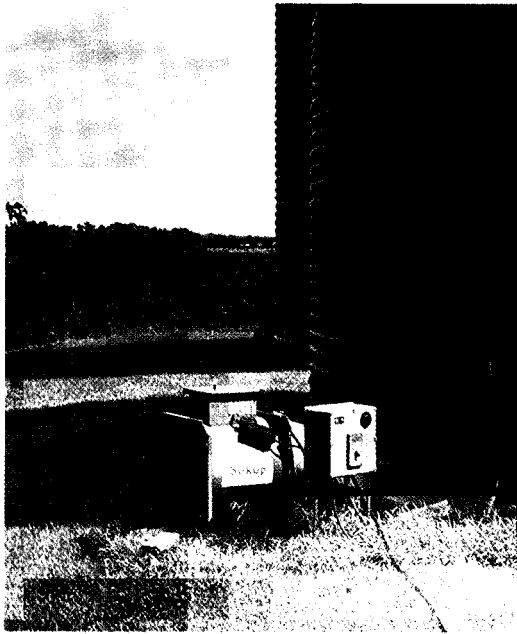


SAM

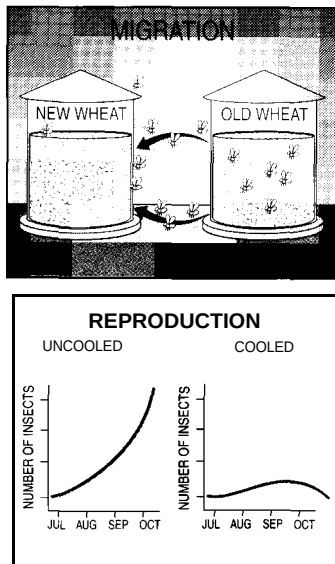
SANITATION • AERATION • MONITORING

AN INTEGRATED PEST CONTROL STRATEGY FOR FARM-STORED WHEAT



SAM stands for Sanitation, Aeration, and Monitoring, which are three management components necessary to preserve the quality of wheat stored on-farm. A decade of field trials conducted by Kansas State University scientists showed that the proper use of these procedures improves the control of stored-grain insects and helps to reduce reliance on pest control chemicals.

INSECTS are the major cause of grain deterioration. Populations of damaging insects build up from the time wheat is put into storage in early summer until winter. Two main factors determine how fast this buildup occurs: **migration** and **reproduction**. If these factors are not adequately controlled, infestations often develop rapidly enough to cause major grain damage and loss by September or October. **Migration** is rapid if there are large numbers of stored-grain insects nearby. **Reproduction** is rapid if grain remains for long periods of time at the optimum temperature (85°F to 100°F).



Aeration is the best tool to control storage problems and maintain the quality of the wheat in your farm bin. Proper sanitation and monitoring complete the integrated approach to grain quality maintenance. In certain situations, grain protectants and fumigants are required. Because chemicals are expensive and can be hazardous if not handled properly, the decision to apply them should be based on the data and experience gained through proper monitoring. Chemical use, as well as grain deterioration, can be minimized by using the following strategy.

SANITATION

Sanitation is used to limit the rate of insect migration into stored grain from infestation sites in bin bottoms, nearby stored grain, or other places where grain, grain dust, or grain-based materials accumulate. The timing of your sanitation practices can make them more effective.

Clean trucks, combines, and augers before harvest and **before unloading the grain from the bin**. Much of the rodent and bird contamination in marketed grain is introduced by dirty augers.

Clean bins **immediately after emptying them**. Wheat bins are often emptied in winter, when cold temperatures will disinfest a very clean bin. However, if small amounts of grain are left at edges or in the auger well, insects often create enough heat within these areas to survive winter temperatures. Two or three weeks prior to refilling, spray bins with an approved bin spray.

If you process feed on the farm, inspect feed production and feed ingredient storage areas often, **especially in warm weather**. These areas provide sources of infestation for grain in farm bins.

Follow the other common-sense rules of sanitation (i.e. keep the area around bins clean, separate grain by crop year, etc.).

AERATION

An **aeration controller** is extremely helpful when managing aeration for insect control. In wheat, the best way to control insects is to cool the grain as quickly as possible, to as cold as possible, until the grain temperature is 50°F or colder. With an aeration controller, you can cool wheat earlier in the year, and do so more conveniently than by manually operating fans. Aeration controllers are available from a variety of sources (see back page). You may order wiring diagrams from your KSU Agricultural Engineering Extension Specialist.

