

# MAINTENANCE GUIDEBOOK VII TERMITE, INSECT, AND RODENT CONTROL

## CHAPTER NINE - PANTRY AND STORED-PRODUCT PESTS

### SECTION A CHARACTERISTICS AND RECOGNITION

#### 1. GENERAL

Stored food products are subject to infestation from the point of origin to consumer by different insects. Sites of potential infestation include fields where products are grown and harvested, storage bins where food is held for use or sale, mills where foods are ground, mixed, or packaged, warehouses, food-processing plants, food-service establishments, retail stores, and residential pantries and cupboards.

The most commonly attacked stored food products are cereal grains, spices, and nuts. Less commonly attacked are dried fruits, candy, rodent bait, dried dog food, and dried decorative flowers. Products that are old, or located in hard-to-reach places offer potential for infestation.

#### 2. INDIAN MEAL MOTH

The Indian meal moth, *Plodia interpunctella* (Hbn.), (Fig. 9-1) is one of two major insect pests in this country, and it has become increasingly resistant to pesticides. The Indian meal moth is a small colorful moth about 1/3-inch long with a brown head and thorax. The base of its wings is gray with the rest copper-colored with dark bands. Larvae are caterpillar-like, about 1/2-inch long, and cream-colored with a brown head.

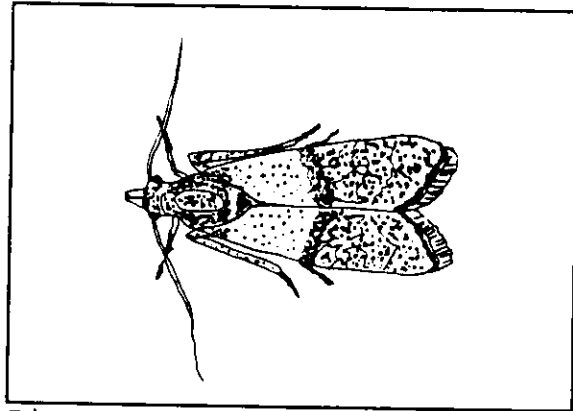


Figure 9-1

Even a small number of larvae constitutes infestation. As the larval population increases, they spin silken strands of webbing contaminated with excrement over their food. Indian meal moths can infest cereals and starch-containing products, such as crackers, cake mixes, pasta, dog food, and rodent bait. They are particularly attracted to nut meats, powdered milk, a number of spices, and dried fruits.

Control depends on finding and destroying the infested items. Sticky traps containing attractive odors are available to monitor the presence of adults, and can be used to determine the location of the

infestation. Other techniques include increased sanitation, treatment of surfaces, cracks, and crevices with pesticides, or, as a last resort, fumigation.

### 3. SAW-TOOTHED GRAIN BEETLE

The saw-toothed grain beetle, *Oryzaephilus surinamensis* (L.), (Fig. 9-2) is another major stored-product pest in the United States. This is a tiny, slender, dark-brown beetle that measures a little under 1/8-inch long. It has three ridges on the top and six fine teeth on either side of the thorax. Adults are imported in infested packages. Saw-toothed grain beetles are scavengers that readily penetrate and feed on the same materials as do Indian meal moths. Since each female produces

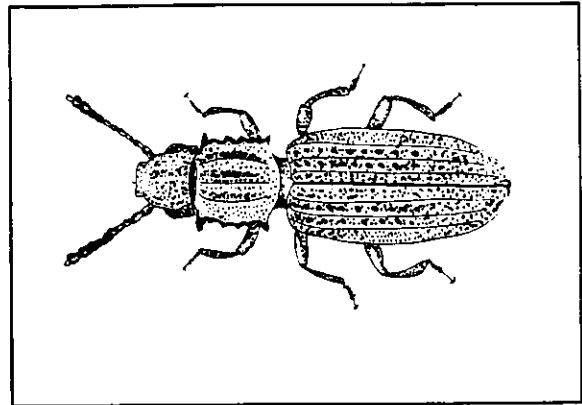


Figure 9-2

around 350 eggs and there is a new generation every 30 days, populations build quickly, making it important to find the infested products quickly. They can destroy a large amount of food. Pesticides are usually unnecessary when infested materials can be found and discarded and cracks and crevices thoroughly cleaned.

