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Methods of Reduce Wastes during Storage Processing Transportation of Grains

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Abstract: ***To reduce wastes during storage, processing and transportation of grain we have consider these types of losses and damage, and also few methods to remove it from whole process. 1. Farm-storage losses, 2. Postharvest losses, 3. Operator-induced losses, 4. Threshing loss with the straw, 5. Threshing loss, grain damage, 6. Storage losses, grain damage: 7. Transportation losses, 8. Dryer-induced loss, laboratory method, 9. Dryer-induced loss, method for use in mill, 10.Batch dryer testing, 11.Drying in sun light(solar equipment process), 12.Grinding loss as bran, 13.Rice hulling losses, 14.Rice polishing losses, 15. Three periods of time may be identified during which food may be lost, and each period has its characteristic problems, and means of overcoming these problems. a. Preharvest are losses that occur before the process of harvesting begins, for example, losses in a growing crop due to insects, weeds and rusts. b•. Harvest losses occur between the onset and completion of the process of harvesting, for example, losses due to shattering during harvest of grain. c. Post harvest losses occur between the completion of harvest and the moment of human consumption. d. Evidence and non evidence of grain damage; kinds and amounts. C. Frass and webbing, d. Exit holes, e. Darkened (rotten) kernels, f. Degermed kernels, g. Mechanical loss factors***

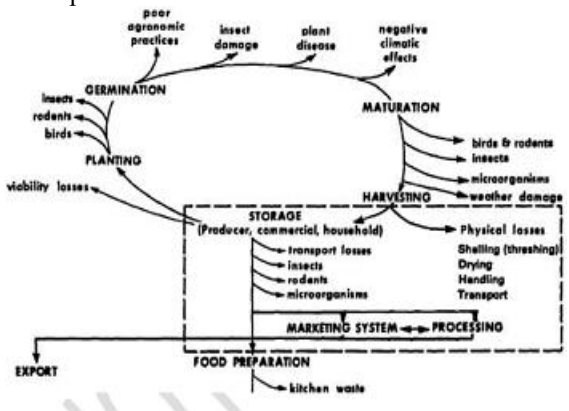
Keywords: grains, threshing, drying, grinding, hulling, harvesting

1. Introduction

India has an aim to feed every mouth of his huge population. Considering the fact that India is already struggling to feed its existing population, the country's current food crisis is only going to worsen in the coming years. Food production is not an issue of a day as farm output has set new records, showing increased output. The most significant problem is that enough proportion of the food that India produces is not consumed.

'Food IS the first necessity for the people ' Gram IS the essential consumer goods for human beings, and basis of social existence and development. It IS the key part of the base of economic development, which plays a special and important role Therefore, gram researchers from different countnes try to work out advanced scientific gram strong techniques and facilities.

The farm produces is subjected to damage during storage, processing and transportation. To reduce wastes, there should be efficient method to remove wastage at every step of food value chain. Due to the presence of highly perishable grains and large lead time for the produce to reach the customer, there is a need to bringing methods for increasing life of the products



Shelling of Maize

Stripping of maize grain from the cob is known as shelling. Losses occur wherever mechanical shelling is not followed by hand-stripping of the grains remaining on the cob. Certain shellers damage the grain, making insect penetration easier and subsequent storage losses higher.

Threshing

Losses occur during threshing by spillage, by incomplete removal of grain from stalk, or by damage to grain during threshing. They also occur after threshing due to poor separation of grain during cleaning or winnowing. Inco-!1lplete stripping usually occurs in regions of relatively high labor cost at harvest time, where the method of threshing leaves some grain unthreshed but labor is too expensive to justify hand-stripping. Workers in Malaysia observed that 1.13070 of paddy was lost by falling outside the threshing tub; it was also noted that up to 11.7% was left on the straw. Certain mechanical threshers have cleaning equipment designed for only dry grain. A wet season's harvest, eg, of paddy, will clog the screens and grain will be lost with leaf and broken stalk.

