

Postharvest Loss Assessment of Commercial Horticultural Crops in South Wollo, Ethiopia “Challenges and Opportunities”

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Abstract

Postharvest losses assessment of horticultural crops in south wollo, at two districts were investigated using data from 220 farmers and 80 traders. Data were collected using structured questionnaire and focus group discussion. The results revealed that the performance of using irrigation water is very interesting (96.4% of respondents) but there is shortage of irrigation water (21.8%). The problem of pest and disease is one of the major production-limiting factors as replied by most of respondents (44.8%) and the problem is severe during winter. The major causes of postharvest losses as replied by the respondents are preharvest infection (46.4%) and others (25%) replied both infection and injury. The general postharvest losses of commodities as replied by the producers is estimated as <5% (50% of respondents) 5-10% (34.1% of respondents) and 10-20% (13.2% of respondents). The losses of individual crops at different stages of handling (farmers level, transportation and storage) is summarized as banana (1.5%, 1.2% and 4.5%), orange (3.04%, 1.2% and 3.6%), mango (1.6%, 1% and 3.7%), papaya (1.5%, 1% and 3.3%), tomato (2.5%, 2.5% and 5.9%), onion (3.3%, 1.1% and 3.7%), cabbage (4.3%, 2.8% and 4.2%) and carrot (2.8%, 1.2% and 3.8%). Awareness creation about the amount of losses, criteria to be used during selection and other postharvest principles and operations should be given due emphasis to minimize the postharvest losses of perishable horticultural commodities.

Key words : Postharvest, horticulture , losses, value chain

1. INTRODUCTION

Food security, both in terms of availability and access to food, poses a challenge to rapidly growing populations, in environments of dwindling land and water resources. The horticultural sector has established its credibility for improving land use, and generating employment and nutritional security (Kader, 2005). Horticulture, which includes the production of fruits, vegetables, flowers, spices, medicinal and aromatic plants and plantation crops has emerged as a major economic activity in the world. More than 85% of the Ethiopian population, residing in the rural area, is engaged in agricultural production as a major means of livelihood. Agriculture in Ethiopia has not made such a contribution in the past because of the various constraints associated with it. Such constraints include the lack of integrated post-harvest technology. In order to help and to address the problem of small-scale agriculture towards development into a modern production sector, strengthening the post-harvest sector or system is essential.

Given the current development strategy in the country of Agricultural Development Led Industrialization (ADLI), a lot is expected from the post-harvest sector. Finally, in order to attain a high nutritional status, improved post-harvest management, reduced post-harvest losses, production of value added products, effective and efficient research programs on the post-harvest sector must be strengthened and promoted (EARO, 2000). So far, a number of researches have been done on horticultural crops, no more research was done on the postharvest losses assessment of horticultural crops especially in northeastern part of Amhara region. Thus, the main aim of this research is to create awareness on the yield loss of perishable horticultural crops.

2. RESEARCH METHODOLOGY

2.1 Area Description

The research was conducted in 2011/2012 at two districts namely (Kalu and Tehuledere). Both of them are in South Wollo administrative zone of Amhara region, Ethiopia. The research also assessed information about handling and marketing of horticultural crops from wholesalers and retailers at Dessie, Kombolcha and Haik towns.

The researchers collected baseline information from each district using qualitative and quantitative data. The research focused on fruit crops such as Mango (*Managifera indica*), Avocado (*Persia Americana*), Orange (*Citrus sinensis*), Banana (*Musa sp*) and Papaya (*Carica papaya*). Vegetables like tomatoes (*Lycopersicum esculentum*), head cabbage (*Brasica oleracia*), onion (*Allium cepa*) and carrot (*Daucus carrota* L). Post harvest loss assessment at the level of farmers and traders were conducted.

2.2 Sampling Procedure

Multistage sampling techniques were used to select the respondents. First vegetable and fruit producing kebeles from each district were identified based on their potential (two kebeles from each Wereda) and then vegetable and/or fruit producing farmers will be selected randomly from each kebele. We considered 110 farmers from each Wereda, so 220 farmers from both Weredas were considered. The research also took a total of 80 traders (20 wholesalers and 60 retailers) from Dessie, Kombolcha and Haik towns to assess the extent of losses at trader's level.

2.3 Methods of Data analysis

The data entered and analyzed using appropriate software (SPSS version 17). Frequencies and pie charts were used to display results of findings for categorical variables. In addition mean, minimum and maximum values with their t value is used to analyze findings of quantitative data. Chi-square was used for ordinal variables.

