



Current Report

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INSECT CONTROL OF FARM-STORED GRAINS

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STORED GRAIN PESTS

Due to the current lack of elevator storage, there will be larger quantities of grain stored on the farm than in previous years. A number of growers have not had experience with farm-storage, and are perhaps not fully aware of the serious damage and down-grading that can occur by insect and rodent infestations.

Losses caused by insects in stored grain may sometimes be considerable. Damage during the growing season is usually obvious while insect damage or destruction of stored grain may go unnoticed until the grain is removed from storage.

Temperature and moisture content of the stored grain are the most important factors affecting the abundance of stored grain insects. The growth and reproduction of most stored grain insects are greatly reduced below 70°F and cease at 50°F. Insect populations are not a problem in dry grain, while they multiply rapidly in moist grain. Grain with moisture content of 12 to 15 percent is most attractive to stored grain insects.

Once established in grain, insects are capable of creating their own microclimate. The heat and moisture produced by their body processes raise the temperature and moisture levels in the grain. Thus, the insects are able to survive and increase in numbers during the cold months of the year.

Losses in stored grain often involve both insects and mold growth. The increases in temperature and moisture content which accompany insect activity are conducive to mold growth.

Aeration systems designed and managed to maintain cool grain for control of moisture migration and mold growth will at the same time help in controlling insects. Lowering grain temperature by aeration slows the life processes of the insects and destroys their microclimate. For more aeration information see: O.S.U. Extension Facts No. 1100 - Maintaining Quality of Stored Grain and O.S.U. Extension Facts No. 1101 - Aeration and Cooling of Stored Grain.

Some of the common grain infesting insects that are called primary or internal feeders (those that develop inside the kernel) are: rice weevil, granary weevil, lesser grain borer, and Angoumois grain moth (larva). Common insects that are considered secondary or external feeders (those that feed on cracked kernels) are: Mediterranean flour moth (larva), Indian meal moth (larva), flat grain beetle, confused flour beetle, cadelle beetle, and saw-toothed grain beetle.

In Oklahoma, the long period of warm temperatures from harvest until the cool weather of late fall dictates the use of chemicals for preventing damage by stored grain insects. A good insect control program will begin with preventive measures.

PREVENTION AND CONTROL PRACTICES

1. Storage Bin Clean Up - When the grain is removed from the bin, immediate clean up of the storage facility is advised. Sweep up and remove all debris from the bin and destroy any grain that may harbor or provide a food supply for stored grain pests from beneath, around or near the bin area. A vacuum sweeper is very useful in a clean-up job, and all collected material should be destroyed.

2. Residual Bin Spray - The following pesticides may be used to spray the inside surfaces of storage facilities to provide control of any pests that may migrate into a storage area or any incidental pests that were not removed during the "clean up" operation.

- Methoxychlor 25% EC - 3 3/4 pts./5 gal. water.
- Malathion 57% EC (Premium Grade) 2 1/2 pts./5 gals, water.

Both of these sprays should be applied liberally to all seams, cracks, crevices, floors, and walls of the bin. The best time to apply residual spray is about three weeks before new grain is binned since many of the insects not removed during "clean up" may emerge, walk over, or come in contact with the pesticide and receive a lethal dose.

3. Grain Protectant Treatment at Harvest - While grain is being binned, a protective treatment should be applied. If the grain will be stored in flat storage structures or emergency storage situations which cannot be effectively fumigated, a good grain protectant treatment at harvest is essential.

We highly recommend treatment in this manner for it is the most economical method of protecting the grain and is relatively easy to use. A treatment at binning will generally insure season-long control of serious pests.

Since most grain protectants are less dangerous than the chemicals used when one has an active infestation, the use of a protectant will reduce the human risk involved in applying some of the more dangerous pesticides at a later date.

The following insecticides may be used as grain protectant treatment at harvest:

- Malathion 57% EC - 1/2 pint in two gallons water mixed with 500 bushels of wheat. This mixture may be applied to the grain as it is augered into the bin. Special attention should be paid to insure thorough, uniform mixing throughout the entire quantity of grain.

- Pyrethrins - 0.3 active ingredient dust/500 bushels or 1.6 oz. active ingredient per 500 bushels applied as indicated above.