Use of oxen for threshing paddy provides a trodden straw said to be more easily digested. If the threshing floor is muddy or cracked, grain will be lost. There can be a *5070* increase in cracked and broken kernels after **combine harvesting** paddy compared to hand-harvesting and hand-stripping. Cleaning and Winnowing Cleaning is customary before milling. At the home, hand-cleaning is a combination of hand winnowing with hand removal (eg, of stones); losses can be very low when carefully done or high when siftings are allowed to scatter on the ground or winnowing done with the same result. With correct equipment, losses should be low in mills, but equipment undersized for the quantity of extraneous material, such as dirt, will cause losses of grain by removal with the dirt or by the dirt being carried forward into the milling stages. Loss assessment is difficult as losses are usually low; high losses are spotted by operators and the extraneous matter is recleaned.

Drying

Two losses are frequently caused by drying: removal of grain and portions of grain from the drying system, and damage to the grain leading to a subsequent loss. Grain which is dried in yards, on warehouse floors, or on roads will be partially consumed by birds and rodents. Wind, either natural or from passing vehicles in the case of road drying, will blow some grain away. Although very little grain is removed on vehicle tires, damage by vehicles may cause subsequent losses. Mechanical dryers may cause damage leading to removal of parts of the grain (such as bran) from the system either in the air flow or in subsequent cleaning operations ("checking") of grains such as rice, which are eaten whole. Usually the greatest damage occurs through re-wetting which happens when grains of different moisture content are mixed in a dryer, and when rain or dew re-wets grain in a yard. The damage is manifested as broken grains during milling, especially in the polishers.

Primary Processing (Milling)

This includes all processing operations carried out on grain in the home or mill, such as cleaning, parboiling, hulling, de-branning, grinding, and separating (classifying). Secondary processing (cooking, baking, fermenting, extruding) is excluded; such losses as occur are usually unavoidable, being intrinsic to the process and preventable only by a change of process - more a subject for the sociologist than technologist. In the home and small mill, grain processing is effectively a batch process in which relatively small quantities of grain are processed by one or more operations. and the product collated, then brought together for sale or other processing. In large mills, the processes are continuous and loss measurement is performed periodically by sampling product streams. All of the pre-milling history affects the fate of the grain during milling.

Parboiling

Though easily quantifiable losses of soluble materials occur during parboiling of paddy, these losses are more than offset by the improvement in nutritional value of the kernel. Hulling, Polishing, Especially Rice Milling Removal of the outer coats from a grain may take place in one or more stages. For paddy rice, red sorghum, and oats, considerable mechanical effort is needed to remove these layers. Any weakness in the kernel, caused previously or inherent, will manifest itself at this stage. Even with grain in perfect condition, only the best process with correctly set machinery will yield an out-turn of whole polished grains approaching 100%. In the case of rice, broken grains command lower prices and finely shattered material ceases to be human food. Some leaves the mill in the husk (fuel or waste), but most with the bran (feed). Bran removal may be considered a loss. With the consumer demanding rice with a high degree of polish, the loss at that stage must be measured and then changes made to keep the losses to a minimum. It has been noted that even a 10/0 increase in yield of whole grain rice can result in huge increases in national resources.

Grinding

In some processes such as wheat milling, removal of an edible part of the grain, e.g., the germ is deliberate and desired by the consumer. Whether this is a loss depends on the terms of any particular study. However, mechanical losses of desired ground products frequently occur, often caused by maloperation of the process or worn equipment. Common processes are pounding in a mortar, grinding between stones or toothed steel plates, and the complex Hungarian system for milling wheat into flour.

Separation

Whether the separation of edible from less desired products is done in the home (eg, winnowing hulls and bran from rice) or mill (eg, sieving flour from bran), complete separation is rarely achieved. With rice, it is difficult to separate the more finely broken grains from bran, and with wheat, flour adheres to bran and special equipment is used to remove most of this as flour. **Nonuniformity**

Processing of mixtures that are nonuniform because of such factors as hardness and softness of kernels, size (length, plumpness, etc.), and moisture content difference is itself a cause of losses.

