



Pre and Postharvest Losses and Marketing of Grapes in Afghanistan: Case Study in Mirbachakot, Shakardara and Kalakan Districts of Kabul

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Abstract Grape is one of the most commonly produced and globally well-known fruit crops. And also grape is the major fruit species grown in Afghanistan that accounts 48% of the total fruit growing area. Reduction of post-harvest losses is the indispensable challenge in the country, hence to increase the availability of fruits and vegetables. However, the purpose of this study is to determine the pre and post-harvest losses of grape at stages of marketing and distribution. A questionnaire survey was conducted in Mirbachakot, Shakardara and Kalakan districts of Kabul province, Afghanistan. A total 60 farmers, including contractors, wholesalers and retailers were randomly selected and interviewed across in the study areas, using structured and semi-structured questionnaire sheet during the months of August-September in 2016. Based on the result of questionnaire, pre-harvest loss of grape from large, medium and small by 14%, 13 and 12%, respectively. Similarly, total post-harvest losses of grapes; Contractor loss, 9.0%, Wholesaler loss, 10.3% and Retailer loss 12.0%. In addition, there are many other causes such as, insect attack, diseases, dropping, mummification, water berries, improper packing and transportation. All these factors contribute and significantly declining the grape production. It can be suggested that grape growers would be trained on the subject of pre and post-harvest management and marketing practices.

Keywords pre and post-harvest loss, marketing, grape, Afghanistan

INTRODUCTION

It is acknowledged that grape is one of the most important fruit crops of the world and it contains many of the most valuable elements necessary for life. In Afghanistan 48% of the total fruit growing area is under grape vine equivalent to 82,450 hectares with estimated 874,500 tons production (CSO, 2016). The outputs of all agricultural commodities produced in the field have to undergo a series of operations such as harvesting, packing, transportation, processing, storage and exchange before they reach the consumer, and there are substantial losses occur during pre-harvest and post-harvest stages (Kader et al., 2004). The information on the extent of losses at these stages are important not only for agricultural scientists, but it would be useful for the policy makers as well. The agricultural scientist and technologist will be guided by these findings in improvements in the crops production and post-harvest technologies aimed at minimizing these losses. The sum quantity of outputs loss in these operations at all of these stages is referred to as post-harvest losses (FAO, 1980). One of the main reasons attributed to lower availability food is plenty of post-harvest losses that occur at various stages of marketing which ranges from 15% to 50% (FAO, 1981 and Roy, 1989).

Pre-harvest factors greatly influence the crop conditions on the stage of harvest, storage, and nutritive potential. There are many pre-harvest factors have known that affect storage quality, including genotype, cultivar selection, and stage of maturity at harvest has a very important influence on subsequent storage life, soil texture and fertility, fertilizer application, climate conditions such as temperature, light intensity, and rainfall amount (Watada et al., 1984).

Evaluating pre-harvest conditions indicated the most influence on the postharvest fruit quality (De long et al., 2003; Stanle et al., 1999; Robert, et al., 1996). The importance of post-harvest losses has been discussed at several national and international levels. Many studies and researches have been conducted in developed and developing countries for estimating the post-harvest losses, but the importance of post-harvest losses in agricultural commodities have not fully recognized yet. However, studied by USAID, 2012 and ROP, 2009 the agricultural production in Afghanistan has not fully linked to marketing. The number of scientists involved in production research in these countries is significantly higher than those concerned with post-harvest losses in agricultural commodities. Unfortunately, much time and money are being spent to cultivate crops, irrigation, fertilization and protection. Nevertheless, has received little attention and resources devoted to the issues related to pre and post-harvest losses resulting in failure, to meet food requirement, thereby millions of people now suffer from hunger throughout the nation (FAO, 1980 and FAO, 2011).

