



Entomological Notes

Department of Entomology

CONFUSED FLOUR BEETLE AND RED FLOUR BEETLE

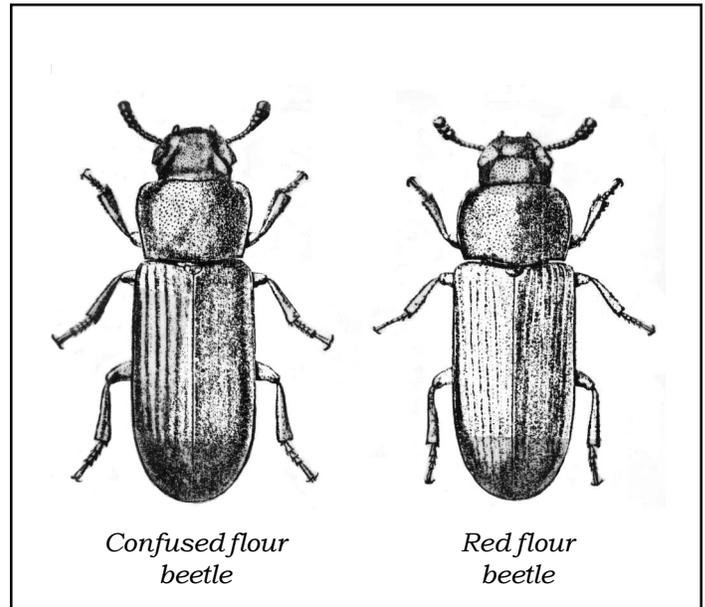
The confused flour beetle, *Tribolium confusum* Jacquelin du Val, is a common insect that attacks stored grains and foods in the pantry. This insect has a world wide distribution and is very abundant in the United States. It generally feeds on finely ground or broken starch materials, such as flour or meal. Adults and larvae feed on broken kernels and fine-grind materials in granaries, mills, warehouses, and other places where grain or grain products are stored. A closely related species, the red flour beetle, *Tribolium castaneum* (Herbst), is often found associated with the confused flour beetle. These two species are difficult to distinguish, particularly in the larval stage of development.

THE PROBLEM IN PENNSYLVANIA

On-farm grain storage, particularly of corn, is increasing in Pennsylvania. Stored grains offer ample food sources for a number of insect pests. Good storage management practices are aimed at excluding grain feeding insects while maintaining grain quality. Grain that has not been screened of fine materials and broken kernels is particularly susceptible to attack by these two species of insects. The longer grain is held in storage, the greater the need to maintain good management practices, such as sanitation and residual sprays. When proper management is ignored, populations of insects which have been feeding and reproducing in grain residues are free to infest new grain. Once in the new grain, the insects continue to eat and reproduce. Substantial numbers of grain-infesting insects can reduce grain weight and quality. The presence of live insects can result in dockage or rejection of the grain.

LIFE CYCLE

The adult beetles are very active and move about rapidly when disturbed. The average life of adults is about one year. Females lay an average of about 450 eggs, which are small and clear white. The eggs are laid loosely on fine materials and broken kernels where the adults reside. The eggs are covered with a sticky secretion which the fine material adheres to. Fresh material placed in a grain bin will become



rapidly infested if previous grain residue is not removed. Larvae (small brownish-white worms) hatch in five to twelve days and are full-grown in one to four months. Full grown larva are about three-sixteenths inch long and tinged with yellow. These larvae feed on fine materials and broken grain kernels. The larvae transform into small naked pupae, which are white at first and then gradually change to yellow and then to brown and shortly afterwards into the reddish-brown adult beetle. The period from egg to adult averages about six weeks under favorable weather conditions, but is greatly prolonged by cold weather, as is true of all grain pests. The life cycle of the red flour beetle is usually shorter than the confused flour beetle.

DESCRIPTION OF LIFE STAGES

The confused flour beetle is a shiny, flattened, oval, reddish-brown beetle about one-seventh of an inch long. The head and upper parts of the thorax are densely covered with minute punctures. The wing covers are ridged lengthwise and are sparsely punctured between the ridges. The antennae of the confused flour beetle gradually enlarge toward the tip, producing a four-segment club. The red flour beetle is similar in appearance. The main distinguishing characteristics are the shape of the antennae, the head margin, and the shape of the pronotum. The red flour

beetle's antennae enlarge abruptly at the last segment giving the antennae a knobbed appearance. The head margin of this species is nearly continuous at the eyes and does not have a ridge over the eye. The pronotum is widest in the middle as compared to the confused flour beetle where the pronotum is wider toward the front margin. The wing covers are not as deeply ridged as the confused flour beetle.

DAMAGE

The confused and red flour beetles cannot feed on whole undamaged grain; they are, however, often found among dust, fines, and dockage. The beetles do cause damage by feeding but probably cause more problems by contaminating the grain. Large numbers of dead bodies, cast skins, and fecal pellets, as well as liquids (quinones), can produce extremely pungent odors in grain. The nauseous smell and taste caused by infestations of confused and red flour beetles can result in poor feed consumption by livestock and rejection by grain buyers. In most cases, the presence of live insects in a grain bin indicates that moisture buildup and molds are also present. The combination of these three factors can greatly reduce the quality and value of grain.

MANAGEMENT

Prevention is the best strategy to avoid insect problems in stored grains. Proper bin sanitation before introduction of new grain minimizes the need for pesticides. Good sanitation involves the removal of old grain and dust in and around the grain bin. This includes removal of old grain from corners, floors, and walls. Any grain remaining when a bin is emptied can harbor insect infestations which will move into the new grain. Grain that is to be stored for longer than six months may need a protective application of an approved insecticide.

Before grain is placed in a bin, it should be screened to eliminate fine materials and broken kernels. Grain placed in a clean bin should be checked at two week intervals during warm months and at one month intervals during cooler months for the presence of hotspots, moldy areas, and live insects. *If any of these conditions exist, the grain should be aerated to lower the moisture level and temperature.*

Fumigation should only be used as a last resort. Because of the high toxicity of registered fumigants and technical knowledge needed for their proper use, a qualified pesticide applicator should be contacted if fumigation is required.

WARNING

Pesticides are poisonous. Read and follow directions and safety precautions on labels. Handle carefully and store in original labeled containers out of the reach of children, pets, and livestock. Dispose of empty containers right away, in a safe manner and place. Do not contaminate forage, streams, or ponds.

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