3%; or Baygon 1 1/2%; or Diazinon 1 1/2% are effective ant killers. Spot treat only, and be sure to include the edge of shelves, cabinets and sinks. Baits are effective on some, but not all, ants. Kepone (0.125%) may be used.

To control ant colonies outdoors, use sprays of 2% carbaryl (Sevin liquid flowable or wettable powder to be added to water); or chlordane 2 to 3% (liquid or wettable powder). These sprays should be applied to the ground around the house in a 10-foot band. Cracks in sidewalks and the exterior foundation wall should also be sprayed with chlordane.

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.

Emulsifiable Concentrates

Emulsifiable concentrates are liquids. They must be mixed with water, turning it milky (the emulsion). They are generally not used inside buildings. Apply them outdoors both to plants and around foundations. Be careful when applying to tender flowers and shrubs for they may injure these plants. In concentrated form, emulsifiable concentrates 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 will cause severe injury. Like emulsifiable concentrates, solutions are dangerous if spilled on clothing and skin. Immediately wash off with soap and water and change clothing. For other instructions, see Emulsifiable Concentrates above.

Wettable Powders

These are similar to dusts (below), but they contain a higher percentage of chemical. 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 as previously specified.

Aerosols

Aerosols are liquids held under pressure in a container. When released, usually by pressing a button, some form a gas, others a spray. "Gas-producing" types are used for control of flying insects (such as flies), and liquid types 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 against 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 one to four 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.

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.

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.

Paintbrush

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

WARNINGS

1. Inside buildings, apply chlordane, lindane, Baygon, Diazinon, and most malathion formulations to small areas only (such as baseboards). Do not apply to entire rooms or buildings. Rotenone and pyrethrum preparations are even safer provided that 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 it. Do not allow children on insecticide treated grass until 3 days after application.

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

4. If emulsifiable concentrates 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 (pilot lights), 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 or fruits, or to garden soils unless the label or up-to-date Michigan State University Co-

operative Extension literature says you can safely do so.

8. Never puncture an aerosol can. This can cause injury.

9. Read the label for each insecticide used. Then, follow directions.

SPECIAL WARNING

For indoors, apply only 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 than the pest itself.

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 of 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.