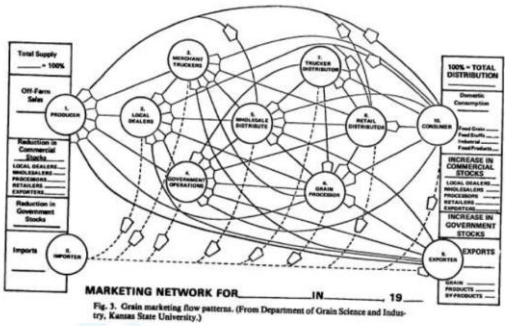
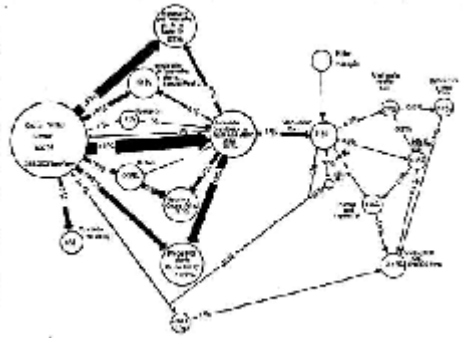


Fig. 3. Grain marketing flow patterns. (From Department of Grain Science and Industry, Kansas State University.)

For a country like INDIA, It is necessary to minimize the storage losses. As of now storage losses in INDIA is 10%, which is abnormally high as compare to other developing countries. We can reduce losses about 20% of total produce grains in our country



Useful for all living being:-if all food (grains, rise)will 98-99% then nobody will begger, will not die due to lack of food.

2. Results

In making grain loss estimations, it is important to relate losses to the Pattern of grain consumption. If grain is left untouched throughout the storage Period, the total loss over the season can be obtained by accurately weighing all the grain in and out of the store and comparing the totals. This does not, however, indicate the relation between loss and time, when the Loss reached a peak or whether it was related to a particular part of the season. If at the time of removal the estimated loss is 10%, then this represents the total loss over the storage period. In most cases, however, grain is removed at intervals during the storage period and each

quantity removed will have been exposed to deterioration for a different length of time and will have suffered a different degree of loss. If a measurement of the quantity removed is available, then estimates from samples covering the removal period and pattern may serve to cross check with the total loss as well as showing the pattern of loss.

If, as often happens on subsistence farms, the amount removed is quoted in volume terms (e.g., tins), then the volume removed will be the same whether or not the grain is damaged but the weight will be different. In this case, the weight of grain that occupies the farmer's measure should be recorded carefully at the beginning of the storage period. For each subsequent removal of grain, this weight can be reduced by the percentage of loss estimated from the appropriate sample. If samples are taken at monthly intervals and the dates of removals are known, an approximation can be made by applying the estimated loss to removals two weeks either side of the sampling date. To obtain the total loss, all individual losses can be summed.

Where removals are roughly estimated, the loss may be obtained by calculating the percentage of the total quantity stored which was removed at each sampling date and applying the percentage loss to this. The resulting losses are then summed to produce an overall percentage loss. When stored grain is regularly removed for household use, weight loss may be measured by taking, or having the user set aside, a sample from, or taken at the same time as, the portion withdrawn for use. The household may be provided with an equivalent amount of grain in exchange for the test samples.

3. Background

Two basic concepts are used in this project. One is to measure the situation (usually output) of a given operation and to compare it with an ideal (hand or special machine) operation. The other is to measure losses by weighing the various food, feed, and other streams and making direct calculations of what does not end up as food. Whether the loss is waste is not a matter that depends on methodology. Bran can be waste, feed, or food, independent of loss-assessment methodology. What results as food may be compared to total food value, to food obtained by the best possible process or best possible commercial process, or even by an experimental process. The methodology simply needs to be set up to make the required measurements.

Problem- India has an aim to feed every mouth of his huge population. Considering the fact that India is already struggling to feed its existing population, the country's current food crisis is only going to worsen in the coming years. Food production is not an issue of a day as farm output has set new records, showing increased output. The most significant problem is that enough proportion of the food that India produces is not consumed. The farm produces is subjected to damage during storage, processing and transportation. To reduce wastes, there should be efficient method to remove wastage at every step of food value chain. Due to the presence of highly perishable grains and large lead time for the produce to reach the customer, there is a need to bringing methods for increasing life of the products.

