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These represent only three of the many graduate students studying in home economics at The University of Arizona.

The faculty is engaged in a great number of different activities too. Dr. Victor Christopherson has just published a book entitled COMPARATIVE MARRIAGE AND THE FAMILY, a book dealing with family structure in different countries of the world. This, of course, is quite different from the work of Dr. Mary Ann Kight. She has been working with local hospitals and one in Nogales in the development of a program designed to provide new and realistic experiences to freshmen and sophomore dietetic students. At the other extreme is Mrs. Mildred Jensen's work with local interior designers in the establishment of actual on-the-job work experiences for students.

Like all other disciplines, home economics is becoming more and more specialized. Recognition of the areas in which the specialization occurs helps point to the broad base upon which home economics rests, and helps understanding of the total field.

The Eggless Breakfast

People just do not eat as many eggs as they used to. Per capita consumption has fallen more than 10 percent in the last 10 years. Why?

Mainly it's because of the parallel trends to skimpier breakfasts and less strenuous work.

Most people who eat eggs have them at breakfast. The bulk of all shell eggs are consumed then. But changes in living and working patterns during recent years have swayed many away from the breakfast egg.

Some people do not feel the need for a large breakfast; others are dieting. More and more working wives have switched to prepared breakfast cereals for themselves and their families, and they use fewer eggs in baking than non-working wives.

Hire Hike

Machine hire, custom and contract work —three tactics to cut equipment costs. But there's a price tag attached to these services—and it came to $869 million in 1964 (the year of the last agricultural census). Back in 1959, expenditures for such work amounted to only $805 million.

Per farm, expenditures for machine hire, custom and contract work rose about 30 percent between 1959 and 1964 — from $405 to $530.

Approximately 1.6 million farms — or half the U.S. total — reported using these services in 1964. Though this was 17 percent fewer than the number reporting similar work in 1959, the total number of farms in the United States declined 15 percent during 1959-64 — which accounts for a good part of the drop.