In developing countries, it is not only the problem of production, but it is equally important to save whatever is produced. Therefore, knowledge regarding to the magnitude of losses at various stages of handling and storage is considered to be very important to introduce necessary improvement for saving and preserving production (FAO, 1980). The purpose of this study is to determine the pre and post-harvest losses of grape at various stages and marketing practices in the Mirbachakot, Shakardara and Kalakan districts of Kabul province, Afghanistan.

METHODOLOGY

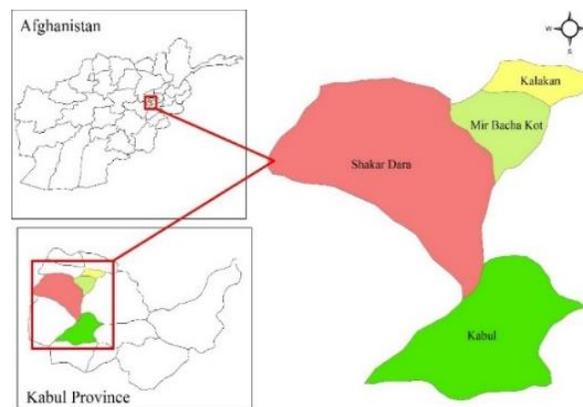


Fig. 1 Map of the study area

In order to identify the pre and post-harvest losses and marketing of grape a survey was conducted in Mirbachakot, Kalakan and Shakardara districts of Kabul province, Afghanistan as shown in Fig.1. A total 60 farmers were randomly selected across the entire study area and interviewed using structured and semi-structured questionnaire in the survey. Farmers were categorized into six groups; large, medium, small grape growers, pre-harvest contractor, wholesaler and retailer based on their trade and characteristics (production, farm size of vineyard). In addition, two kinds of data were collected as primary and secondary during the grape harvesting and marketing season. Primary data included information, face to face interview with grape growers, local authorities of villages and NGO. Secondary data were assigned from scientific papers, journals, and books. Data were calculated for

average and percentages of pre and post-harvest losses and marketing channels. Likewise, primary data were recorded for various parameters were subjected to statistical analysis, Critical Difference (CD) at the 5% level of probability and used Statistic Package for Social Science (SPSS) software.

RESULTS AND DISCUSSION

Pre-harvest Losses

The pre-harvest losses defines from production to the farm gate, which includes growing, harvesting and on-farm handling (COMCEC, 2016). Although, estimates of losses in developing countries are hard to judge, evaluating pre-harvest conditions exert the most influence on post-harvest quality. However, based on the survey conducted, the pre-harvest losses of fresh grapes are due to several common factors like insect attack, diseases, birds, droppings, water berries, short berries, mummification, poor water management and drought, and cultural practices (pruning, fertilizing, and pesticide spraying). Insect attack and diseases were contributed the maximum loss, 3.2% and 3% in large and medium farmers respectively. Similarly, in the small grape farmers maximum loss was reduced by 2.7%. The total pre-harvest of grape loss was 14% from large farmers, 13% from medium farmers and 12% from small farmers. The result showed that the severe pre-harvest loss was by insect attack, diseases and dropping among three categories of farmers as shown in Table 1.

Reported by COMCCE, 2016 loss of the agricultural production ranges 23% to 39% in Africa, Asia and the Middle East, high percentage of loss is recorded for fruits and vegetables. In Developing countries the agriculture production losses and waste are mostly, financial, managerial and technical limitations, but developed countries, mainly related to consumer attitude (FAO, 2011). Thus pre-harvest losses could be significant impacts on production and post-harvest process leading to lost revenue, lower yields and waste of resources.

