



Beetles in Flour and Meal

Injury: Beetles of several species infest packages of whole grain and grain products. The infestation may begin at the time of manufacture or processing, in the warehouses of food distributors, in transit, on the grocers' shelves, or in the home. Most food processors and handlers make every effort to avoid insect infestations, but occasionally the efforts fail.

Infestations are usually discovered when an infested package is opened for use, or when small brown beetles are found in the kitchen near containers of stored grain products. A wide variety of foods may be infested, including flour, cereal, dried fruits, dehydrated vegetables, shelled nuts, chocolate, spices, candies, pet foods, and bird seed. Eggs, larvae, pupae, and adults of the beetles may occur in infested foods.



Fig. 1. Confused flour beetles. (Photograph Jim Kalisch, Department of Entomology, University of Nebraska-Lincoln)

Description: Two dozen or more different species of insects may occasionally infest grain and grain products used in homes, but four species are much more frequent than the others. Three of these are minute insects, and the fourth is moderate in size.

The **confused flour beetle** (*Tribolium confusum*) (**Fig. 1**) is perhaps the most common. It is about 1/7 inch in length, an elongated, dark brown, hard-shelled beetle. The **sawtoothed grain beetle** (*Oryzaephilus surinamensis*) (**Fig. 2**), which is slightly shorter and more slender is nearly as common. For more information on saw toothed grain beetles see the Factsheet: <http://entomology.cornell.edu/cals/entomology/extension/idl/upload/Sawtoothed-Grain-Beetle.pdf>.

The **red flour beetle** (*Tribolium castaneum*) (**Fig. 3**), is slightly larger than the confused flour beetle, but both are red-brown in color.

The growth and development of the flour beetles and the saw-toothed grain beetle are similar. Adult females lay eggs so small as to be nearly invisible to the naked eye. The newly hatched larva, a tiny cream-colored insect with dark head, feeds voraciously upon grain and meal, and under the best of conditions will complete its development in 6 to 7 weeks. The pupal stage will require another 10 days to 2 weeks, so that it is not uncommon to have 5 or more generations each year. Adult female beetles may lay hundreds of eggs during a two to three year life span.

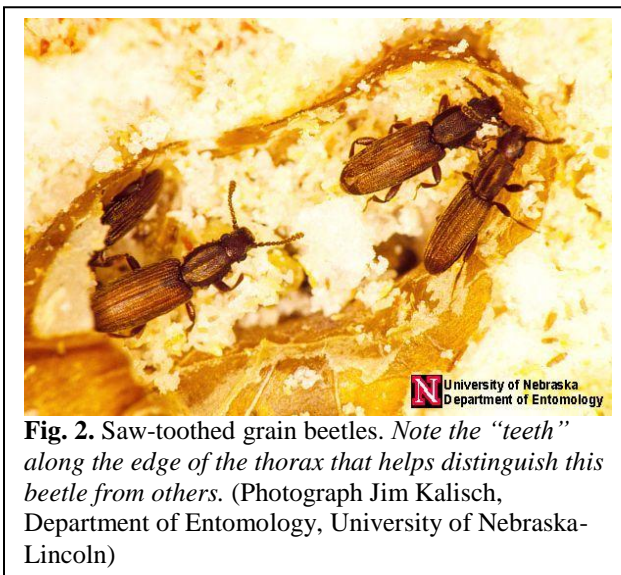


Fig. 2. Saw-toothed grain beetles. Note the "teeth" along the edge of the thorax that helps distinguish this beetle from others. (Photograph Jim Kalisch, Department of Entomology, University of Nebraska-Lincoln)

The **yellow mealworm** (*Tenebrio molitor*) (**Fig. 4**) is a larger insect, with the adult being more than 1/2 inch in length and black in color. It develops more slowly than the three small species, seldom completing a generation in four months, and frequently requiring more than one year. Because these large black beetles are so easily seen, and because of their extended period of development, infestations are usually discovered and treated before they become serious in the home.

Though these four are the most common of the beetles infesting meal and flour in the home, many others are not uncommon, and vigilance is necessary to detect infestations as early as possible.



Fig. 3. The red flour beetle (Peggy Greb, *USDA Agricultural Research Service*, www.Bugwood.org)



Fig. 4. The yellow mealworm, left to right larva, pupa & adult. ((Photograph Jim Kalisch, Department of Entomology, University of Nebraska-Lincoln)

Management: The following suggestions may be useful in bringing an infestation quickly under control. Prompt action can be important in preventing losses of quantities of foods stored on kitchen and pantry shelves.

1. Carefully examine all susceptible foods that may have been exposed to infested material. Insects may even be found in paper-wrapped products that have not yet been opened in the home. All infested packages should be destroyed. There is no satisfactory way of separating insects from the flour of meal.
 2. The contents from opened packages that appear to be uninfested should be transferred to glass jars or plastic containers with tight-fitting tops. This precaution is necessary because of the possibility that eggs of beetles, concealed in the product when the examination is made, may hatch later and lead to a new infestation if not contained. The glass aids in the periodic examination of the food.
 3. Remove all food containers and utensils from the infested area. Remove old shelf paper and clean thoroughly, first with a vacuum cleaner and then with soap and water. Special attention should be paid to cracks and corners where bits of flour, meal, or spices may have accumulated.
 4. Continue to observe the area for several months after above procedure. If beetles reappear, the clean up may have been inadequate, or a newly infested package may have been brought into the kitchen.
- Long term storage of meal and flour products often leads to infestation, and therefore, such products should be purchased in quantities suitable for early use unless adequate containers are employed.

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The Pesticide Management Education Program (PMEP), in cooperation with the New York State Department of Environmental Conservation (NYSDEC), maintains a web site with a searchable database for pesticide products currently registered in New York State. Individuals who have Internet access can locate currently registered products containing the active ingredients suggested above at <http://pims.psur.cornell.edu/> (NYS PIMS).

This publication contains pesticide recommendations. Changes in pesticide regulations occur constantly and human errors are still possible. Some materials mentioned may no longer be available, and some uses may no longer be legal. All pesticides distributed, sold or applied in New York State must be registered with the New York State Department of Environmental Conservation (NYSDEC). Questions concerning the legality and/or registration status for pesticide use in New York State should be directed to the appropriate Cornell Cooperative Extension Specialist or your regional NYSDEC office. Read the label before applying any pesticide.

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