Food and Agriculture Organization of the United Nations

Food loss analysis: causes and solutions

Groundnut supply chain in Malawi

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Groundnut or peanut (Arachis hypogaea) is one of the most important food crops in Malawi where about 80 percent depend on agriculture for livelihood. It is grown by about 3 million smallholder farmers involving mostly women because it is a subsistence crop. It is both a grain crop and an oil crop and is consumed in various forms – direct consumption, boiled, roasted, fried or as an ingredient in other foods. It is a major ingredient in the manufacture of ready-to-use therapeutic food that treats acute malnutrition in young children and the chronically ill.

The groundnut supply chain

In assessing the post-harvest losses, an informal supply chain was followed in Mchinji District in the villages of Gomani, Magubo and Mikayere within Zulu Extension Planning Area in Malawi. The informal supply chain is characterized by less organized group of stakeholders that uses traditional methods in various post-harvest operations. Observations, direct interaction with the stakeholders, and actual load tracking were done to provide an estimate of the quantitative and qualitative losses, and identify the critical loss points in the chain.

Groundnut production is mainly rainfed starting at the onset of the rainy season in November and harvested in March. Farmers, mostly women, are heavily involved during production including harvesting, drying, stripping and shelling. From the primary producers, groundnut reaches the consumers through several players in the chain including small- and large-scale traders, assemblers, transporters, cottage shellers, warehouse agents, wholesalers, processors and retailers (Table 1).

Critical loss points in the supply chain

During harvesting, the haulms are manually lifted and stacked in heaps with the pod facing up to facilitate drying of nuts in the pod and avoid mould growth. During lifting, some pods are left in the soil or on ridges resulting in quantity loss of 3 percent and 1 percent quality loss (Table 1). During drying in the field and homestead, loss amounted to 4.6 percent in the form of damaged grains resulting from weevil, bird and rodent infestations. Losses that occur during field stripping are quantitative in nature (8 percent) due to pods being left on the haulms attributed to faulty stripping because children are mostly involved in this operation. During shelling whether done in the homestead or cottage shellers, hand shelling is done by mixed ages, mostly children resulting in 8 percent loss both in quantity and quality in the form of reduction in weight and broken groundnut grains. In most cases, to facilitate shelling, farmers sprinkle water to soften the pods not realizing that this practice will enhance mould growth leading to aflatoxin contamination. Among the post-harvest operations, highest losses (15 percent) occur during storage. Groundnuts are stored in polyethylene bags, metal drums, and in traditional granaries that do not offer adequate protection against the attack of weevils and rodents.

TABLE 1

The groundnut supply chain, stakeholders, operations and loss points

Supply chain level	Production →	Collection centre →	Wholesale market Warehouse store Processing plant →	Retail market →	Consumption
Stakeholders	Farmers	Traders Transporters Cottage shellers	Wholesalers Warehouse Agents Processors	Transporters Retailers	Consumers
Operations	Harvesting Drying Stripping Shelling Bagging On-farm storage	Transport Shelling	Transport Storage Wholesaling Processing	Retailing	
Losses (%) Quantitative: Qualitative:	 13.0 3.6	 6.0 3.0	 8.0 7.0		
Loss Points (%)	Lifting: 4.0% Drying: 4.6% Stripping: 8.0%	Shelling: 9.0%	Storage: 15.0%		

TABLE 2
Budget calculation for the post-harvest interventions in the supply chain of groundnut

Critical loss point	Drying	Stripping	Shelling	Storage
Intervention	Drying facility	Striping machine	Groundnut sheller	PICS Bag
Item				
Product quantity (tonnes/yr)	6.3	6.3	6.3	6.3
Product value (USD/tonne)	1 714.3	1 714.3	1 714.3	1 714.3
Loss rate (%)	4	7	9	10
Food loss (tonne/yr)	0.252	0.441	0.567	0.63
Economic loss (USD/yr)	432.0036	756.0063	972.0081	1 080.009
Total cost of intervention (USD/yr)	210	360	420	500
Client cost of intervention (USD/tonne)	33.3333	57.146	66.6667	79.3651
Anticipated loss reduction (%)	50	50	50	50
Volume of loss reduction (tonne/yr)	0.126	0.2205	0.2835	0.315
Loss reduction savings (USD/yr)	216.0018	378.0032	486.0041	540.0045
Profitability of the intervention (USD/yr)	6.0018	18.0032	66.0040	40.0045

Impact of post-harvest losses

Most of the losses occur at the level of the farmer who depends on groundnut as a source of livelihood. Quantitative loss results in outright loss of volume sold hence the loss in income and the failure of the farmer to provide for the family contributing to food insecurity. Losses also result in lack of raw materials for processing. Low quality groundnut fetches low price which is usually taken advantage by the buyers. Groundnut used to be an important export crop but because of aflatoxin contamination, the country lost the European Union market because of food safety issues hence the reduction in foreign exchange earnings. Aflatoxin contamination of groundnut products is believed to contribute to health problems in the population.

FIGURE 1
Groundnut hand sheller

The importance of good post-harvest handling

Although groundnut is considered as a durable crop because its moisture content is low prior to storage and marketing, it is however susceptible to various forms of losses if the post-harvest operations are improperly done and if the produce is roughly handled. Post-harvest losses in groundnut occur because of poor practices during harvesting, drying, stripping, shelling and storage resulting in lost pods and low quality groundnut due to pests and mould growth. These lead to short storage and shelf life and aflatoxin contamination that pose health risks to consumers. Losses are avoidable through introduction of technologies and enhancing awareness of the stakeholders on the benefits of post-harvest loss production programmes that will maintain the quality, extend shelf life, and assuring safety of groundnut for the benefit of the consumers.

Recommendations to reduce losses and the economic benefits

The critical loss points in the groundnut supply chain are drying, stripping and shelling. Losses in these operations can be reduced with the provision of appropriate technologies. During drying, provision of covered and raised platforms for drying to protect against pests and livestock feeding on groundnut is shown to be profitable at USD 6.0018 per year for the farmer who usually performs this operation (Table 2). The problem of untimely rains during drying that favours mould growth on the pods is also eliminated with covered drying facilities. Stripping demands a lot of labour thus the use of stripping machine would save labour cost and minimize the use of under-age labour. The 50 percent reduction in losses with the use of stripping machine translates to a loss reduction savings of USD 378.0032 per year and profitability of USD 18.0032 for the farmer.

Because of the difficulty of shelling groundnut which is done manually, pods are sprinkled with water to soften them thus the ease in shelling but this practice leads to quality loss due to mould growth. Groundnut hand shellers (Fig.1) reduce losses and the drudgery of the operation resulting in loss reduction savings of USD 486.0041 per year and profitability of USD 66.0040 per year both for the farmer or the trader who provides the cottage sheller (Table 2).

An appropriate container for hermetic storage of groundnut is the Purdue Improved Crop Storage (PICS) bags that can be used for 2 to 3 seasons with proper use (Fig. 2). The bags are effective in preventing spillage of the nuts during transport and attack of pests during storage thus eliminating the use of chemicals that pose health risks. The use of PICS bag results in loss reduction savings of USD 540.0045 per year and profitability of USD 40.0045 per year for all stakeholders in the chain who practice storage.

This information sheet summarizes the results of the study on Food Loss Analysis: Causes and Solutions, Case Studies in Small-scale Agriculture and Fisheries Subsectors of the Food and Agriculture Organization (FAO) of the United Nations. *For more information:* Global Initiative on Food Loss and Waste Reduction (www.fao.org/save-food).

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