Table 1 Pre-harvest losses of grapes at large, medium and small level of farmers

Stages of losses	Large farmers			Medium farmers			Small farmers		
	Qty (kg)	Loss%	Value (AFN)	Qty (kg)	Loss%	Value (AFN)	Qty (kg)	Loss%	Value (AFN)
Quantity harvested	1,000	100	20,000	1,000	100	20,000	1000	100	20000
Dropping	28	2.8	560	27	2.7	540	27	2.7	540
Water berries	26	2.6	520	25	2.5	500	22	2.2	440
Shot berries	24	2.4	480	23	2.3	460	24	2.4	480
Mummification	26	2.6	520	24	2.4	480	22	2.2	440
Insect and diseases	32	3.2	640	30	3.0	600	26	2.6	520
Total	136	14	2,720	129	13	2,580	121	12	2,420
Quantity Remaining	864	86	17,280	871	87	17,420	879	88	17,580

(USD 1 = 66.5 Afghani)



Fig. 2 Packing, transportation and marketing grapes system in Afghanistan

Most of the fruit losses occur between leaving the farm and reaching the consumer. The grapes normally harvests in the farm. After that removing the damaged bunches and berries, packed in plastic bags or cartons, then transporting to market by vehicles as shown in Fig. 2. It was observed that poor packing and faulty transporting were the main factors for loss of agricultural production, particularly fruits in the study site.

Postharvest Losses

Over the past decades, 95% of the research investments were reported to have focused on increasing productivity and only 5% directed towards reducing losses (Kader, 2005; Kader and Roller, 2004; WFLO, 2010). Food production is currently being challenged by limited land, water and increased weather variability due to climate change. To sustainably achieve the goals of food security, food availability needs to be also increased through reductions in the post-harvest process at farm, retail and consumer levels. Based on Table 2, the loss at contractor, wholesaler and retailer level were 9%, 10.3% and 12% respectively, due to handling and packing, loading and unloading, poor transportation, and faulty storage. The maximum loss during the transportation and storage were 2.3% and 2%, respectively.

Other researchers found that the high losses occur during on-farm and postharvest stages in developing countries (COMCEC, 2016). In Pakistan about 21% the grapes grown (9.8 thousand tons amounting \$3.25 million) lost and wasted, due to gaps in the cold chain, unavailability of cold storage and poor transportation (Khalid et al., 2011). On the other hand field management practices; genotype, cultivar selection, soil texture and fertility, fertilizer application, pruning, irrigation, pest control, and stage of maturity play a very important role in determining quality attributes size, color, flavor, texture, and nutritional values. Understanding the effect of pre-harvest factors would contribute minimize losses and maintain the quality of the grape.

Table 2 Post-harvest losses of grapes at different level

Stages of losses	Contractor loss (%)	Wholesaler loss (%)	Retailer loss (%)
Quantity purchased	100	100	100
Transportation	2.3	2.5	2.5
Handling and packing	1.9	1.5	2.3
Loading and unloading	1.8	2.3	2.2
Storage	2.0	3.0	3.0
Others	1.0	1.0	2.0
Total losses	9.0	10.3	12.0
Quantity Remaining	91.5	89.7	88.0

It observed from Table 1, that there was negligible different grape loss between large, medium and small farmers, But at the field level, the dropping, insect attack and diseases accounted for the highest percentage of loss. Based on Table 2, the total postharvest loss in grapes in pre-harvest contractor was found to be 9%. The wholesaler level loss was found to be 10.3% and loss at the retailer level was slightly higher at 12%. At the pre-harvest, wholesaler and retailer level, the storage and transportation were found to contribute more toward the loss. Due to, insufficient storage, poor roads and no specialized transportation vehicles exclusively for fruits were used in the study site.

According to the Fig. 3 post-harvest losses from point of harvesting to consumption worked out to be 43.3% comprising of 13% at the farm, 9% in pre-harvest contract, 10.3% in wholesaler, and 12% at the retailer level respectively. Based on table 4, findings indicated, that the maximum grape loss occurred was due to insect attack, diseases and dropping at farm level.

