Stored Grain

Lesser Grain Borer

David K. Weaver and A. Reeves Petroff

Lesser Grain Borer.

Introduction

(Rhyzopertha dominica) Although it is still relatively rare, the lesser grain borer has become the most commonly encountered primary pest of stored grain in Montana. It is the most economically important primary pest of stored grain in the United States and is a strong flier that can tolerate high temperatures and dry grain (moisture content less than 12%).

Identification

The adults of this species are readily distinguished by the “squared-off” appearance at the front of the body. Viewed from directly above, the cover of the thorax hides the head. The adults are less than 1/8 of an inch in length and range from reddish brown to dark brown. This species is a good flier, and adults are readily trapped in pheromone-baited traps at harvest. However, infestations are infrequent, when compared to the rate of capture for adults in these traps.

Damage

The lesser grain borer is a long-lived species and a female can lay up to 500 eggs. The eggs are deposited loosely among the kernels of grain and both the adults and the larvae can bore readily into, and out of, intact kernels. Adults and larvae have powerful jaws that are used to riddle the grain, creating large, irregular-shaped holes. Heavy infestation with lesser grain borers can be identified by a sweetish, musty odor in the storage. This odor is a result of the male-produced aggregation pheromone that has been demonstrated to be an effective lure for use in traps. This species is very capable of causing insect-damaged-kernels (IDK), which are important in quality assessment of samples. Weevils in stored grain also readily cause insect-damaged-kernels (IDK), but the larvae of these species remain within a single kernel.

Insecticide Resistance

The lesser grain borer has shown high resistance to malathion in wheat producing areas where it is more common. It is moderately tolerant of the insecticide chlorpyrifos-methyl (Reldan®), so this insect is not listed on the label. A light to moderate tolerance has been found to phosphine gas, once again in those areas where it is more commonly encountered.

Biological Control

There are a number of insect predators and parasitic wasps that attack insect pests of stored grain. All are effective if used in overwhelming numbers. However, biologicals are generally not used because the Food and Drug Administration (FDA) and food processors do not accept live insects or insect parts in raw grain. This inudative approach is simply the addition of very large numbers of beneficial insects.

Biological agents have limited commercial avail-ability and are cost prohibitive, except perhaps for organic production. Specific species that attack the different groups of pests are listed below. It is important to note that there are limited numbers of naturally occurring biological control agents:

Primary Pests
Parasitic wasp of grain
Anisopteromalus calandrae
Choetospila elegans
Lariophagus distinguendus

Predaceous mites
Warehouse pirate bug - *Xylocoris flavipes*

Secondary Pests
Predaceous mites
Warehouse pirate bug - *Xylocoris flavipes*

Indianmeal moth
Habrobracon hebetor
Predaceous mites
Trichogramma pretiosum
Warehouse pirate bug - *Xylocoris flavipes*

Insecticide Treatments

Empty bin treatments include residual insecticides applied in and around the fan, aeration ducts, auger, door openings, and hatch covers, or fumigants, before bins are filled at harvest. Commercial facilities must comply with the Occupational Safety and Health Administration (OSHA) bin entry permits. Following are pesticides available for treating empty bins:

Insecticides Labeled for Use as Empty Bin Treatments

Active Ingredient (a.i.)	**Example Brands**	**Comments / Usage**
Cyfluthrin	Tempo Sc Ultra Premise Spray®	Most effective residual as compared with malathion and chloripyrifos-methyl.
Chlorpyrifos-methyl	Reldan 4E®	Can only be applied from outside of bin and sprayed downward into the bin. Degrades on hot surfaces.
Diatomaceous earth (DE)	Insecto, Protect-it®	Excellent empty bin treatment. Special grade required for grain use. Must use DE labeled for grain.
Malathion	Malathion	No longer recommended for empty grain bins because of high insect resistance and rapid degradation in warm, relatively moist grain.
Chlorpyrifos-methyl + cyfluthrin	Storcide®	Can only be applied from outside of bin and sprayed downward into bin. It is not recommended for grain intended for export.
Chloropicrin	Chlor-o-pic®	Empty bin fumigant, under false floor, aeration tubes, and tunnels.
Methyl bromide	Brom-o-gas®, others	Empty bin fumigant; seldom used.
Phosphine	Phostoxin®, others	Empty bin fumigant.

Liquid Insecticides Labeled for Use as Grain Protectants

Active Ingredient	**Example Brands**	**Comments**
Chlorpyrifos-methyl	Reldan 4E®	Reldan does not control lesser grain borer. Can only be applied to the grain stream as it is moved (augered) into the bin. Use limited to existing stocks.
Malathion	Malathion 5EC	Existing stocks are available but label has been withdrawn. Most stored grain insects are resistant.
DDVP	Vapona®	Also as strips. Used in the head space against Indianmeal moth.
Methoprene	Gentrol, Diacon II®	Kills developing insects only, slow kill of larvae, no kill of adults though causes

		sterility. High cost and must use other products before sale. Newly marketed.
Chlorpyrifos-methyl + cyfluthrin	Storcide®	Can only be applied to the grain stream as it is moved (augered) into the bin. It is not recommended for grain intended for export.
Pyrethrins	Pyrenone®	Expensive, short residual life.

Grain protectants are insecticides applied directly onto grain going into the storage or already in storage. Grain protectants do not kill insects inside the kernels. Following are insecticides labeled as protectants.

In Montana, the use of protectants should be limited to high-value commodities that need protection during storage for several months, and for which it is cost effective to use them. For direct application on wheat at first storage, there are limited circumstances where the use of a protectant is necessary.

Dust Insecticides Labeled for Use as Grain Protectants

Active Ingredient	**Example Brands**	**Comments**
Malathion	Big 6 Grain Protector®, Agrisolutions 6% Malathion Grain Dust	Top-dress treatment. Insects are resistant in many areas. Millers resist purchasing grain with strong malathion odor.
Diatomaceous earth (DE)	Protect-It™, Insecto®	Can lower the test weight of grain and is expensive if it is applied to entire grain mass, so is best applied to empty bins and to the top and bottom layers of the grain mass.

Categories: Stored Grain, Insects, lesser grain borer, Rhyzopertha dominica

Date: 12/20/2004