Suction - Controlled Plastic Grain Storage

By W. T. Welchert and James W. Little

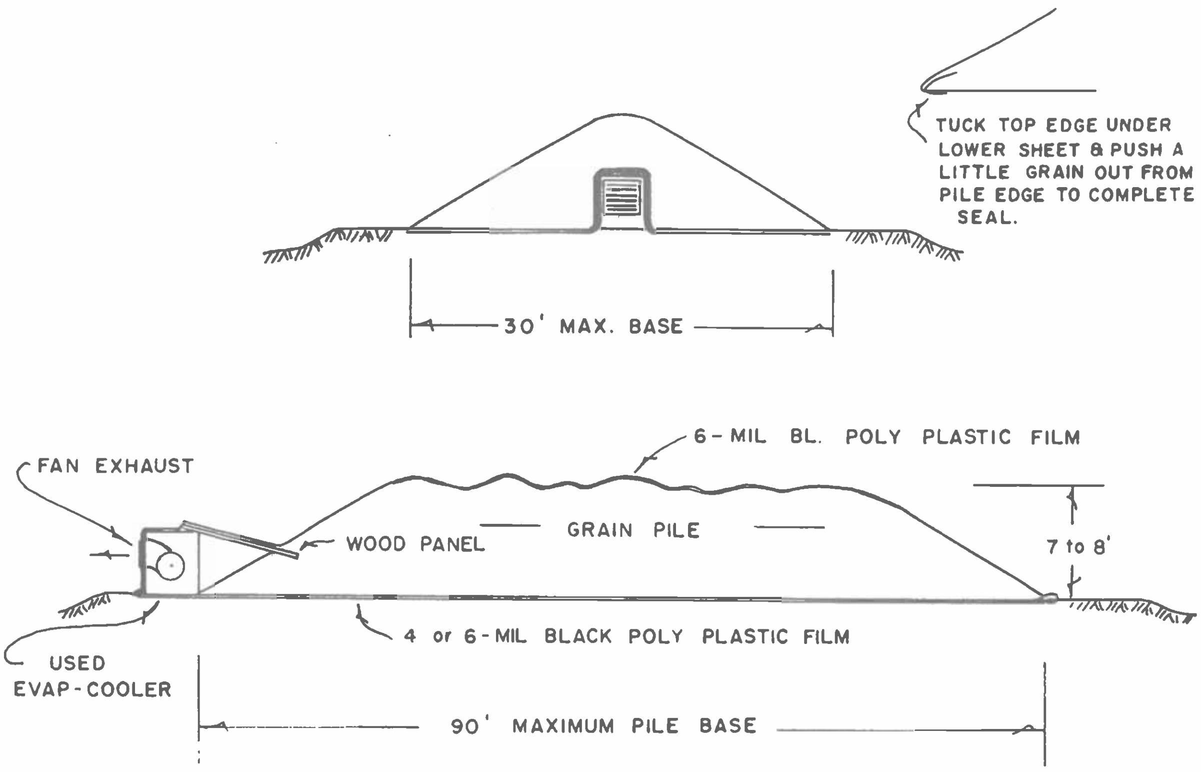
Materials Needed

1. Two large polyethylene plastic sheets of 6 mil thickness. A sheet 32′ x 100′ is suggested for the base (4 mil is OK for the base). A sheet 40′ x 100′ is suggested for the cover. Cost estimated at one cent per square foot.
2. A used evap-cooler package unit, with fan and motor in good working order. A fan capable of developing at least ¼ inch of static water suction at either full capacity or zero air delivery and operating continuously without harm is required.
3. A one-inch by about 3′ x 6′ solid wood panel or equivalent to form the top of duct between the grain and fan. Side panels are also suggested to reduce the stress on the plastic.
4. A roll of 2″ plastic tape. Cost less than $4.00.

Procedure

1. Select and clear a good ground storage site with drainage in all directions or build up a ground storage pad.
2. Spread the bottom 32′ x 100′ sheet of 6 mil plastic on the cleared ground pad. Use some temporary weights to hold the film in place.
3. Unload the grain directly on the sheet. Set the auger to unload on the centerline of the sheet and as high as necessary or permissible so that the grain seeks its own level of repose and is centered on the 32 foot wide sheet. The angle of repose for sorghum and barley is about 30 degrees from the horizontal. Hence, a pile 7½ feet high will result in a base covering about 30 feet and the top cover distance required is about 35 feet. Keep grain at least 5 feet from both ends of plastic sheet and 2 feet from the edges. It is easier to unload with the elevator located in the middle of the width of the sheet, rather than from the side. In this case, spread the bottom of the sheet and then roll it up about 40′ of the length. Set the elevator over the rolled up section. As the pile progresses, move the elevator forward and unroll the sheet forward.
4. Set a used evap-cooler at one end of the pile. A 4000 CFM forward-curved centrifugal fan evap-cooler package unit with a ⅓ horsepower motor has been used successfully on a 130 ton pile of sorghum by Willis Combs at Queen Creek. It's probable that 200 tons might have been stored with this same material and equipment.
5. Place a wood panel about the width of the cooler frame on top of the cooler and push it into the grain pile to form the top of the fan duct inlet. Handle side panels in the same way to form duct.
6. Cover the grain pile and fan frame with the 40′ x 100′ plastic sheet. The edges of the top sheet should be tucked under the edges of the bottom sheet. Roll the grain at the edge of the pile out slightly to anchor the plastic edges and form a seal. At the exhaust fan end, tape the plastic around the fan exhaust outlet. Mr. Combs simply rolled the excess plastic edges together and

Mr. Welchert is Extension Agricultural Engineer, Mr. Little an Agricultural Agent in Pinal County.



ENGINEER'S DRAWING shows placement of the evaporative cooler device, location of fan exhaust, general specifications of the grain storage unit.

(Continued from Previous Page)

anchored the roll with a little soil.

7. Turn on the fan and the plastic should draw down tight on the grain pile in a matter of several minutes. Plastic under suction tends to be self-sealing. Operate the fan continuously throughout the storage period. A conventional evap-cooler fan can easily maintain ¼ inch of static suction. Forward curved centrifugal fans actually unload the motor slightly when not exhausting air. (The fan motor current drops about 10% of full air delivery capacity.) However, the motors used in evap-coolers *do not* generally have any safety or overload protection. In fact, their design normally anticipates a cool running environment in the evaporated air stream. Normally, an electric motor is designed with an overload factor of 1.1 to 1.2. For evap-cooler motors this is not the case. *Do not* exceed the rated current load on the motor plate. Use an ammeter and adjust the pulleys to stay within the rated current.

Comments

A chicken wire fence should be installed around the area to keep cats and dogs from breaking holes through the plastic. Actually, a few small pin holes are not likely to be of concern so long as these openings are not more than the fan can draw off while still maintaining ¼ inch of static suction. If a portion comes loose and the air comes in faster than the fan can draw it off, then suction will drop to nearly zero and there will be a problem of keeping the cover in place. Fortunately, small holes or a rip can be repaired with tape or small plastic sheet.

Likewise, short power failures are not serious because it will take some time to lose all of the vacuum through the exhaust fan opening. When operating continuously, this plastic-covered pile will stay in place without a ripple with surface winds in excess of 60 mph.

A ¼ inch static suction is equivalent to a uniform pressure on the plastic cover of 1.3 pounds/ft^2 or about 3000 pounds for a 125 ton storage cover.