3.RESULT AND DISCUSSION

3.1 Production practices and Handling at farmers' level

3.1.1 Season of production and production system

Farmers in the respected Weredas produce horticultural crops both in summer and winter (6.6%), however 33.6% of the respondents produce these crops only in winter because of the problem of pest and disease in summer and the crops preference during the dry periods using irrigation water (such as onions). Almost all respondents in the study area use irrigation water, this is because the research is purposely focused on potential kebeles of the respected Weredas, where horticultural crops are produced. The major source of irrigation water is from river (58.2) and spring (18.2). In addition, they also use water-harvesting structure to collect rainwater, and Lake Haik is source of irrigation water in Tehuledere Wereda, but of minor use (table 1)

3.1.2 Problems faced during production and causes of postharvest losses

Majority of the respondents (44.5%) replied that the major problems in the production of horticultural crops are pest and diseases. According to WFLO, 2010, similar causes of losses were indentified. Mechanical damage was reported by majority 112 (79%) and 80 (56%) as a main types of post-harvesting losses during harvesting and transportation respectively while microbial damage was mentioned by 40 (67%) as the main post-harvest loss during marketing

In the group discussion, they further emphasize that the problems of pest and disease is severe in summer seasons and we are subjected to produce during winter season. Even during the winter season, there is limited access of irrigation water, stated by the respondents (21.8%). The major causes of postharvest losses as replied by the respondents are infection (46.4%), injury and infection (25.0%) and nature of the produce (respiratory pattern). In a similar study Gudila *et al.*, 2013, mechanical damage was reported by majority 112 (79%) and 80 (56%) as a main types of post-harvesting losses during harvesting and transportation respectively while microbial damage was mentioned by 40 (67%) as the main post-harvest loss. With respect to market condition from farmers point of view, majority of the respondents (90.9%) replied that there is no satisfactory market, they further replied that the reason for these unsatisfactory market were higher supply of the produce at a time (48.6% of respondents), middle men exploitation and higher supply at a time (21.8%) and most of the time they are selling their products on farm and on the nearby market (table 2).

3.1.3 Quality production, transportation, packaging and loss in percentage (general)

According to the perception of farmers (without a standard reference), they categorize the quality of their produce as low, medium and high. 69.5% of the respondents believe that they are producing medium quality produce and 27.7% of them perceive as they are producing high quality product. In the focus group discussion, they further argued that it is not the quality of the produce that is making us liable to low price and postharvest losses. They also believe that the quality of the produce can further be improved if the market condition is so conducive.

The handling/packaging materials they are using are sacks (82.7) in which there is no palletizing and large mass of commodity is tightly packed, with low gas exchange between commodities. In addition, the kind of transportation system is the use of pack animals (64.5 %) and on back of man and woman. These have a problem of bruising during loading and unloading. Generally, 50.9 % of the respondents said that there is around 5% and others (34.1%) believed that the loss of such products from production until marketing is estimated as high as 20% and rarely above this (table 6). Post harvest losses of fruits and vegetables are estimated at 5-20% in developed countries and 20-50% in developing countries (Mashav, 2010). In Nigeria post harvest losses of fruits and vegetables amounts to 35-45% of the annual production (FAO, 2004). In a similar study about tomato and other crops, results revealed that most of the tomatoes, ball and hot pepper farmers experience losses of 10-30% during harvesting and transportation stages. The farmer harvest mostly when they have buyer, harvest at fully ripe stage (90%) and most still use the traditional basket and sacks as their packaging material in conveying produce resulting into massive post harvest losses (62.5%) (Olayemi F. et al., 2012).

3.2 Marketing of Horticultural crops at level of traders

3.2.1 Selection criteria of fruits and vegetables during marketing

In marketing of horticultural crops, 75% of traders have shown that there is a chance to select during buying and most of them give physiological defects as the only criteria of selection giving little emphasis to maturity level. However, others use maturity level and preharvest infection as criteria of selection during buying of these commodities (Fig 1). These traders have also replied that physiological defect was the more significant criteria followed by maturity level.

3.2.2 Demand and supply

Most of the traders replied that the supply of such kind of crops is seasonal/irregular and few of them said that it varies with crop. They further told that the supply of the produce is higher during winter

3.2.3 Price determining factors

Majority of the respondents (40%) replied that price-determining factors are quality of the produce, demand and supply, and external factors. Others believed (33.75%) that it is the quality with demand and supply that determines price of the produce.

