DRYING SMALL GRAIN

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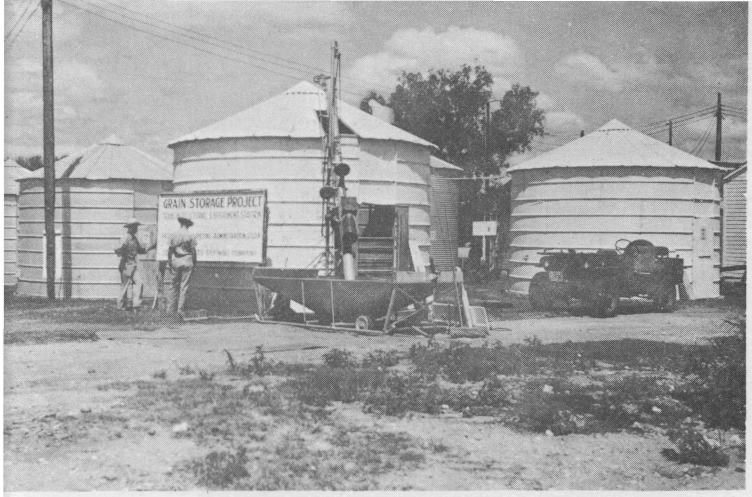
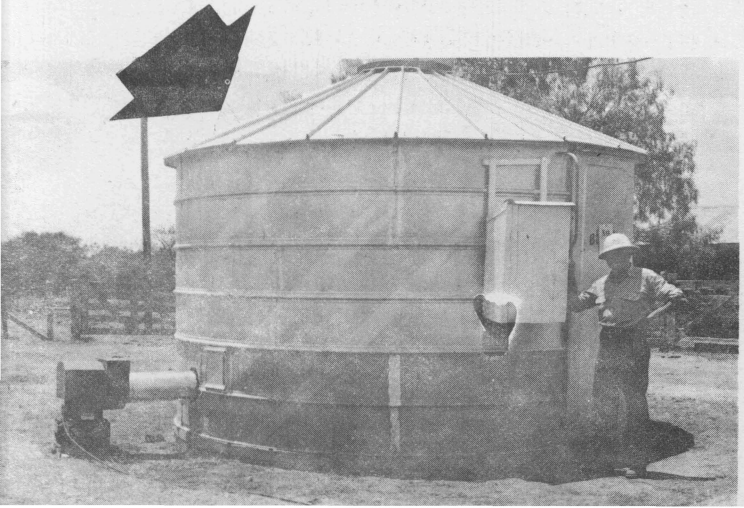


Fig. 1. Research on drying and storage is being conducted at the Beeville Experiment Station. Various types of bins have been used and several methods of drying have been tried.

Fig. 2. A metal bin equipped with a fan, motor and controls for drying grain sorghum with unheated air.

Fig. 3. A metal bin equipped with a small fan for aeration of grain. Note the difference in size of fan and motor required for aeration in this photograph and drying equipment as shown in Fig. 2.



In some areas of Texas, certain small grains require artificial drying for safe storage. Most types of grain and oil seed crops can be dried successfully; however, the principal concern is usually with sorghums in the coastal area or where late maturing crops occur.

Practically all of the problems of storage are intensified in South Texas where high temperatures, humidity and danger of severe insect damage make storage of grain hazardous. Most of the grain is high in moisture when harvested and must be dried artificially before it can be stored without risking spoilage from heating.

In tests made with grain sorghums conducted by the Texas Agricultural Experiment Station at Beeville, (Fig. 1) a moisture content above 12 percent was too high for safe storage. Grain with a moisture content above 13 percent usually heated after a few weeks storage and required turning at frequent intervals or aeration with mechanical ventilation to keep it in good condition. On the other hand a moisture content of 11 to 12 percent appears low enough for safe storage. Grain in this moisture range has been stored for as long as 23 months without serious losses.