After harvest, level the grain surface and set the aeration controller to about 75°F, depending on your location in the state. Ask your Extension agent for the publication *Questions and Answers about Aeration Controllers*, MF-2090 for more specific information. Monitor the cooling by checking the fan-hours, or grain temperature if you have temperature cables. When the cooling cycle is complete, reset the aeration controller about 15°F cooler than before, and complete the second cooling cycle. Repeat with the aeration controller set at about 45°F. When this third cycle is complete, cover the fans for winter. The cooling is likely to be complete in late October or early November, when warm days may re-warm surface grain slightly. Therefore, you should operate the fans 12 to 24 hours in winter during freezing weather to help kill insects that may have survived.

University research has shown that farm-stored Kansas wheat maintained under this strategy does not require grain protectant and seldom requires fumigation if held until November when the process is complete. Furthermore, the grain usually contains fewer insects than wheat wherein other strategies are used, and grain quality is maintained throughout the storage period. Once the hardware has been purchased, yearly costs are about 0.5¢/bushel compared with about 2¢/bushel for grain protectant or 1 to 3¢/bushel for fumigation.

MONITORING

Monitoring is used to manage the risk of deterioration caused by insects. If you follow the steps outlined below, you will become aware of a storage problem in time to take appropriate action before deterioration occurs.

At Harvest

Sample the grain going into the bin to ensure that excessively moist or weedy grain is not stored without your knowledge.

During Aeration

Monitor the temperature of the grain mass frequently (see back page for sources of inexpensive temperature monitoring equipment). If you do not have a temperature monitoring system, you may estimate when cooling is complete by monitoring the fan-hours on your aeration controller.

Monthly

Once the grain temperature is uniform and stable, sample the grain monthly. Use a short probe (3 to 5 feet) in addition to a surface sample. Sieve the grain in order to better detect insects. Check and record the grain temperature to detect hot spots.

Take adequate safety precautions whenever you enter a bin.

CHEMICALS

Protectants: If you have reason to believe that special measures are necessary, (for example, if insects have caused losses in recent years, and your sanitation and aeration practices cannot economically be improved), the application of Reldan® in wheat may be helpful. Protectants leave chemical residues which some end-users find objectionable.

Fumigants: Grain managed with the integrated pest management strategy described above seldom develops troublesome infestations. However, if you find more than two lesser grain borers or weevils, fumigation is usually economical. Fumigants are restricted use pesticides to be used only by persons properly trained and certified, and provided with the proper safety equipment.

Remember SAM.

► Sanitation

to reduce the rate of insect migration into new grain

► Aeration

to reduce the rate of insect and mold growth and damage; and

► Monitoring

to manage the risk of grain deterioration.

Kansas Suppliers of Quality Maintenance Equipment for Farm Bins

This list includes Kansas sources of temperature monitoring and aeration control equipment specifically sized and priced for farm storage. We will attempt to update the list if additional suppliers are identified. Kansas State University does not endorse any company or product listed, nor is any claim of superiority implied over products or companies not listed.

Grain Temperature Monitors

Shepttell Co.
925 West Maple
Arkansas City, KS 67005
Tel. (800) 442-2471

7-M Inc.
HC 01 Box 56
Palco, KS 67657
Tel. (800) 235-0427

Aeration Controllers for Cooling

7-M Inc.
HC 01 Box 56
Palco, KS 67657
Tel. (800) 235-0427

MCI, Inc.
1400 Spencer Road
Box 563
Newton, KS 67114
Tel. (800) 279-6812

Airmaster Sales
P.O. Box 129
Norcatur, KS 67653
Tel. (913) 693-4460

Carl Reed

Extension Specialist, Grain Storage
Extension Grain Science and Industry

Tim Herrman

State Leader
Extension Grain Science and Industry

Randall Higgins

State Leader
Extension Entomology

Joseph Harner III

Agricultural Engineer
Extension Biological and
Agricultural Engineering

In cooperation with

*American White Wheat Producers Association
Kansas Consolidated Farm Service Agency
Kansas Grain and Feed Association
Kansas Wheat Commission*



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