3.3 Loss of commodities during transportation and storage

Among the horticultural crops studied, the mean percentage value showed that the maximum percentage of loss was exhibited in crops like tomato, (2.5% during transportation and 5.9% during storage), banana (1.2% during transportation and 4.5% during storage) and cabbage (1.2% during transportation and 4.2% during storage) (appendix 1). In a similar study, losses in tomatoes ranged from 18 to 22% while losses in onion, potato, and yam ranged from 9 to 12.4%. Greater postharvest losses of bananas were associated with longer transport distance on poor roads because of increased physical damage incidence and severity (WFLO, 2010).

4. Conclusion

Postharvest losses occur in horticultural crops in the studied areas. However, the losses of these crops show difference between the two Weredas. The majority of farmers (63.6%) produce these horticultural crops in both summer and winter, however, other produce only during winter because of the problem of pest and diseases in summer. 58% of the respondents use river water as the only source of irrigation and 18.2% use springs. They responded that irrigation water is one of the production constraints besides pest and diseases however the use of other sources of irrigation such as water harvesting structure is very limited. Most of the farmers perceive that they are producing medium quality products and can further be improved. Majority of them handle/pack their products using sacks and few are using wooden crates and other structures such as basket to transport their commodities. The mode of transportation is using pack animals and others carry their products to transport to the nearby market.

In terms of market condition, most of the farmers sell their products on nearby market and a few sell both on farm and in nearby market. The marketing condition is unsatisfactory and discouraging mainly because of higher supply of the product at a time and middlemen exploitation. The nature/physiology of the crop, which makes it to deteriorate very fast and the absence of storage facilities makes the problem very sever. These conditions make farmers to sell their products even at very low prices. The chance to select commodities during buying is higher as replied by most of the traders but they use physiological defect as the only criteria of selection. Others use maturity level and as criteria to select produce. Even though there is variation among commodities, there is an irregular supply to the market in which the supply is higher during winter/dry season. The general postharvest losses as replied by most of the respondents is estimated between 5-10%, others (13.2% of respondents) estimate between 10-20% and there is also a case in which the loss may reach up to 50%. The losses of individual crops at different stages of handling (farmers level, transportation and storage) respectively is summarized as banana (1.5%, 1.2% and 4.5%), orange (3.04%, 1.2% and 3.6%), mango (1.6%, 1% and 3.7%), papaya (1.5%, 1% and 3.3%), tomato (2.5%, 2.5% and 5.9%), onion (3.3%, 1.1% and 3.7%), cabbage (4.3%, 2.8% and 4.2%) and carrot (2.8%, 1.2% and 3.8%).

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Table 1. Season of production and production system

Variables	Frequency	Percentage
Season of production		
Summer	6	2.7
Winter	74	33.6
Both summer and winter	140	63.6
Use of irrigation		
Yes	212	96.4
No	8	3.6
Source of irrigation water		
River	128	58.2
Spring	40	18.2
Water harvesting structure	2	0.9
Tap water	1	0.5
Others	25	11.4
River and spring	5	2.3
River and water harvesting structure	3	1.4
Spring and water harvesting structure	8	3.6
Spring and others	1	0.5
Tap water and others	1	0.5

Table 2. Problems faced during production and causes of postharvest losses

Variables	Frequency	Percentage
Problems faced		
Lack of irrigation water	48	21.8
Inappropriate production technology	12	5.5
Pest and disease	98	44.5
Lack of irrigation water, pest and disease	36	16.4
Inappropriate production technology pest and disease	26	11.8
Causes of postharvest loss		
Injury	22	10.0
Maturity level	7	3.2
Respiration pattern	25	11.4
Infection	102	46.4
Injury and infection	55	25.0
Where you sell the produce		
On farm	15	6.8
Nearby market	178	80.9
On farm and nearby market	25	11.4
Satisfactory market		
Yes	20	9.1
No	200	90.9
Reason of unsatisfactory market		
Middle men exploitation	37	16.8
Higher supply at a time	107	48.6
Middle men exploitation and higher supply at a time	48	21.8
Middle men exploitation and poor quality	7	3.2

Table 3. Quality production, transportation, packaging and loss in percentage (general)

Variables	Frequency	Percentage
How do you evaluate quality of your produce		
Low	6	2.7
Medium	153	69.5
High	81	27.7
Can the quality be improved		
Yes	190	86.4
No	30	13.6
Packaging/handling materials		
Sacks	182	82.7
Wooden crakes	9	4.1
Sacks and others (Basket)	22	10.0
Kind of transportation		
Pack animal	142	64.5
On back of man and woman	23	10.5
Pack animal and on back of man and woman	54	24.5
How much loss do you estimate		
No loss	2	0.9
<5%	111	50.9
5-10%	75	34.1
11-20%	29	13.2
21-50%	3	1.4