### 4. DERMESTID BEETLES

Dermetid beetles (Fig. 9-3) are a large family of similar-appearing, small beetles that also includes carpet beetles (see Chapter Eleven - Fabric Pests). These pests infest not only fabrics but also a wide variety of stored food products. If food is scarce, some species will cannibalize one another or feed on their own cast skins, and can survive for an extended time without any food. These are among the more common residential pests found in stored seeds, beans, grain, meal, cereals, meat, dry milk,

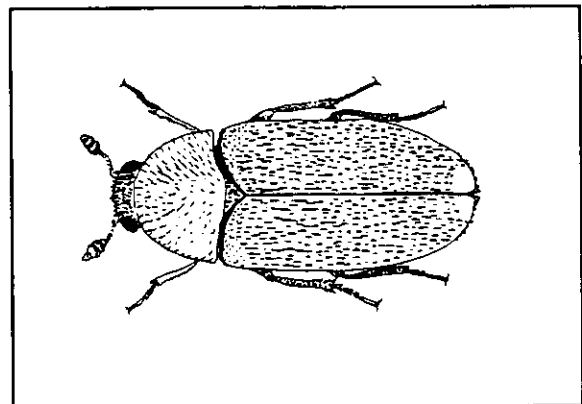


Figure 9-3

milk products, spices, pet food, nut meats, and dried foods. Their presence usually draws attention when small, shell-like skins cast off from larvae are found in food and on shelves among food packages. For inspection and control see Chapter Eleven - Fabric Pests.

## 5. RICE WEEVILS AND GRANARY WEEVILS

Rice weevils, *Sitophilus oryza* (L.), and granary weevils, *Sitophilus granarius* (L.), (Figs. 9-4 and 9-5) are two similar-appearing snout beetles found and transported in whole-grain products throughout the United States. Adult beetles have long snouts with jaws at the tip; females use their jaws to drill holes into whole grains, where they deposit eggs. Larvae eat the interior of the seed during growth, pupate, and emerge as adults to renew the cycle. Rice weevils fly, but granary weevils do not. Although these two weevils are more common in granaries and mills than in housing, they sometimes infest a wide variety of cereal grains and seeds, including popcorn, puffed wheat, and decorative corn stored in residential pantries and garages. The presence of adults requires that all stored products be checked and that infested ones be discarded.

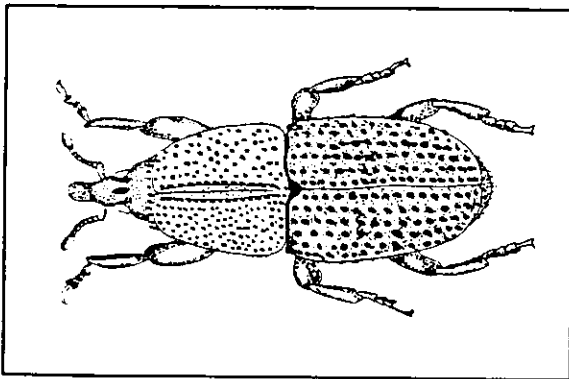


Figure 9-4

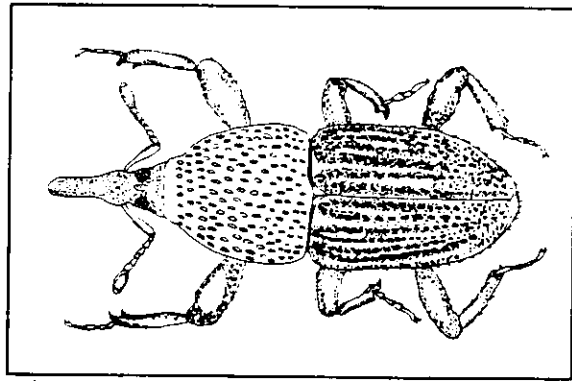


Figure 9-5

## 6. CIGARETTE AND DRUGSTORE BEETLES

Cigarette, *Lasioderma serricorne* (F.), and drugstore beetles, *Stegobium paniceum* (L.), (Figs. 9-6 and 9-7) are two similar-appearing pests about 1/8-inch long and reddish-brown in color. Both species fly.

