

Study of Post-Harvest Losses of Wheat in North Eastern Iran

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ABSTRACT: Iran produces a wide range of agricultural products which are lost at one level or the other at post-harvest stage leading to wastage in human effort, farm inputs and investments. The expression "post-harvest losses" means a measurable quantitative and qualitative loss in a given product. These losses can occur during any of the various phases of the post-harvest system. Wheat grain may be lost in the pre-harvest, harvest and post-harvest stages. Post-harvest losses occur between harvest and the moment of human consumption. They include on-farm losses, such as when grain is threshed, winnowed and dried, as well as losses along the chain during transportation, storage and processing. There is potential for loss throughout the grain harvesting and marketing chains. The post-harvest losses have been estimated using the survey data collected from 82 farmers, 55 wholesalers, 20 processors and 20 retailers in each crop in North Eastern Iran (Quchan, Farouj, Shirvan, Chenaran) for the years 2009-11. Tabular analysis has been used to estimate the post-harvest losses at different stages. Loss assessment surveys were conducted to determine the harvest loss from shattering of grain, loss of panicles and other effects, threshing loss and the amount of grain lost to rodents in the period between harvesting and storage.

Keyword: Post-harvest stages, Farm losses, Wheat harvesting

INTRODUCTION

Wheat is grown on more than 240,000,000 hectares, larger than for any other crop. World trade in wheat is greater than for all other crops combined. Wheat provides more nourishment for humans than any other food source. It is a major diet component because of the wheat plant's agronomic adaptability with the ability to grow from near arctic regions to equator, from sea level to plains of Tibet, approximately 4,000 m above sea level. In addition to agronomic adaptability, wheat offers ease of grain storage and ease of converting grain into flour for making edible, palatable, interesting and satisfying foods. Wheat is the most important source of carbohydrate in a majority of countries. Crop production is dictated by Nature, but post-production operations play an important role in creating a stable food supply. Although post-production operations vary from country to country and region to region throughout the world, procedures are similar among the developing countries. However, operations diversify with farm size such as small landholders, medium scale farmers and progressive growers. Post-production operations will be dissimilar between the developed and developing countries. Functions like harvesting, transportation, and threshing, cleaning, drying, storage, packaging and marketing are described below. Harvest losses occur between the beginning and completion of harvesting, and are primarily caused by losses due to shattering. Post-harvest losses occur between harvest and the moment of human consumption. They include onfarm losses, such as when grain is threshed, winnowed and dried, as well as losses along the chain during transportation, storage and processing. There is potential for loss throughout the grain harvesting and marketing chains. Loss is defined as a measurable decrease of the food quantity and quality. Loss should not be confused with superficial damage generally due to deterioration. Quantitative loss is physical and can be measured in weight or volume, while qualitative loss can only be assessed. It is estimated that about 25.0 million tons of wheat are lost during post-harvest stages (including storage and post-production). About 46 percentage of this loss is recorded in developing countries. Combine loss is one of the most important in agricultural mechanization. Prevent yield loss, is one way to improve performance in the short term. In developed countries, the rate is about 4 percent drop in Combine. While

the exact amount is not known in Iran and in some areas reaches 20 percent (Akhiani, 2008). The aim was to this study, is surveying the effective factors on wheat loss and quantifying loss amount.

MATERIALS AND METHODS

To study the growth rates in area, production and productivity of food grains, time series data were collected for the period 2009-11 from the Directorate of Economics and Statistics and the District Agriculture Offices. The cross-sectional data were obtained from the survey of sample cultivators of food grains and various market intermediaries through personal interview with the help of pre-tested and structured schedules for the agricultural year 2010-11. The data collected from the farmer respondents included general information about the cultivation of food grains, methods of harvesting, and drying, place of drying, mode of packaging, storage system, mode of transportation and losses during post-harvest operations. For computing the growth in area, production and productivity of selected food grains, compound growth equation of the form $Y = abT^x$ was estimated. Averages and percentages were used to compute the post-harvest losses. The total postharvest losses were estimated as a sum of all these losses.

Statistical analysis: The tools of analysis used for this study is descriptive statistics of the Explanatory Variables (both qualitative and quantitative). These involve the use of central tendency including the mean frequency distribution and percentages. Data analysis was carried out using the analysis of variance and LSD test using the "MSTATC" statistical computer package.

RESULTS AND DISCUSSION

Labor harvesting of grains is difficult, energy and time consuming operation. Combine harvester reduce harvesting and storage losses by greatly increasing the timeliness. Methods and timing of harvesting are important actors to total crop yield. A major proportion of the crop in Asia is harvested manually using sickles or with types of knives leaving 3-6 cm wheat straw above the ground level. Hence, it is absolutely essential to mechanize the harvesting operations. As more than 70% of the people in most Asian countries strive on agriculture for their livelihood (Shamabadi, 2012). Loss assessment surveys were conducted to determine the harvest loss from shattering of grain, loss of panicles and other effects, threshing loss and the amount of grain lost to rodents in the period between harvesting and storage. Early wheat harvesting produces immature grains while delayed harvesting causes shattering and quality losses (Chaudhry, 1979). Matter (1967) found that the machine loss was a function of grain moisture, cylinder speed, cylinder concave clearance and feed rate. Clark (1972) demonstrated that at 33% moisture content, wider cylinder speed yielded less grain loss. Chaudhry (1979) found that the grain losses in bullock threshing, mechanical threshing, and tractor threshing and combine harvester amounted to be 3.11, 2.68, 2.01 and 1.2%, respectively. Based on the total quantity of wheat harvested, 0.35 percentages was lost during harvesting, 1.24 percentages was lost during threshing and 0.15 percentages was lost during temporary storage. In many developing countries, overall post-harvest losses of cereals and grain legumes of about 10 to 15 percent are fairly common. In some regions of Africa and Latin America, higher rates are found: up to 50 percent of the quantities harvested. no universal mathematical methods exist for establishing a "model"; the extent of losses may fluctuate considerably depending on weather conditions (rainy season, etc.), varieties, locations, etc. The post-harvest losses at farm level have been observed as 0.65 q/ha. The storage losses at different stages have added up to about 31.50 per cent of the total post-harvest losses in wheat. Transit losses at different levels have been important component of post-harvest losses, contributing to about 18 per cent of the total losses. The estimated post-harvest losses per quintal of food grains produced or handled at different stages are presented in Table 1.

