

Farm Stored Grain Protection

moisture content and temperature of stored grain important in prevention of infestation by pests

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The most important pests of stored grain—such as the granary and rice weevils—either do not thrive or cannot live in grain whose moisture content is 10% or less.

To a large extent, development and multiplication of stored grain insects are regulated by temperature. Little activity occurs below 60°F, and the optimum temperature for development ranges between 80°F and 90°F. Under these conditions, some species may complete their life cycle in about a month. Temperatures above 100°F are unfavorable, and prolonged exposure results in the death of most species.

Moisture content and temperature are important in protecting stored grain against serious insect attack.

Infestation

Little or no infestation of grain occurs in the field before the crop is harvested, but—given an opportunity—there are a number of insects which will attack grain in storage. A great deal can be done to reduce the insect problem through the adoption of proper sanitary measures.

The principal ways in which grain becomes infested are:

1. Placing clean grain in infested storage or placing infested grain in clean storage.
2. Use of infested transportation facilities.
3. Use of infested sacks and containers.
4. Mixing of new and old crops.
5. By migration of insects either by crawling or by flight from nearby infested areas or seed houses.
6. From infested seeding and harvesting equipment which is not thoroughly cleaned after use.
7. From infestations occurring in dried stored products such as dried fruits, nuts, cereal products, and animal feeds of all kinds.
8. From infestations that occur in the bedding places of animals and the nests of birds and rodents.

Some pests of stored grain, such as the granary weevil and rice weevil, have a limited host range and their breeding is limited in a large measure to grain. Others feed on a wide assortment of materials which include not only

cereal products but also nuts, dried fruits, cottonseed meal, drugs, and many other dried products of plant and animal origin. Because of the extensive host range, there are many sources of infestation.

Spraying

Even though storage bins are thoroughly cleaned, there is the possibility that some insects have found protection in cracks and crevices. Therefore, it is a good practice to thoroughly spray the bins, the inner and outer surfaces of bulkheads, the outside base of bins, and the walls of elevating pits.

The most effective sprays are those which contain DDT or TDE. Both of these materials leave a deposit of residue that is toxic to most grain-infesting insects. The spray should be applied several weeks before grain is placed in the bins.

In stored grain investigations, excellent control of infesting insects was obtained when the following spray mixture was applied with a power sprayer:

DDT—50% wettable powder. 8 lbs.
or
TDE—50% wettable powder. 8 lbs.
Paste-type oil emulsion. 1 gal.
Water 100 gals.

The active ingredient in this spray is equivalent to ½%. In applying it, care should be exercised to avoid any runoff and wetting of elevating equipment. This mixture can be used on the inside and outside surfaces of the bins.

Where there is a serious hazard of contaminating grain, a spray containing 0.5% pyrethrin or allethrin should be used. These materials will kill insects they contact but do not leave a protective residue.

Fumigation

When dry grain is in clean, tight storage which has been treated with a residual spray, there is a good possibility that it will not become seriously infested with insects. However, under any condition, stored grain should be kept under close observation. If an insect infestation is detected, the grain should be fumigated. The amount of

fumigant needed depends upon the tightness of the bin. Best results are obtained where nearly gastight conditions prevail.

Fumigation to be most effective should be done when there is a minimum of air movement and when the temperature is 70°F or higher. All fumigants are poisonous and should be used with extreme caution and applied from the outside of the bin.

Liquid fumigants should be applied as a coarse, or jet-type, spray uniformly over the leveled surface of the grain. For best results, the bins should not be filled to within more than one foot of the top before a fumigant is applied. The entire top of the bin should be covered with a tarpaulin immediately after the fumigant is applied.

A fumigant mixture widely used in California consists of three parts by volume of ethylene dichloride and one part by volume of carbon tetrachloride. Two gallons of this fumigant per 1,000 bushels of grain are needed to produce a good kill when bins are nearly gastight. Most farm bins are not sufficiently tight to permit the use of dosages so low. For average farm storage the amount of fumigant needed will range from four to six gallons per 1,000 bushels. Where construction is poor or where the exposed area is large, as much as eight gallons per 1,000 bushels may be needed.

Excellent control of grain insects can be obtained with methyl bromide in gastight bins. This fumigant must be handled with great care. Severe poisoning may result after long exposure to concentrations of methyl bromide too low to have an anesthetic action or to have a distinctive odor.

When bins can be tightly sealed, such as welded steel or concrete bins, methyl bromide should be used at the rate of one pound to 1,000 cubic feet—800 bushels—of chamber space. If the chamber must be opened after fumigation, it should be well ventilated before it is entered. Methyl bromide diffuses very rapidly, and if there is any circulation at all, the chamber should be free of the gas within 5–10 hours.

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