



## INDIAN MEAL MOTH IN STORED GRAIN

*Plodia interpunctella* (Hubner)

The Indian meal moth is one of the most commonly reported pests of stored grains in the United States. In Pennsylvania it is not a major problem, but can be troublesome occasionally. Larvae of the Indian meal moth feed upon grains, grain products, dried fruits, nuts, cereals, and a variety of processed food products. The Indian meal moth is also a common pantry pest.

### DESCRIPTION

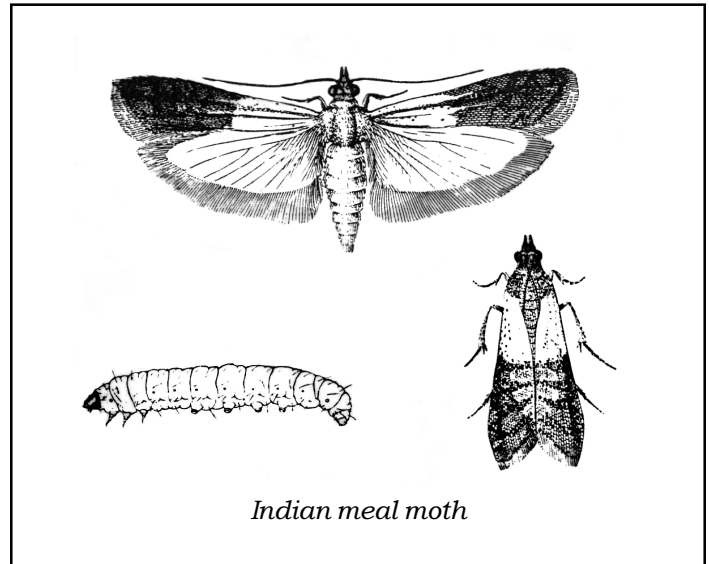
The Indian meal moth is a handsome moth with a wing expanse of nearly three-quarters of an inch. It is easy to distinguish from other grain pests by the peculiar markings of the forewings; they are reddish brown with a copper luster on the outer two-thirds, but whitish gray on the inner or body ends. The hind wings lack distinctive markings and are more or less uniformly gray. Adults can be seen resting on the grain surface or grain bin walls. The adults fly at night and are attracted to lights.

The eggs of the Indian meal moth are whitish, ovate and very small. Because of their small size, they are difficult to see without the aid of a microscope. Eggs are deposited on the grain surface singularly or in groups of twelve to thirty.

Newly hatched larvae are very small and difficult to see. Larger larvae are usually yellowish, greenish, or pinkish. Fully grown larvae are one-half to five-eighths of an inch in length with a brownish head capsule. Larvae have three sets of legs near the head (thoracic legs) and five sets of prolegs on the abdomen. Larvae of the meal moth spin a web as they become fully grown and leave behind silken threads wherever they crawl. The webbing is often sufficiently abundant to attract attention. Loosely clinging webbing on the grain is characteristic of this pest.

### LIFE CYCLE

As long as the temperature within a grain bin or building where grain is stored remains above 50F, the Indian meal moth can survive and reproduce. A typical



life cycle (egg to adult) is completed in forth to fifty-five days. A potential for seven to nine generations per year exists; however, because of cool temperatures during the winter months fewer generations are usually completed. Under optimal conditions, the entire life cycle can be completed in approximately twenty-eight days.

A mature female lays 100 to 300 eggs on food material, either singularly or in groups of twelve to thirty. Larvae begin to hatch in two to fourteen days, depending on environmental conditions. Newly hatched larvae feed on fine materials within the grain and are small enough to pass through a sixty mesh screen. For this reason, it is difficult to exclude larvae from most packaged foods and grain.

However, larvae cannot chew through packages, so they must enter through a hole or at the seam. The larval stage lasts from two weeks to one year, and is responsible for grain losses. In grain, larval feeding is usually restricted to the top one to two inches. Large larvae feed on the grain germ. When mature, larvae spin a silken cocoon and transform into light-brown pupae. The cocoons and pupae can be seen on the grain surface and walls of grain bins. Adults emerge in four to thirty days, mate, and females lay the next generation of eggs. Adults live from five to twenty-five days.

## DAMAGE

Direct damage to grain is the result of larvae feeding on the seed germ. In grain to be sold for human or animal consumption, meal moth feeding reduces the dry weight. At the same time, grain weight may actually increase because of water absorption; with an increase in water content mold can become a problem. The biggest reduction in value is the result of contamination by larvae that leave droppings and silken webs in the grain. The presence of live insects and insect parts can result in dockage of the grain when sold.

## MANAGEMENT

On-farm grain storage, particularly corn, is increasing in Pennsylvania. Stored-grains offer compact food sources for a number of insect pests. Good management practices are aimed at excluding these insects while maintaining grain quality. 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 the value of grain, or render it unfit for processing or feeding. Indian meal moths in the grain result in reduced grain weight and dockage because of contamination by fecal material and webbing.

Prevention is the best strategy to avoid Indian meal moth problems. Proper sanitation will help minimize the need to use pesticides. Good sanitation practices involve the removal of old grain and dust in and around the grain bin before storing new grain. This includes removing 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.

Another tactic which can be used to help prevent build-up of insect populations in stored grains is to periodically run the grain dryer fan. Increased air flow through the grain mass helps control the grain temperature and reduces moisture build-up, creating an unfavorable environment for the insects.

Proper and consistent sanitation of the bins before the new grain is stored will usually protect grain up to six months. If the grain is to be stored for over six months, a residual insecticide application should be applied to the floor and structure walls. After the bin is filled, a residual spray should be applied to the grain surface. See the Penn State Agronomy Guide for specific control recommendations.

Fumigation should be considered only if an emergency exists. Because fumigants are extremely hazardous, they must be handled with care.

## 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.

Steven B. Jacobs  
Sr. Extension Associate  
Dept. of Entomology  
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Dennis Calvin  
Associate Professor  
Dept. of Entomology

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