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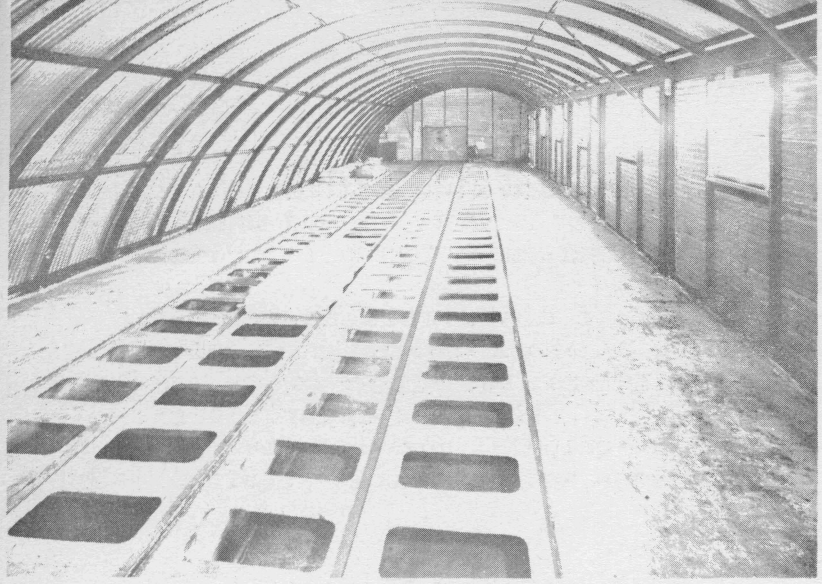
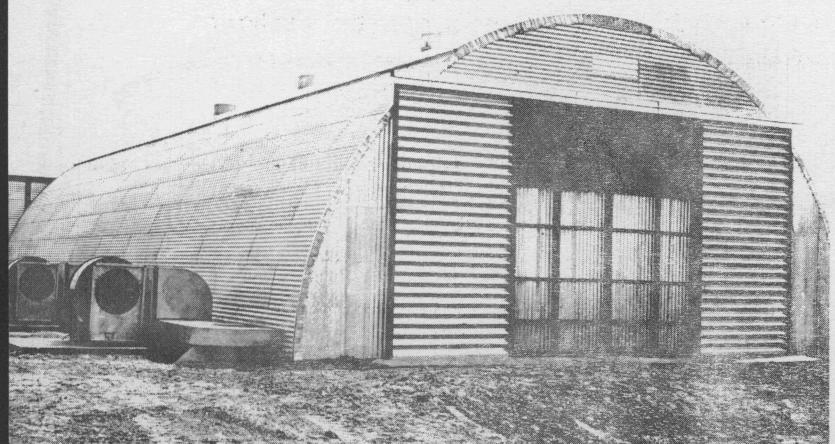


Fig. 4. An inside view of a sack-type dryer installation.

Fig. 5. A batch-type dryer developed by the Texas Agricultural Experiment Station with major parts labeled. Units operating on the same principle are available commercially. Heated air is required and close supervision is necessary but drying capacity is relatively high.

Fig. 6. A commercial general purpose building with dryer installation. This building is equipped for drying to a depth of 8 feet. It can be used for other storage purposes when not needed for grain.



DRYING AND AERATION

The terms drying and aeration in this circular are defined as follows, since they easily can be misinterpreted in their "popular" use:

Drying is the procedure used to remove excess moisture from grain to reduce the moisture to a level acceptable for sale on the market or for safe storage. Drying can be accomplished with either heated or unheated air. (Fig. 2)

Aeration refers to the procedure used to cool and ventilate grain during storage, in order to maintain quality. This can be accomplished by turning the grain at frequent intervals - transferring the grain from one bin to another or by forced air circulation. (Fig. 3)

Larger quantities of air are required for drying than for aerating grain by forced air circulation.

METHODS OF DRYING

Three methods of drying that have been used in Texas on the farm are known as sack drying, batch drying and bin drying.

Sack drying refers to drying grain in burlap bags. This method of drying is particularly suitable for drying planting seed. Heated air ordinarily is used with these dryers. They are better adapted to the drying of rice, certain grasses, and small quantities of other grains. They are too slow and otherwise unsuited for large amounts of grain such as grain sorghum. Some results of tests with this method as conducted at the Beaumont Station are outlined in Southern Cooperative Series Bulletin 29. (Fig. 4)

Batch drying is a means of drying grain in layers 6 to 18 inches thick. This method is used when high drying

capacities are desired and the method requires large volumes of heated air. Grain dried by this method must be transferred from the dryer to another bin for storage. Results of tests with this method are given in TAES Bulletin 710 and TAES Progress Report 1352. Plans for construction of a batch-type dryer are available from the Texas Extension Service (Plan No. 372). Commercial units based on the same principle are also available. (Fig. 5)

The advantages of this system include large drying capacities (40 to 100 bushels per hour); the final moisture content is uniform; and the drying compartment can be portable. Disadvantages include the fact that additional handling is required, extra storage bins are necessary and underdrying is difficult to correct. Operation instructions for this type dryer must be followed closely to insure top quality. Each installation should have engineering assistance for the design of the unit and plan of operation.

Bin drying means drying grain in storage bins (either individual or a series of bins grouped in a larger structure). The depth of grain is usually 6 to 8 feet. The grain ordinarily is dried in the same bin in which it is stored and, therefore, is particularly suited for on-farm installations. Bin drying may be accomplished with the use of either heated or unheated air.

Bin drying with *heated air* requires that each bin be fitted with a duct system or false floor, and usually a fan, burner and motor unit per bin.

Chief disadvantages are the difficulty of controlling uniformity of drying from the bottom to the top of the bin, the fire hazard, high initial equipment cost and the fact that close supervision is required.