- A 2% Malathion dust is now available for use on grain being moved into final storage. Use 30 lbs. of the 2% dust per 1,000 bushels. The dust may merely be sprinkled over the surface of the grain in the truck or wagon, then cut the Malathion dust into the grain with a shovel. It will then become mixed as it is augered into the bin, or a simple applicator is available which sits on top of the grain auger and automatically distributes the Malathion dust to the grain as it moves through the auger.

The Malathion dust may also be applied to the surface of clean, or infested grain to prevent or control Indian meal moth, and other surface feeding insects.

4. Post-Harvest Inspection of Stored Grain - Producers should inspect especially during the summer and fall. Look for insects, hot spots, mold growth, rodent damage, and rodent excrements. Remember to sample the grain at various areas within the grain mass. A standard grain probe is handy for this purpose.

To locate hot spots in the grain, take the grain temperature at several areas in the bin by fastening a thermometer to a stick and thrusting it into the grain. If hot spots are detected take samples from these areas and seive out the insects. If there are not insects present, then look for other causes such as high moisture and mold odor.

5. Routine Inspection - Those who routinely inspect their grain rarely suffer significant losses from insects or mold growth, since they are able to use control measures or to market the grain before damage occurs.

Many producers already own and/or plan to construct flat storage facilities. Under flat storage conditions, it is especially important that one treat with a protectant while storing because once infested, grain in flat storage is difficult to fumigate, as the grain surface may not be level, and there generally is an uneven distribution of the fumigant and therefore, uneven control.

6. Treatment of Grain After Being Stored - A rule of thumb to follow is to automatically treat stored grain with a grain fumigant 6-8 weeks after initial storage if one of the grain protectants was not used at harvest time.

Most commercially prepared grain fumigants contain mixtures or combinations of carbon tetrachloride, carbon bisulfide, ethylene dibromide, ethylene dichloride, sulfur dioxide and chloropicrin. These materials may be applied as a course spray to the entire exposed surface of grain. Since fumigants produce gas, the structure needs to be sealed tight to eliminate gas leakage and increase the efficacy of the pesticide.

When fumigating, pick a warm day with grain temperatures above 60° F. Best results are obtained at 70° or higher.

Fill holes and cracks in the bin to make it as gas tight as possible. Level the surface of the grain, and keep the grain level at least 8 inches below the top of the bin. This will prevent the fumigant from "rolling" over the sides.

Apply the fumigant as uniformly as possible over the grain. An ordinary pump-type garden sprayer is good for small operation

You may enlarge the spray disc opening to the size of an 8-penny nail, or remove the nozzle entirely and substitute a quarter-inch pipe 6 to 8 inches long. Flatten the pipe-end to allow for a broad fan-like spray pattern.

Whenever possible, apply the fumigant from outside the bin. Where applications must be made inside the bin, wear a gas mask approved for the specific fumigant being used.

A note of warning when using grain fumigants: NEVER fumigate a bin by yourself. FOLLOW ALL SAFETY PRECAUTIONS, especially the use of an approved respirator and all other precautions written on the container label. Read the label closely for any limitations, restrictions, particular peculiarities, and application instructions.

All pesticides are poisonous and should be used with extreme caution. BE SURE TO FOLLOW THE MANUFACTURER'S INSTRUCTIONS. In the event of an accident, the label becomes extremely important. Be sure you take the exact information relative to ingredients to your physician. If at all possible take the label.

Any pesticide information presented is current with EPA regulations at the time of printing. The user is responsible for determining that the intended use is not inconsistent with the pesticide label.

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PARTNER FOR PROGRESS

The cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of: agriculture, natural resources and environment; home economics; 4-H and other youth; and community resource development. Extension staff members live and work among

the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

*The federal, state and local governments cooperatively share in its financial support and program direction.

*It is administered by the land-grant university as designated by the state legislature through an Extension director.

*Extension programs are nonpolitical, objective, and based on factual information.

*It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.

*It utilizes research from university, government, and other sources to help people make their own decisions.

*More than a million volunteers help multiply the impact of the Extension professional staff.

*It dispenses no funds to the public.

*It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.

*Local programs are developed and carried out in full recognition of national problems and goals.

*The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.

*Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.