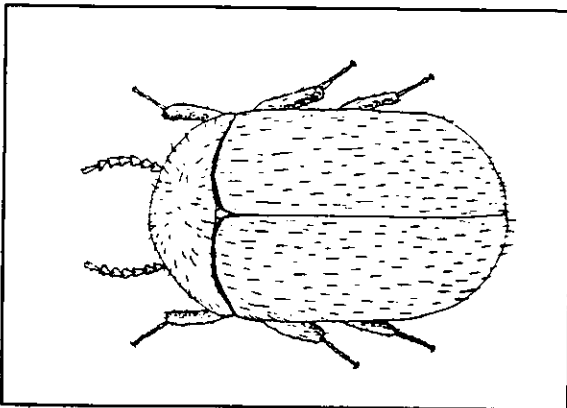


Figure 9-6

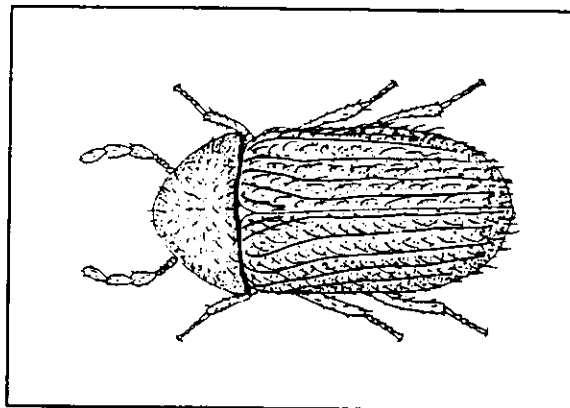


Figure 9-7

These destructive pests affect a wider range of foods than most other stored-food pests. They are found in stored tobacco, spices (especially paprika, ginger, and ground pepper), beans, cottonseed

meal, rice and other grains, milled flours and cornmeal, dry dog food, peanuts, dried fruits, cocoa, herbs, flax, books, some drugs and cosmetics, crackers, celery seed, and even some poisons. They also feed on hardwoods and softwoods (preferring older wood with fairly high moisture content), paper, cellulose, textiles, baskets, herbarium and insect specimens, furniture upholstered with flax tow, straw, fish meal, leather, grain-based rodent bait, and they may damage some protein materials like silk. The larvae cannot develop below 65 degrees F, nor survive in less than 30 percent humidity. Adults are attracted to high-moisture conditions. These beetles are brought into homes on firewood, outdoor furniture, and lumber. Their control requires finding and destroying infestations.

## 7. FLOUR BEETLES

Two common kinds of similar-appearing flour beetles are the red, *Tribolium castaneum* (Hbst.), and the confused flour beetles, *Tribolium confusum* (Duval), (Figs 9-8 and 9-9). These insects are about 1/8-inch long, reddish-brown in color, and have short, stout antennae. Larvae are only slightly longer than adults, cream-colored, and with few hairs. They infest packaged and milled cereals such as flour, cornmeal, and cake mixes. Bulk flour may remain stored long enough to allow eggs or larvae not killed during milling and packaging to develop. The presence of these pests enhances mold development and imparts disagreeable tastes and odor to flour. They also feed on spices, shelled nuts, dried fruits, and milk chocolate. Control requires that the source of infestation be discarded or sanitized, and the storage area thoroughly cleaned.

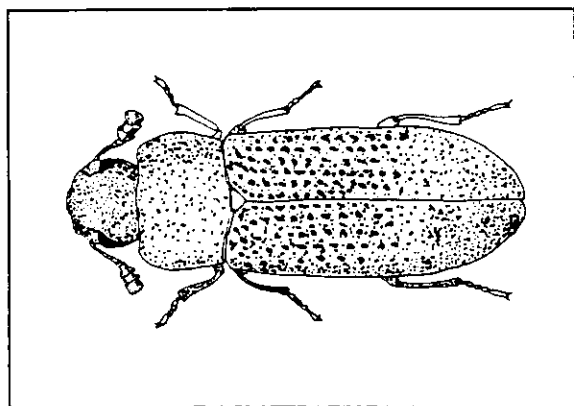


Figure 9-8

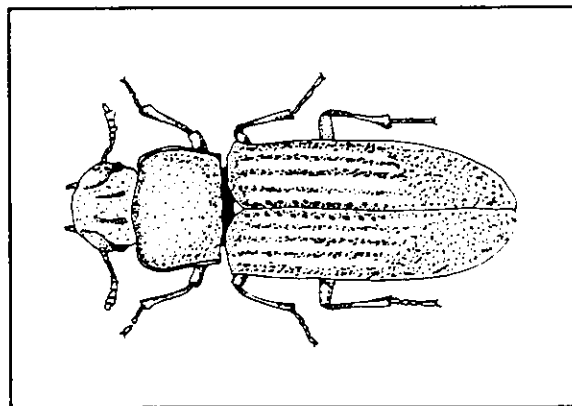


Figure 9-9

## SECTION B HAZARDS OF INFESTATION

Worldwide, costly losses of food occur every year because of stored-product pests. When accidentally eaten, larval hairs in contaminated food may cause enteric irritation in infants or intestinal disturbances or allergic conditions (urticaria, conjunctivitis, nausea, respiratory-tract irritations) in adults.

