



Flour Moths

Fact Sheet No. 1

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Introduction

Flour moths of the family Pyralidae are some of the most common and the most serious pests of grain products. They are usually called flour moths because they seldom attack whole grain, but generally feed upon flour or milled products. Their preference for broken grains, insect damaged grain, and especially milled cereal products such as flour, breakfast foods, and meals make them important pests of food storage in Utah.

Several species are commonly found in stored products, but the Indian meal moth is probably the most frequently encountered in Utah. The Mediterranean flour moth, the meal moth, the dried fruit moth, and the raisin moth are other pests in this group that have been identified as food storage pests in Utah. Under exceptionally favorable conditions, any of these moths may become established in whole grain and other seeds, causing injury by eating out the germ.

Biology, Description, and Habits

Adult Indian meal moths (*Plodia interpunctella* [Hubner]) have a wingspread of about 3/4 inch. The basal third of the forewings are whitish to light gray in color. The outer two-thirds of the forewings are reddish-brown with a copper or bronze luster. The hind wings are grayish white. At rest, the wings are held back along the sides of the body. The adults are often seen on the ceilings and walls of infested structures.

Females deposit up to 300 eggs each, either singly or in groups of up to 30 eggs, on or near materials that will serve as food sources for the larvae. The eggs hatch within 2 weeks, and the small whitish larvae begin feeding. Full grown larvae are about 1/2 inch long, the head brownish, and the body dirty white but sometimes with green or pink tinges. Larvae may spin a silken cocoon and transform to the light brown pupal stage on the surface of the food source or crawl around and pupate nearby. The larvae leave a silken thread behind wherever it crawls so that the surface of the food may become covered with webbing produced by the larvae. The adult moth can emerge from the cocoon in 4 to 30 days.

Depending on the environmental conditions and the quality of the food source, it may take from 2 weeks to 2 years for the larvae to reach full size. In heated structures a generation

may be completed in as little as 4 weeks with six or more generations produced in a year.

The adults of the meal moth (*Pyralis farinalis* Linnaeus) may have a wingspread of up to 1 inch. The inner and outer parts of the forewings are dark brown separated from the light brown central area by two transverse wavy white lines. The hind wings are light brown and also have lighter wavy lines running across them.

Female moths live only about 1 week and may deposit up to 400 eggs. Larvae produce a considerable amount of webbing, often binding portions of the food source together. They can even cut through burlap sacks and cause considerable damage when heavy infestations develop in sacked material. Full grown larvae are about one inch long with black heads. The first one or two segments behind the head are dark brown to orange along with the terminal segment. The remainder of the segments are white to gray in color. The larvae spin though silken tubes, often incorporating small particles of the food. The larvae feed through the opening at the ends of the tubes. When fully grown, the larvae leave the tubes, spin silken cocoons, and change to the pupae from which the adult moths will later emerge. Under favorable conditions, a generation can be completed in 6 to 8 weeks.

Damage

Indian meal moth larvae rarely, if ever, damage dry, sound grain. They will feed on cracked or damaged grain, seeds, nuts, flour, meal, bran, cereal, pasta, spices, dried fruits, powdered milk, milk chocolate, pollen in beehives, and various other dried materials (primarily of vegetable origin).

Larvae of the meal moth fed on essentially the same food sources as the Indian meal moth larvae. However, meal moths generally attack products with abnormally high moisture contents. They are commonly found in foods kept in damp storage areas such as basements or root cellars. They will feed on whole, unbroken grain if the moisture content gets high enough. Their presence is often an indication that the stored material has gone "out of condition" and is in danger of molding.

The larvae of both species are capable of chewing through paper, cardboard, cloth, and burlap containers. In addition to the damage caused by their feeding, the food source becomes fouled with silk, shed larval skins, cocoons, pupal cases, dead adults and larvae, and fecal material. Infested foods may take on "off" colors, odors, and flavors.

Prevention

Uninfested food items should be stored at the proper moisture levels in glass, metal or thick plastic containers with tight-fitting lids. Proper storage of food items in such containers seems to prevent nearly all problems with stored product pests, including flour moths. Paper, cardboard, foil, or cloth containers will not prevent infestation. To avoid attracting insects, wipe out the cupboards and storage areas and vacuum the cracks and crevices to remove food particles.

It is recommended that all dried items be rotated, using the older materials before the recently purchased items. Severe infestations generally occur in containers of food that have been stored for long periods of time. When infestations occur, examine all stored food items for signs of infestation-- moths, larvae, shed larval skins, webbing, cocoons, or off odors,

flavors, or colors. Infested foods can be treated with heat or cold or simply discarded.

Control

Regardless of the species involved, the only reliable control technique is to locate and remove all infested food and food sources. Insecticide treatment of the area will not give control if infested food sources remain.

Infested food items, particularly those infested with meal moths, should be checked closely for the presence of molds before attempting a salvage operation. Moldy food should be discarded regardless of the degree of insect infestation.

Heat treatment consists of placing the food item in an oven for 1/2 to 1 hour at 130-140 degrees F. (or as long as it takes to heat the food item all the way through). This temperature should kill all stages of the insects. Heat treatment may alter the characteristics of some foods and may not be economical in terms of energy costs versus replacement cost of the food. Do not attempt to heat treat finely ground foods such as flour due to the danger of fire or explosion in the oven.

Cold treatment will also kill all stages of the insects present. In a freezer lower the temperature of the food item to 0 degrees F. or lower and keep it there for 4 to 7 days. As with the heat treatment, there are some foods that freeze well and which will be adversely altered by this treatment. Neither the heat or cold treatment will remove silk, cocoons, pupal cases, insect bodies, fecal material or off odors, flavors, or colors.

Common indoor household insecticides labeled for meal moths include various formulations containing acephate, allethrin, chlorpyrifos, cyfluthrin, D-phenothrin, diatomaceous earth, diazinon, dichlorvos, esfenvalerate, hydroprone, permethrin, prallethrin, pyriproxyfen, resmethrin, S-methoprene, tetramethrin, or tralomethrin. Insecticides for flour moth control are generally applied as a crack and crevice application or spot treatment. Nearly all of the above active ingredients are available in some type of ready-to-use aerosol or pump formulation.

Do not use aerosols or pressurized liquid sprays around open flame. Do not contaminate food, foodstuffs, dishes, food handling equipment, utensils, or surrounding surfaces. Apply insecticides only to the cracks and crevices; do not treat entire areas. Allow the spray to dry before replacing food items, dishes, and utensils. If the infestation persists, after about two weeks a second application should be applied following additional cleaning and a search for any remaining infested food sources.

Precautionary Statement

All pesticides have both benefits and risks. Benefits can be maximized and risks minimized by reading and following the labeling. Pay close attention to the directions for use and the precautionary statements. The information on pesticide labels contains both instructions and limitations. Pesticide labels are legal documents, and it is a violation of both federal and state laws to use a pesticide inconsistent with its labeling. The pesticide applicator is legally responsible for proper use. Always read and follow the label.

