Stored Grain Management

In This Chapter

Cleaning Bins and Equipment Before Harvest
Managing Fines
Keeping Grain Dry
Keeping Grain Cool
Checking Stored Grain Frequently
Taking Actions to Correct Problems
Chapter 2: STORED GRAIN MANAGEMENT

**Learning Objectives:**

♦ Discuss the six most important steps in stored grain management.

♦ List the ideal maximum moisture for storing wheat, corn, and oats.

♦ Know the ideal temperatures for storing grain in Minnesota during the summer and winter.

♦ Describe why grain “fines” attract insects.

♦ Describe the temperature and grain moisture ranges that encourage insect infestation.

Fumigating grain to kill insects is a costly and potentially dangerous operation that should be performed only as a last resort. In Minnesota, we can normally take advantage of our cool, dry weather and use preventive measures to avoid major insect infestations and the need for grain fumigation.

Here is an outline of some of the management approaches that will help prevent insect infestations in stored grain.

**Clean bins and equipment before harvest.**

Stored grain insects seldom infest grain in the field, so freshly harvested grain is generally free of stored grain insects. Infestation usually occurs after grain is binned. The primary sources of infestation are insects that fly into the bin and insects that are already in or near the bin in old grain and grain residue left from last year’s crop. To minimize insect infestation, avoid mixing crops from two different years and thoroughly clean bins and equipment before harvest to remove all old grain, fines (broken grain kernels and small pieces of foreign material), and dust.

“Fumigating grain to kill insects is a costly and potentially dangerous operation that should be performed only as a last resort.”
Manage fines.

Fines, especially concentrated pockets of fines, increase the chance of insect infestation in stored grain. For one thing, fines provide a ready food source for insects; some insect species do not have the mouthparts that would allow them to bore into whole grain kernels and they need broken grain kernels to survive. For another, fines tend to separate from whole kernels during grain handling operations and end up accumulating in pockets of high concentration. Separation of fines and whole grain is especially likely when bins are filled from a spout that drops grain into a cone-shaped pile. The fines tend to accumulate under the spout and whole kernels roll to the outside of the pile. Fines have a higher airflow resistance than whole kernels, so when air is forced through the bin during drying or aeration, air diverts around the pockets of fines. The fines, which are already more attractive to insects than whole kernels, stay warmer and wetter than the whole kernels in the bin and become even more attractive to insects.

Problems with fines can be minimized by cleaning grain before bin filling to remove them, by using grain spreaders to evenly distribute fines around the bin, or by not using a grain spreader, but periodically removing some grain from the center of the bin during bin filling to remove fines that accumulate in the center of the bin. See *Wheat and Barley Storage, FS-5947* for an illustration of fines removal during bin filling.
Keep grain dry.

Insects need moisture to survive, so keeping grain dry is one strategy for reducing insect problems. Recommended storage moisture depends on the specific crop, expected storage temperature, and the expected storage time. For example, wheat that is to be stored for less than nine months can be up to 14% moisture, but wheat stored longer than nine months should be 13% moisture or less. See *Wheat and Barley Storage*, FS-5947, or *Management of Stored Grain with Aeration*, FO-1327, for more information on storage moistures. See *Wheat and Barley Drying*, FS-5949, *Natural-Air Corn Drying in the Upper Midwest*, BU-6577, or *Grain Drying, Handling, and Storage*, MWPS-13, for more information on drying crops.

---

“Aerate during the coolest weather available to reduce grain temperatures”

---

Keep grain cool.

Insect activity slows as the temperature drops, so aerating grain with cool outdoor air to keep grain temperatures low will reduce insect problems. Insect activity slows greatly as the temperature drops below 60°F, some insects become dormant at 40°F, and many insects will die if they are held at 0°F for several weeks. Stored grain should be held at less than 60°F at all times; in Minnesota, we suggest that grain be held at 20 to 30°F during winter and somewhere between 30 and 50°F during warmer months. If grain is infested with insects during fall and the grain will be stored through winter, it might be possible to take advantage of cold winter weather to avoid fumigation by using aeration to quickly reduce the temperature to 0°F or so and holding the grain at that temperature for several weeks. See *Wheat and Barley Storage*, FS-5947, or *Management of Stored Grain with Aeration*, FO-1327, for more information on using grain aeration to manage grain temperatures.

Check stored grain frequently.

Once insects move into stored grain, they produce heat and moisture, as byproducts of respiration, that make the grain warmer, wetter, and more
favorable for further insect development. This contributes to small infestations growing to large infestations in a relatively short amount of time. Thus, it is important to check stored grain regularly and frequently (every week or two during warm weather) to make sure that insect problems are not developing. See *Wheat and Barley Storage, FS-5947*, or *Management of Stored Grain with Aeration, FO-1327*, for more information on checking stored grain.

**Take actions to correct problems as soon as possible.**

If insect problems are found, and there are times during the day when the temperature is less than 60°F, aerate during the coolest weather available to reduce grain temperatures. If the grain contains a fair amount of fines and chaff, consider running the grain through a grain cleaner to remove the fines and chaff and some of the insects. If feeding the grain to livestock is an option, grind and feed the grain as soon as possible. If no other options are available, use grain fumigation as a last resort. Keep in mind though, that if insect problems developed because the grain was too wet, too warm, or contained too many fines, insects will reinfest the grain as soon as the fumigant gas dissipates.

Here are some additional grain drying and storage publications that provide management information that might help you avoid the need for grain fumigation.

The following handbooks can be purchased from:

MWPS Orders
U of M BioAgEng Dept
1390 Eckles Ave
St. Paul MN 55108
612-625-9733
mwps@gaia.bae.umn.edu
www.bae.umn.edu

- Grain Drying, Handling, and Storage, MWPS-13
- Low-Temperature & Solar Grain Drying, MWPS-22
- Dry Grain Aeration System Design, MWPS-29
The following bulletins and factsheets can be ordered from:

Extension Distribution Center
405 Coffey Hall
1420 Eckles Ave
St. Paul MN 55108
800-876-8636
orders@extension.umn.edu
www.extension.umn.edu

• Wheat and Barley Storage, FS-5947
• Wheat and Barley Drying, FS-5949
• Management of Stored Grain with Aeration, FO-1327
• Natural-Air Corn Drying in the Upper Midwest, BU-6577
• Selecting Fans and Determining Airflow for Crop Drying, Cooling, and Storage, FO-5716
• Preventing Stored-Grain Insect Infestations, FS-0997

You can also view these publications on the Internet by going to the Extension home page (www.extension.umn.edu), clicking on “catalog,” and then searching for the publications by either title or item number.

References