## **SECTION C INSPECTION AND MONITORING**

### **1. GENERAL**

There is a reason for pest infestation. The intent of inspection is to determine the kind and extent of infestations, how the pest got into the space, and what factors contribute to its survival.

### **2. INSPECTION**

Conduct inspections with a bright flashlight. Special attention should be given to all food spills. To determine if insects have chewed their way into or out of a plastic bag, carefully examine the bag with a hand lens; insects will have entered from the direction in which holes are larger or from the side of the bag showing scratches where insects tried to rasp holes.

Since flour beetles are transported into residences with infested products, control cannot be complete until all infested material is found and removed. This can be a sizeable undertaking, based on the variety of places where stored-product pests may be found. Places where stored-product pests will most likely be found in households are:

- Indian corn decorations and popcorn packing;
- Animal food such as dried dog food, biscuits, and treats stored or spilled under appliances, and bird seed or feed;
- Children's bean bags, forgotten candy or party nuts hidden away;
- Ornamental and decorative foods and grains in printers' boxes, apothecary jars, picture frames, jewelry, and table centerpieces containing nuts or seeds;
- Old rodent bait;
- Spices in metal containers that have been kept for years;
- Ethnic and seasonal foods only used once a year, such as matzo meal or Christmas foods;
- Stuffed dolls and furniture padding;
- Turtle and fish food;
- Old books where insects are attracted to the glue in bindings;
- Old tobacco products forgotten by ex-smokers.

Other locations where stored-product pests may be found are:

- Cork boards and backings;
- Dead animal carcasses in voids, attics, or crawlspaces;
- Objects containing fur, skins, horn, hair, feathers, and bristles;
- Lint in cracks;
- Picture frames, decorations;

- Stored leather goods;
- Old drugs;
- Organic fertilizers and bonemeal;
- Garden seeds and bulbs;
- Insect displays and collections;
- Bird, rodent, wasp, bee, and bat nests;
- Smoked or dried meats.

**a. How to Inspect**

- Initially, look at products on the "Big 11" list of susceptibles: cocoa, corn meal, farina, grits, fry mix, pasta, barley, flour, dried beans and peas, and spices. Open the bags and examine the inside of bag edges with a flashlight. Pour part of the contents of the bag onto a white paper and look for insects; sometimes insects will "play dead" for a period of time. If insects are not seen, return product to container. Then inspect spices, corn meal, cake mix, other types of food mixes, and dog food. Never look at just the top packages in a stack, examine the second and third packages down where there is less light. Turn packages over and look at bag bottoms for pin holes, insect debris, cast skins, and holes drilled in beans or peas. Sources of infestation are usually old packages of pancake mix or cornmeal that have not been used for years.
- Inspect closets and pantries for forgotten bags of nuts, candy, ornamental corn, or grains. Wild birdseed is a good potential source for infestation. Provide residents instructions on what to look for and request their help in the inspection.
- Inspect the garage if food or pet food is stored there. Also look for containers of wallpaper paste, rodenticide, presence of rodent or insect feces, and bird or insect nests.
- Check to see that shelf paper is not being used in pantry or, if it is used, that it adheres tightly to shelves and doesn't provide insect harborage in folds and loose areas.
- Keep notes on whether the area being inspected is unduly attractive to pests.
- Check crawlspaces and attics, particularly around plumbing lines and bath traps. A commonly overlooked source of stored-product pest problems occurs when rodents store pet food or bird seed in inaccessible wall voids, which then becomes infested. When such "lost" foods gets wet, fungus-dependent beetles, flies, and mites become a whole new array of pests that may infest the residence. Locate and remove such food.
- Request that the resident mark on a floor plan of the residence places where pests have been seen, and then carefully examine those areas.
- Inspect all doors, windows, and structural openings to be sure they exclude insects and mammals.
- Keep notes on the kinds and conditions of outside vegetation. Many spring-flowering shrubs

(Spirea) attract adult Dermestids at a time when outside doors are most often left open. Beetles are attracted into dwellings by food odors and temperature differentials. Pecan and other nut trees harbor insects in fallen fruit which, unknowingly, may be brought into the residence.

- Inspect for the possibility of infestations inside seldom-used food-processing equipment and toasters. Also, regularly inspect dust collectors, look for pipes that connect to fabric sleeves.
- Inspect for infestations in candy and cigarette products in vending machines.