These were estimated to be 3.28kg/q in wheat at the farm level. These losses were maximum due to faulty storage (0.95 kg/q) in wheat. Important factors leading to storage losses were (i) non-availability of separate godowns for storage, (ii) poor storage structures, (iii) presence of rodents, insects and dampness, and (iv) improper drainage at storage places. Based on the total quantity of wheat harvested, 0.35 percentages was lost during harvesting, 1.24 percentages was lost during threshing and 0.15 percentages was lost during temporary storage. Losses during harvesting are related to the degree of maturity of the crop at harvest and to delays in harvesting. Such losses are difficult to reduce. Although this represents a private loss to the owner, some of this grain will be recovered by those permitted to pick wheatears in the harvested field. Losses during threshing are operations related and may be eliminated with a better adjustment of the thresher to limit the amount of grain lost with the straw. The grain losses during the threshing activity were estimated to be 0.52 kg/q in rice and 0.44 kg/q in wheat. The threshing losses were mainly in the form of broken grains, which were slightly higher, when the produce was threshed by machine as compared to manual. The average post-harvest losses per farm were estimated at 1.20 quintals for wheat. The average losses per ha worked out to be 1.68 quintals wheat. The study on post-harvest

losses in food grains at different stages of their handling would help assess the extent and magnitude of losses and identify the factors responsible for such losses. This in turn would help develop proper measures to reduce these losses. Evolving correct policies for minimizing post-harvest losses would crucially depend on reliable and objective estimates of such losses at different stages. This information is important for scientists, technologists, policymakers, administrators and industrialists.

Table 1. Nature and Principal Causes of Post-Harvest Losses (FAO Corporate Document Repository)

NATURE	DIRECT CAUSES	INDIRECT CAUSES
	Premature harvest	Inadequate:
	Poor maturation	- capital
	Poor threshing	- professionalism
In weight	Insufficient drying	- equipment
	Insufficient cleaning	- pesticides
	Bird attack	- packaging
In quality	Rodent attack	- transport
	Insect attack	- organization
	Micro-organism attack	Constraints:
	Biochemical change	-social
Economic	Leakage and waste	-economic
	Moisture content wrong for storage	-political
	Inadequate storage and transport techniques	

CONCLUSION

The world population is increasing faster than the growth in the food supply, and the resources used for creating food are all becoming increasingly scarce. Production operations vary from country to country and region to region throughout the world, procedures are similar among the developing countries. However, operations diversify with farm size such as small landholders, medium scale farmers and progressive growers. Postproduction operations will be dissimilar between the developed and developing countries. Functions like harvesting, transportation, and threshing, cleaning, drying, storage, packaging and marketing are described below. The time of harvesting plays a vital role. The following harvesting care should be taken. Reducing postharvest food losses must be an essential component in any strategy to make more food available without increasing the burden on the natural environment.

A reduction in the quantities or qualities of grain means a corresponding commercial loss that is evidenced as a loss of money. But beyond these direct economic losses, an evaluation of losses should also take account of some factors within the post-harvest system that can hamper the growth of production and of income. These include production systems, work schedules and methods, infrastructure, organization models, credit mechanisms etc. Adoption of mechanized or semi-mechanized systems for some operations (harvesting, threshing, drying, etc.) can cut working time while, at the same time, permitting an increase in production by reducing the labour required and exploiting the land to better advantage. Commercially, if the transport system is inadequate, the farmer may find it impossible to sell his products within the required time-limits and in the places where market prices are the most attractive. The fact of having to forgo a potential profit is beyond a doubt a loss of money. If a farmer is not able to store products in complete security in existing storage buildings, he may be obliged to sell his production immediately after the harvest, thus becoming unable to profit by market prices when they are at their best. Once again, missing a profit is an economic loss for the farmer. The consequences of such situations often go beyond individual losses of money: they affect production and the entire national economy. Wheat crop should be harvested, when the grains become hard. Harvesting before maturity means low recovery of grain, higher proportion of immature seeds, broken and poor quality and disease prone during storage. Delay in harvesting means shattering and spillage of grains. Its exposure to birds, rodents and insect and pest attack. Harvesting should be done in dry summer season. Harvesting should be done by using proper method and improved equipment's. Harvested wheat should be kept separately to avoid mixing of varieties. Direct sun drying and excessive drying should be avoided. Threshing and winnowing should be done in the fields. The grains should be packed in sound clean gunny bags to minimize the losses during transportation.

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