***Observation*:-** there are two types of losses. One is the loss due to grain being converted by microorganisms to carbon dioxide and water. The other loss occurs when the grain (in its entirety or as individual kernels) is rejected as food. Such rejection can occur because of an obvious discoloration or odor, or because of the more technical knowledge or implication that harmful substances (mycotoxins) are present. In the latter situation one must determine the amounts of grain rejected for food use. Any visual survey by locals or outsiders on what an individual rejects or accepts becomes a difficult assessment. It needs an input of all of the principles of measuring subjective values, bearing in mind that bias is eliminated with difficulty and that all elements of bias are probably not completely known.

Proposed Solution of the Problem

To reduce the losses in postharvest- In many states like Punjab, Gujrat, Hariyana, etc. We are using harvest machine(cutting machine for cutting and collecting crops)so many grains fall down in field and farm mix with soil that's grains are wastage about 5% of total produce grains

Planning

The mission will:

1. Map the pipeline using available government statistics and other inputs from key informants.
2. Conduct an initial survey of the postharvest grain sysem to establish who is handling, storing, transporting, and marketing the harvested crop; what part of the crop is handled and stored by each operator, and for how long, including farm storage for self-consumption purposes; and the condition of handling, storing, and processing.
3. Review all available data on quantitative and qualitative losses occurring in the system(s) and identify the major causes and extent of loss.
4. Prepare an inventory of available storage, transport, marketing, and processing facilities and assess their adequacy in capacity, design, and condition.
5. Review the present activities being undertaken to reduce postharvest losses and list the resources available for these activities from both internal and external sources.
6. Design a phased action program to investigate or implement under the project terms of reference.

In conducting the preliminary study, remember that grain losses occur in situations that cause or allow them to occur, and as the losses occur, evidence

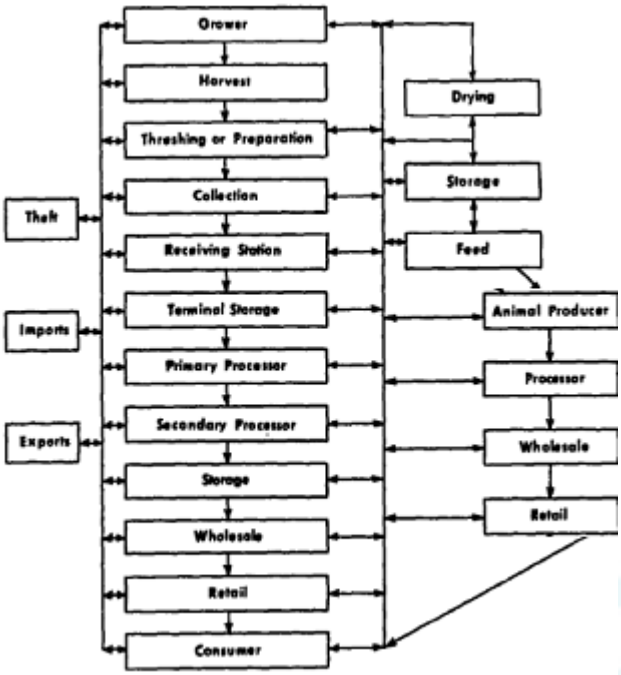
To Make Underground Storage

First we make the underground storage, where water level is very low. We make a large pitting type structure underground surface. By use of underground storage transportation medium is also very easier. Because in that process we don't necessary any machine or equipment to pull or through the grains, simply dispose it by any large vehicles.