### **3. MONITORING**

The following methods should be used for monitoring pantry and stored-product pests:

- Use a variety of traps to monitor and identify insect pests. Place sticky or attractant (pheromone) traps in a grid where there is a history of infestation and especially in high-risk food-storage areas; pheromone traps may attract beetles from over ten feet away. Replace traps periodically to assure that pheromones are fresh.
- Look for insect trails in dust and determine causes.
- Look for cast insect skins and spilled stored-food products on shelves.

## **SECTION D CONTROLS**

The presence of stored-product pests generally indicates inadequate sanitation practices; control requires that sources of infested food be found and discarded and the storage area be meticulously cleaned. If the source of infestation is not removed, control programs will not be effective.

### **1. PHYSICAL, MECHANICAL, AND CULTURAL CONTROLS**

Use the following methods to control infestations of pantry and stored-product pests:

- Beverage and laundry trucks and pallets are potential pest sources which should be inspected and frequently cleaned. Store all cans and bottles to be recycled inside six-mil plastic bags and within a closed drum.
- Frequently vacuum up debris from around equipment, under pallets, and from cracks and crevices. Proper sanitation and cleaning programs are vital where foods are stored or processed. Cleaning denies food to pests, and this plays a vital role in reducing the number of insects that survive or reproduce.
- Replace or modify equipment having inaccessible spaces that accumulate food.
- Caulk all wall cracks and penetrations leading into other rooms or voids.
- Correct moisture problems; try to reduce relative humidity as much as possible in food-storage areas.

- Properly install insect electrocuters and frequently clean out collection pans.
- Proper disposal of refuse is vital; keep trash containers covered and regularly empty them.
- Advise residents to store corn meal and flour, if possible, in the refrigerator; store dog food in a tight metal can outside or in the garage; store spices in sealed glass bottles.
- Practice good sanitation. If active infestations are found in food packages, place the food in its original package in an oven at low heat for one hour (until the core temperature is 130 degrees F) to kill pests before throwing the food and package away; re-contamination often occurs when infested goods containing live insect pests are simply discarded into garbage cans. If infested packaged goods cannot be sterilized, seal them in plastic bags and put them into outdoor garbage receptacles; do not allow insects to spread indoors before disposing of infested food.
- For exterior lighting, use high-pressure sodium-vapor lamps that do not attract pests, or mount lights on poles at least 30-feet from buildings so they shine back onto buildings rather than mounting them above doors.
- Refrigerators will protect products from infestation.
- All screens, doors, and windows should be insect-tight, and roof vents/openings screened.
- Clean bulk food bins before refilling them; if different bulk foods are stored close together, establish barriers to prevent pest invasion.
- Regularly check packages to assure plastic wraps are not wrinkled, which allows pests to penetrate the fiber carton. Insects cannot penetrate one-mil polyethylene when the surface is smooth, but will invade creased or bent surfaces; four-mil polyethylene wrapping is resistant to insect penetration.
- Freeze all susceptible flour and cereal goods at 0 degrees F for two weeks when first bringing them into the residence, then periodically freeze them again if they are not promptly used up.
- Heat susceptible flour and cereal goods and hold internal temperature at 120 degrees F for an hour to kill most stored-product pests.
- Provide residents a checklist of the most susceptible products and information on how to monitor for infestations.
- Store susceptible foods in sealed glass or plastic containers.
- Frequently vacuum kitchen cabinets, dry-food storage areas, and under stoves and refrigerators where food debris accumulates.
- Purchase seldom-used foods only in small quantities and avoid long-term storage; rotate foods by a first-in and first-out method, using date codes to manage storage time. Remove and destroy old or suspected items.
- Place food-storage shelves and platforms three to four inches off the floor so floors can be inspected and cleaned; use metal shelving, if possible.



## **2. CHEMICAL CONTROLS**

The use of pesticides, without cleaning and removal of infested foods, will not control stored-product pest infestations. Carefully follow label directions when applying pesticides registered for use in food-storage areas. Storage areas are best treated with spot applications to cracks and crevices that are then caulked.

The large number of chemical pesticides labeled for stored-product pest control includes sprays, aerosols, dusts, and fumigants. However, more and more insects show resistance to insecticides. Follow all safety precautions described on pesticide labels for application and subsequent contact with pesticide-treated surfaces.

Be sure all food products are placed in tightly sealed containers prior to pesticide treatment.

**END OF CHAPTER NINE**