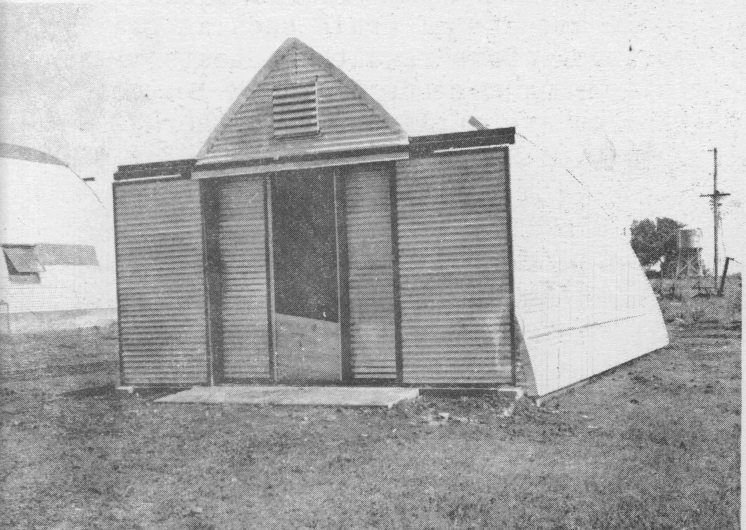
Chief advantages are the comparatively short drying period and the fact that drying can be accomplished regardless of weather conditions.

Bin drying with *unheated air* has been used successfully in tests conducted over the past two years. It has several advantages for the average on-farm installation. Although each bin must have a duct system or false floor the advantages of the method are:

Less investment in equipment; fire hazards reduced or eliminated; more uniform drying of the grain; easy and quick installation. (Fig. 6)

However, these factors must be kept in mind. The rate of drying depends on the weather and a longer drying time is necessary. Details of designing and operating a bin dryer using unheated air are contained in an Extension Service Leaflet.

Fig. 7. Bins of various types can be used for drying if properly equipped and managed.



AERATION

In most sections of the State, where grain is stored for a prolonged period, aeration of stored grain may be desirable to maintain quality. Smaller fans, motors, and duct systems are required for aeration than for drying.

Where aeration equipment is used, the bins should be aerated as often as necessary to cool the grain as near to atmospheric temperature as possible.

REMEMBER AERATION DOES NOT NECESSARILY MEAN DRYING. It is a means of keeping the grain cool and the usual equipment designed for this purpose is not large enough for the removal of moisture in amounts necessary for successful drying.

GENERAL CONSIDERATIONS ON DRYING AND STORING GRAIN

Almost every problem encountered in storing grain traces back to moisture. High moisture conditions lead to insect, heat and mold damage and appear to be the basis for most of the difficulties.

Separate moisture checks should be made at the bottom, center and top of each bin to obtain a more accurate check of the condition of the grain.

All of the grain stored in any one bin should be reduced to a moisture content of not over 12 percent for safe storage. In other words, the wettest grain in the bin should not be over 12 percent.

The temperature of the grain is a good indication of its condition during storage. Dry, clean, insect-free grain should not heat when stored in satisfactory storages. Therefore, any increase in temperature indicates an increase in moisture due to trash, insects, or leakage of outside moisture. Therefore, when "hot spots" occur, steps should be taken to eliminate the cause of the heating.

Where "hot spots" are caused by high insect infestation, the grain should be fumigated at once. If fumigation is effective, grain temperatures should decrease without aeration. Therefore, temperatures should be checked twice weekly after fumigation. If "hot spots" persist after two weeks, the cause of heating is likely due to high moisture and the grain should be aerated.

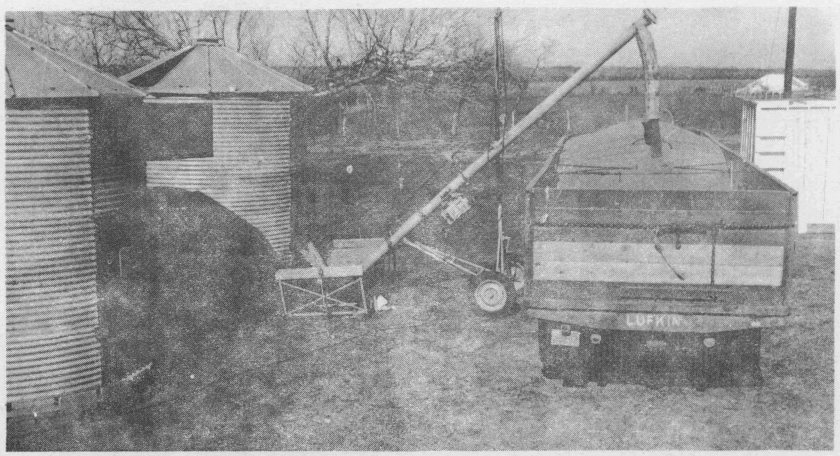


Fig. 8. Be sure to provide easy loading and unloading arrangements.

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