Grain stored in this manner should not exceed 12% moisture content. Sunlight either penetrating a translucent material or absorbed on the surface as in the case of black polyethylene can produce a surprising effect. The surface temperature of the cover may approach 160° F. during midday. During early morning the surface may cool down to 50° F. or less. Such temperature differential may cause moisture to condense just under the surface of the plastic if high moisture grain is present. The high surface temperature creates a vapor pressure difference in the pile, which sucks the moisture to the surface and the sudden night cooling causes it to condense. So if you suspect some local high moisture grain, lift the cover and inspect for a film of moisture in the early morning.

If grain of questionable moisture content is to be stored, an aeration system may be incorporated in this system. Thus far, not much engineering data are available to completely insure success with an aeration system even though Andrew's experience at Illinois involved corn that was generally above the normally accepted safe storage level. However, conditions are just not the same.

Arizona's low relative humidity results in a low equilibrium moisture content and the high temperatures tend to increase all forms of biological activity. The higher the storage moisture content is above equilibrium the greater the storage danger. To combat high moisture content, air must be moved through the grain and air flow should be uniformly distributed. If the volume of air movement is sufficient, some drying is accomplished. To do this we must first add an air inlet opening at the end of the pile opposite the fan.

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SUCTION-CONTROLLED plastic temporary grain storage setup in actual use in Arizona. Notice how effectively the suction causes the plastic to cling to the contours of the piles of grain. Also note crimped edges of the plastic, where it meets the ground.

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This area should be about twice the size of the fan outlet area, but in no case more than enough to reduce the ¼ inch of static pressure required to hold the plastic cover in place. Further, fan capacity should be increased and/or the pile size decreased so that we can anticipate an air exchange of from 1 to 5 CFM per ton of grain at ¼ inch static vacuum or more. This specification requires that we match the fan capacity at a given static resistance to the resistance of air flow through the grain. The static resistance in sorghum will vary from about ½″ static resistance at 10′ grain depth and 5 CFM per ton to as much as 7″ static resistance at 100′ grain depth and only 1 CFM air flow per ton. As air flow required increases and the grain depth increases, the static resistance to air flow increases rapidly. Even at the lowest beneficial air flow for aeration through 10′ of sorghum we quickly exceed the static characteristic of an evap-cooling fan which usually does not exceed 0.4 inches of water. Thus, fans with higher static vacuum capacity are required as outlined in USDA Marketing Research Report 178 "Aeration of Grain." On the other hand, some air may flow at ¼″ static pressure. The question is, how much? It is doubtful that the air flow amount will approach minimum aeration level. Hence, we can assume that an aeration design for high moisture content grain storage will require a fan capable of developing 7″ of water static suction. This rules out the use of evap-cooler fans.

Grain harvested from the field during the day is usually quite warm when stored. One of the advantages of aeration is that the cool night air can be drawn through the pile to cool this grain down to a temperature more near the average for the season. It's an easy matter to flip the plastic back in place over the inlet duct for daytime operation.

Plastic films exposed to the sun will show continuous deterioration because the ultraviolet fraction of the sun's rays cause a chemical reaction. Six mil polyethylene will stand at least one year's exposure. With care, the top cover can be salvaged for use again next season. It is suggested that the top cover be used on the bottom for the second season. It may be possible to salvage the bottom sheet but it is generally assumed that this will be severely damaged when loading out the grain. If odd sizes are required because of some mistake in pile dimension, (i.e. a 40′ film does not cover the top of a pile) plastic film handlers have a film solvent cement that will glue sheets together.

The total out of pocket investment cost for storing 130 tons of sorghum on the Combs farm was $82.00. The cost of continuous operation of the ⅓ horsepower electric motor is about 12 cents per day.

If an aeration system is required, it is suggested that you call the Extension Agricultural Engineer at the University for design assistance.

BLOOM SPRAYS OF GIBBERELLIN ON GRAPES PROGRESS REPORT

By J. M. Nelson, G. C. Sharples, J. R. Kuykendall, L. F. True and H. F. Tate

In recent years the table grape market has placed a premium on grape clusters with large berries. Growers of Thompson Seedless grapes have been able to produce a large berry size through the use of post-bloom applications of gibberellin and by girdling. Gibberellin (GA) is a growth regulator which causes development of greatly enlarged berries when applied to grape clusters following bloom.

As berry size is increased, however, clusters become very compact making packaging more difficult and providing a more favorable environment for bunch rot. Berry thinning is an effective method for loosening tight clusters but requires expensive hand labor. Results of experiments in California vineyards suggest that spraying the flower clusters with GA during bloom reduces berry set and consequently prevents tight clusters from developing. If true, fruit set could be reduced by bloom sprays of GA, and the need for hand thinning of

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