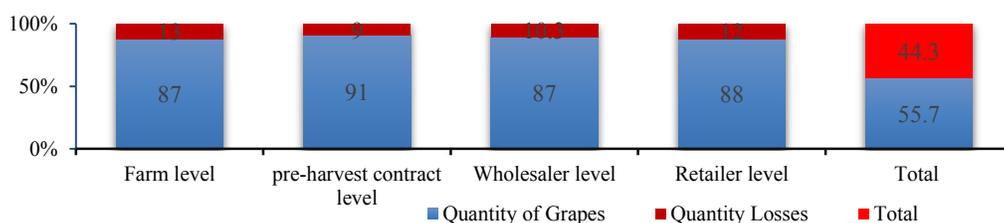


Fig. 3 Pre and post-harvest losses percentage of grapes in different stages

Marketing Channels

The marketing of grapes begins when the produce leaves the farm and ends when it reaches to the final consumers. It is rather a series of important business activities that transform a farm producer’s product into a number of finished products desired by the consumer. The results indicated that 60% of the grape growers sell their yield at a lower price to channel 1, due to non-availability of cold storage, followed by 25% farmers market through direct sale of the products to the channel 2, because direct sales benefit the producers more than contract sales. While remaining 15% farmers’ sale their product to commission agents. It is found that grape growers in the study area follow several marketing channels.

Channel 1 ⇌ Producer ⇌ Pre-harvest contractor ⇌ Wholesaler ⇌ Retailer ⇌ Consumer

Channel 2 ⇌ Producer ⇌ Wholesaler ⇌ Retailer ⇌ Consumer

Channel 3 ⇌ Producer ⇌ Commission agent ⇌ Wholesaler ⇌ Retailer ⇌ Consumer

Table 3 Coefficient of Variation = 5.16

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F calculated	F probability
Replications	2	22.53	11.26	6.373	0.020
Treatments	4	74.26	18.56	10.50	0.008
Error	8	14.13	1.766	-	-
Total	14	-	-	-	-

Table 4 Statistical analysis (ANOVA)

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F calculated	F probability					
Replications	2	41.2	20.6	2.22	0.177					
Treatments	4	495.0	123.7	13.351	0.002					
Error	8	74.13	9.2	-	-					
Total	14	-	-	-	-					
Treatment No.	T 4	T 1	T 3	T 2	T 5	P 5	P 1	P 2	P 4	P 3
Treatment Average	26.6	24.3	21.0	19.0	10.0	29.3	27.3	24.3	24.0	23.6
Critical Difference (CD) Compared	a	ab	ab	b	c	a	a	b	b	b

(T1-T5 show critical difference at large, medium, small farmers and P1-P5 critical difference at pre-harvest contract, wholesaler and retailer level). Significant difference at $p < 0.05$

CONCLUSION

Despite the global progress in the food loss reduction there remain many gaps in the knowledge regarding the quantity of losses at pre and postharvest stages and marketing practices are considered very useful to introduce necessary improvement to enhance quality and quantity of production. Pre and postharvest losses are a complex problem in Afghanistan, it is one of the big challenges for the farmers particularly for fruit growers. Due to improper management and poor knowledge of growers about 30% to 40% losses of agriculture production. However, grape is the most important fruit in Afghanistan, it covers 48% of total fruit growing areas and annual production is about 874,500 tons. The questionnaire survey was conducted in Mirbachakot, Shakardara and Kalakan districts of Kabul province. To determine the pre and post-harvest losses of grape at stages of marketing and distribution. A total of 60 (farmers, contractors, wholesalers and retailers) was randomly selected across the entire study area and interviewed in the survey. Based on the result of questionnaire, pre-harvest loss of grape from large, medium and small by 14%, 13% and 12%, respectively. Similarly, total post-harvest losses of grapes; Contractor loss, 9.0%, Wholesaler loss, 10.3% and Retailer loss 12.0%. In addition, there are many other causes identified such as, insect attack, diseases, dropping, mummification, water berries, improper packing and transportation. Meanwhile, the majority of the farmers live on the margin of food insecurity, so reduction grape losses could have an immediate and significant impact on their sustainable livelihoods. It can be suggested that grape growers would be trained on the subject of pre and post-harvest management and marketing practices. Thereby, using better agricultural practices and adequate technologies can significantly reduce the losses and help in strengthening food security and poverty.

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