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## Control Measures for Stored Grain Insects

George I. Gilbertson

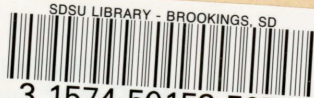
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*Control Measures for*  
**STORED GRAIN**  
**INSECTS**

You Are in for an Awful Shock—if there are insects in your stored grain and you don't know it. Many a farmer has opened up a bin of what he thought was perfectly good grain and was surprised to find nothing but a mass of light empty hulls.—Do You Have Weevils in Your Grain?

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# STORED GRAIN INSECTS

by George I. Gilbertson, Extension Entomologist

Heating of stored grain because of excessive moisture has resulted in prolonging and extending the problem of insect damage which began right after harvest. Except in large bins where heating persists, cold weather will put a stop to insect activity and worries from that score will be over for the time being. Under ordinary circumstances, fumigation need not be considered except in persistent heating. In any case, low temperatures make it practically impossible to do any more fumigating in unheated buildings.

## Dormant in Cold Weather

It should be borne in mind, however, that when storage insects are dormant in cold weather, transferring, cooling, screening, and fanning are important controls. Weevils vary in their length of life. Some live only sixty days, whereas, others live up to two years. These insects are inactive at 50 degrees Fahrenheit and if the grain is cooled, screened, and fanned a great many of the inactive, yet still alive, weevils will be taken out of the grain mass when they then may be destroyed. Otherwise they will resume their activities when the grain temperatures rise to 60 or 65 degrees.

When necessary to use a fumigant the usual (or basic) combination is a 3 to 1 mixture of ethylene dichloride and carbon tetrachloride. Under favorable temperature conditions (grain temperatures of 65 degrees or above) this mixture *must* be used at 5 gallons per 1,000 bushels to get results. There are various mixtures on the market, however, which contain larger proportions of the ethylene dichloride, or are "pepped up" with some carbon disulphide or sulfur dioxide or both. Such grain fumigants need not be used in quite so large amount, although none should be used at less than about 3 gallons per 1,000 bushels.

## Buy Ready-Mixed

Usually the various grain elevators handle grain fumigants. One should not attempt to make up the mixtures as they can be obtained ready-mixed as cheaply as the ingredients by themselves. In order to save on the chlorinated chemicals the Federal Government recommends the mixing of 10 percent methyl bromide with the 3 to 1 mixture mentioned first. Some preparatory compounds are now 10 percent methyl bromide. At any rate, do not attempt home mixing by addition of this chemical. It can be used at 2 to 2½ gallons per 1,000 bushels and is effective at somewhat lower temperatures than the other fumigants.

The U. S. Bureau of Entomology warns that the operator should wear a suitable gas mask while exposed to its vapors, that it be applied from outside the bin by means of spraying equipment, and that precautions be taken to see that no persons or animals are allowed in the building for 72 hours after application.

## Preparation Important

It has been found that preparing the bin for treating is just as important as applying the treatment. Following are several factors which have a marked effect on the results of fumigation:

1. **Bins gas tight.** A leaky floor or cracks in bin sides allow heavy gasses to flow over like water, thereby diluting the gas below lethal concentration. Be sure cracks are sealed; at times it may be necessary to line bins with red rosin paper.

2. **Bins filled too full.** Many bins are filled too full and heaped up in the center. A considerable portion of the heavier than air fumigants are lost when applied to the grain in these heaped-up bins. The vapors flow out over the side walls and through the opening where the roof joins the side walls of the bin. The best condition exists when the grain is leveled and is three to six inches below the top of the side walls.

3. **Caking of the surface of the grain.** When grain is caked or a crust is formed on the surface, it should be broken up by raking and stirring the grain to a depth of six to eight inches before fumigant is applied.

4. **Distribution and application.** Where grain is leveled and the fumigant evenly distributed over the surface, better results are obtained. If the fumigant is not distributed evenly over the surface but is applied in large amounts on a few places on the surface, it appears to channel through the grain and the lateral diffusion is not sufficient to kill, especially near the surface of the untreated area.

5. **Wind.** Air movement has a marked effect on results. There is considerable loss of fumigant around the eaves on a windy day and fumigation should not be attempted on such days.

## Availability

Regarding availability of grain fumigants, the Bureau advises: "We are informed that provisions have been made by the Office of Production Management to enable dealers to purchase supplies of fumigants from the manufacturers on orders accompanied by a statement that they are to be sold for use in fumigating stored grain. It is suggested that the attention of dealers and farmers be called to the fact that these fumigants are now obtainable and to the desirability of their procuring sufficient supplies of them to fill normal demands and also to meet a probable increase in demands on account of the larger quantities of grain now being held in storage.

"The Agricultural Adjustment Administration has already taken steps to procure supplies of grain fumigants sufficient to meet their needs for the care of corn belonging to the Commodity Credit Corporation and stored in steel bins. The Commodity Credit Corporation is also notifying licensed warehouse storage men holding Commodity Credit grain that fumigants can now be obtained and urging them to secure supplies while obtainable."

## Necessary Safety Precautions

The fumigants now used for the treatment of grains stored in metal or farm bins are poisonous to man as well as to insects. When applying them, the operator should avoid inhaling the vapors or getting any of the liquid on the clothing or person. The fumigants have little characteristic odor and may be present in the atmosphere in sufficient concentrations to be harmful without the operator being able to detect them.

When working with these compounds, precautions should be taken by the operators at all times to protect themselves from toxic concentrations of the gasses even though they may not be noticeable. Injurious concentrations have been encountered even in the open air.

### Stay Out of Bin

Equipment that will make it unnecessary for the operator to enter the bin should be used in applying the fumigant to the grain. Sprinkling cans should not be used, and the operator should not move around on top of grain which has been freshly treated with these fumigants. A hand pump, compressed air applicator, or power sprayer can be used for forcing fumigant up into the grain bin through a hose, spray rod, and nozzle, and this will make it unnecessary for the operator to enter the bin at all.

When using such apparatus all joints and connections must be tight so that there will be no leakage of the liquid or gas and all hose and fittings must be tested for pressure above any they are liable to encounter under working conditions. The assembled equipment should be tested for leaks by building up pressure with water before use with a fumigant.

### Prevention

The following preventive methods of insect control should be made available to all farmers:

1. Grain should be placed in a bin at as low a moisture content as possible because weevils do not thrive on grain that is low in moisture content.
2. Prevent as much as possible cracked kernels and foreign material. See that the last load or clean-up load from threshing machine, combine, or sheller is not placed in the bin.
3. Rodents such as rats and mice should be eliminated from the premises because they carry weevils from bin to bin, from farm to farm, and they also grind up grain so that insects can feed on it.
4. See that the bin itself is free of insects. Sweep out bins and spray or paint the floor and bin sides with the following mixture before placing new grain into the bin.

**Mixture of one gallon Dormant Spray Oil**  
**(This can be purchased through any oil company)**  
**Three ounces lye**  
**Nine gallons water**