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TEMPORARY STORAGE OF WHEAT USING PLASTIC SHEETS

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A bumper wheat or milo crop in Oklahome often means some grain will be piled on the ground. The present storage situation and crop prospects indicate a great deal of wheat may be piled on the ground in 1977.

Rain causes losses in these piles primarily by causing sprouting and molding of the grain. The grain can be protected from weather damage by covering it with plastic sheets. And the plastic sheets are most easily held in place by small suction fans.

If a concrete or slab is available, only a top sheet of plastic is required. If the grain will be piled on the ground at a well-drained site, then both top and bottom sheets are required.

Commonly, the bottom sheet is placed and the grain is piled along the sheet with a portable auger until the pile reaches within 2 to 3 ft. of the edge of the bottom sheet. Then the top sheet is pulled over the pile, the bottom sheet is turned up around the edges and the top sheet is tucked under. The suction fan holds the top sheet tightly in place and seals the edges. When properly constructed, the pile can have standing water at the edges and still keep the grain dry.

A $\frac{1}{4}$ to $1\frac{1}{2}$ Hp fan is used to hold the plastic in place. The fan should be selected for its ability to draw at least $\frac{1}{2}$in. of static suction and to operate continuously with blocked inlet without motor damage. These are sometimes called non-overloading fans and may be either axial- (propeller) or centrifugal- (squirrel-cage) types. Small aeration fans or centrifugal fans ordered from wholesale houses have worked well. A short duct is needed to extend the fan inlet into the grain pile and to provide a method of fastening the plastic sheeting to the fan.

Either clear or black polyethylene sheets can be used. However, the clear sheets are preferred as they will collect less solar energy. Either 4-mil thickness costing 2.5 to 3¢/sq.ft. or 6-mil thickness is usually justified, particularly in the larger size sheets.

If the suction fan is chosen to develop about 3 inches of static suction, it can be used to aerate the pile as well as hold the plastic in place. In this case, a section or two of 6 to 12 inch diameter perforated duct should be fastened to the fan inlet and extended into the pile. The opposite end of the pile can be opened by peeling back the top sheet of plastic and inserting a board to hold it open. If too large an inlet is opened, the plastic will not be held firmly enough in place. Experience will indicate the proper amount of inlet. The pile can be fumigated in the same manner.

Rats and mice have not been a problem with this kind of storage, apparently because it is temporary and also because it is clean with no hiding places. There is no odor of grain except at the exhaust fan. Mice occasionally attempt to enter the pile through the fan. Therefore, the fan outlet should be screened with hardware cloth.

All wheat should be dry (13% or less) before being placed in plastic storage. Avoid adding even one combine hopper full of damp grain as this can limit the storage time of the entire pile. By opening the pile at the end opposite the fan, then smelling the air that has been drawn through

the grain by the fan, you can easily detect the odor of any spoiling grain. Perform this test at least once a week.

As long as you have electrical power, the plastic cover is secure. Some weighting of the top sheet might be desireable to avoid losing the sheet in event of loss of power. When grain is piled on concrete or asphalt and only a top sheet is used, weighting of the sheet around the edges is desireable. This protects not only against power failure, but also against high winds which might peel the sheet back far enough to cause a loss of suction.

The operating cost is easy to estimate if the horsepower rating of the fan is known. Remember that one horsepower-hour is approximately one kilowatt-hour. Multiplying the total horsepower hours by your marginal electric rate (the cost of your last KWH) gives the operating cost.

Piles over 50 ft. long should have the fan installed near the center along one side. For aeration, in this case, inlets are opened at both ends of the pile.

Table 1 gives the dimensions, capacities, and costs of various size piles matched to standard plastic sheet sizes. Of course, different dimension piles can be constructed and the sheets can be lapped to cover the piles.

Fan purchase prices start at $75 to $100 for 1/4 to 1/3 horsepower axial or centrifugal fans. One horsepower fans will cost from $120 to $180 and 1 1/2 horsepower fans range from $150 to $300. Short sections of perforated duct will cost from $10 to $25 in 8 to 12 inch diameter sizes. Five to 10 foot sections of perforated duct can be used to fasten the fan to the plastic sheeting.

The fan purchase represents a major share of the cost of plastic storage. By looking around you may be able to avoid having to purchase a fan for one-time use with plastic storage. Avoid using oversized fans as the operating cost is proportional to the horsepower rating of the fan.

Temporary storage is usually limited to periods not over 60 to 90 days. However, if the grain is dry and since aeration and fumigation can be carried out, longer storage periods are possible. The cost of operating the suction fan is, of course, time dependent, ranging from about 1/3 to 1/2¢/bu-mo. as detailed in Table 1.

Table 1. Dimensions, Capacities and Costs of Plastic Storage Units.

Size of Sheets (ft)	Dimension of the Pile: Width at Base (ft)	Depth at Center (ft)	Length at Base (ft)	Length at Peak (ft)	Capacity (bu.)	Approx. Cost for two sheets of 6-mil.	Recommended fan size (Hp)	Approx. Cost of fan	Operating Cost @ 3¢/KWH
20x50	16	4	46	30	1,000	$80 (8¢/bu)	1/4	$ 80	$ 5.40/mo. .5¢/bu-mo.
20x100	16	4	96	80	2,300	$160 (7¢/bu)	1/2	$140	$10.80/mo. .5¢/bu-mo.
40x50	34	8	44	10	3,500	$160 (4.6¢/bu)	1	$200	$21.60/mo. .6¢/bu-mo.
40x100	34	8	94	60	9,000	$320 (3.6¢/bu)	1 1/2	$280	$32.40/mo. .4¢/bu-mo.