Table 4. Season with more supply

		season with more supply			
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	summer	18	22.5	22.5	22.5
	winter	62	77.5	77.5	100.0
	Total	80	100.0	100.0	

Fig 1. Selection criteria

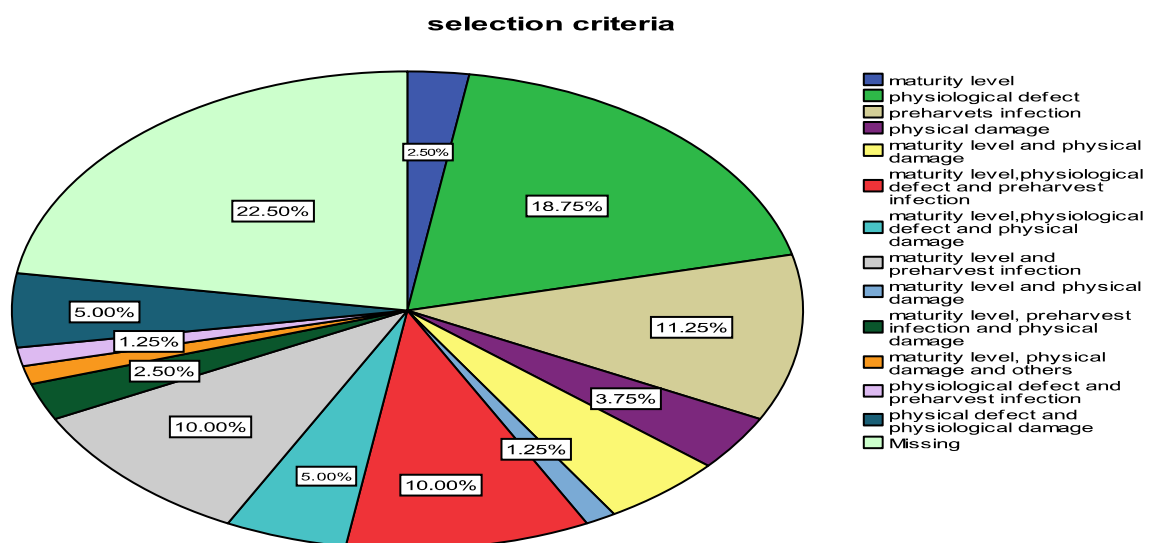
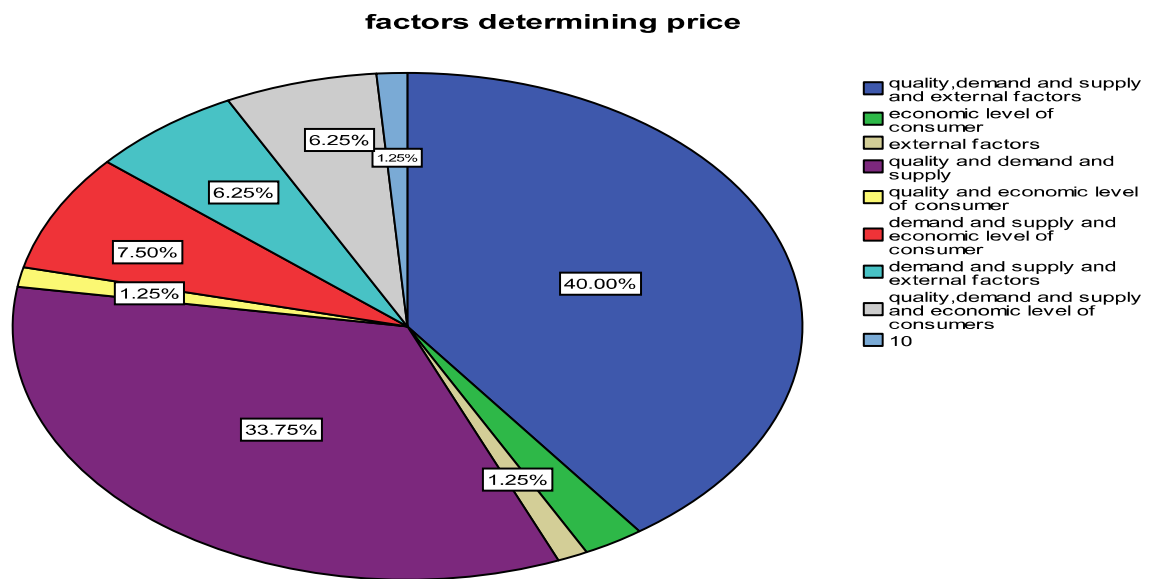


Fig. 2 factors, which determine price



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