4. Follow this Flow Chart

Following factors needs to be controlled to minimize the storage losses:

1) Moisture of the stored grain.
2) Temperature in the storage structure.
3) Insect and rodent's population in and around storage structure.
4) Quality of the grain before storing the grain
5) Types of storage bin
6) Use of pesticides and fumigants
7) Mechanical loss factors
8) General conditions of location of storage.
9) 9 Standard volume/weight method for damage by insects and Microrganisms



An ideal storage structure should have following qualities to minimize the losses:

1) Structure should be elevated and away from moist places.
2) Structure should be air tight, even at loading and unloading portion.
3) Structure should be rodent proof and clean.
4) Structure should be plastered with an impervious clay layer to avoid termite attacker attack by other insects

For safe and scientific storage following points to be remembered

1) Site selection: As described earlier, the site should be chosen in such a way that all year round it should be moisture free and cooler.
2) Storage Structure: Storage structure should be chosen by keeping in mind that the storage capacity and duration of grain storage.
3) Cleaning and Fumigation: Storage structure should be built or constructed in such a way that cleaning of storage structure and fumigation around stored grain will be easy.
4) Aeration: The ventilation should be proper in storage facility. Aeration helps in minimizing the moisture of grains.
5) Inspection: Structure should be built or constructed such that anyone can make regular inspection of grain stock without any hassle

5. Underground Pits

In India, underground pits are claimed to keep grain without damage for many years. The pits keep grain cool, and some of them are relatively airtight. Grain on top and around the sides can however often be mouldy. There are several types of pits, most of them flask shaped covered with sticks, cow dung and mud, or a large stone embedded in soft mud. The area should be free from termites and relatively dry.

6. Conclusion

6.1 Social and Cultural Guidelines

The overall aim of this chapter is to introduce some of the complex cultural social anthropological factors to postharvest grain loss assessment/ intervention activities. The message is made up of a variety of signals that pass in both directions: from the situation being investigated to the investigator and from the investigator to the situation. It is a dynamic process. In grain loss assessments the need is to find out what the situation was or is. The investigator wants to affect the milieu as little as possible while he assesses it. Thus he needs to be in tune with what is happening so that the assessment will be an assessment of what he sets out to assess - not of what his presence is bringing about.

If skilled manpower is not available then Pusan bin provide better alternative to this problem. If climatic conditions are adverse the underground pits provide good option for these conditions. If portability and easy fabrication of storage structure is required then Hamper bins good alternative for farmers. If humidity and moisture in the atmosphere is high for most of the periods in a year then Coal Tar Drum bin is our recommendation for farmers. At last in this process preservation of grain is done by underground pitting storage system. And moisture is removed by solar process.

6.2 Beneficiaries

If we protected grains in that way so we use the grains very large period of time, as in appropriate position. This whole process is also benefit for farmers as well as total public of country. Government of that country is also in advantageous range for this process, because by this process we safely collect the grains at very large period of time. The main benefit of this whole process is that it's not very costly. In that process we use underground storage of grains and remove the moisture by solar equipment treatment. In that total process transportation system is much easier because of underground storage. From ancient times till today, underground grain storage has grown more promising especially in recent decades of scientific study and research in Chma. It IS well known to the world.

References

[1] Food and Agncultural Organization of the Umted Nations,1982 Granary construction m Chma Zhengzhou (in Chmese}, Zhengzhou Gram SCIence Research Institute of Commercial Department
[2] Hangzhou underground granary, No 803, 1990. Outstanding effect of Underground granary 803 Hangzhou. Underground Space (m Chinese).
[3] Guan Yansheng and Shen Jiawei, ed., 1982. Lowtemperaturestorage (in Chmese). Beijing AgnculturalPress
[4] Gram storage Department, Nanjing Grain Economy College, 1985. Grain and all Storage, Nanjmg. Li Xiangnan and Song Sluman , 1992. An mvestigation on economic Issues of underground space utihzation (in Chmese). Underground Space. June.
[5] Lu Xicun, 1982. Good effects of the application of CIvil airdefense shelters (in Chinese). Underground Space. April. Lin Zaiyun, 1988. An investigation on the utilization of Civil air-defense shelters for buildmg grain warehouse (m Chmese) . The Ttudy on Gram Economy No 4, Gram college of Naming.
[6] State Grain Storage Burean m Chma, ed. 1994. The collection of gram storage in Chma. Chongqing (in Chinese). Chongqing University Press. Wang Yuji, 1992. A primary approach to the construction of underground grain and food warehouse (in Chinese). Underground Space. June.
[7] Xu Zongren and Song Wenzhong, ed. , 1995. Grain storage and management (m Chinese). Beijmg, Commercial Press.