



ASSESSMENT OF POST- HARVEST CHALLENGES OF SMALL SCALE FARM HOLDERS OF TOMATOES, BELL AND HOT PEPPER IN SOME LOCAL GOVERNMENT AREAS OF KANO STATE, NIGERIA

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ABSTRACT

The survey assessed the post harvest challenges of small scale farm holder of three different vegetables, tomatoes (*Solanum lycopersicum*), bell pepper (*Capsicum annuum*) and hot pepper (*Capsicum chinense*) in four (4) Local Government Areas namely Danbatta, Bunkure, Kura and Dawakin Tofa of Kano State. The primary data used for the investigation were obtained through the use of questionnaire. One hundred and twenty (120) farmers were randomly sampled and selected for the study; the farming experience of respondent, stage and time of harvest of produce, percentage loss of produce during harvesting and transportation, on-farm storage facilities utilized by respondents and mode of transportation and packaging materials utilized by the respondents were looked into. Investigative Survey Research Approach (ISRA) and descriptive statistics were employed in the analysis of the data. The results obtained revealed that most of the tomatoes, bell 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%). These practices by the farmers often result in reduction of profit and in-availability of these products all through the seasons. Based on these findings, it was concluded that farmers in these areas require proper and extensive training on how to reduce their losses especially through proper pre-harvesting, harvesting and post-harvesting practices like primary processing in times of glut and the introduction of some important easy-to-use technologies that will reduce if not eliminate fruits and vegetables wastages in the areas.

Key word: Tomatoes, postharvest, pepper, losses, assessment.

INTRODUCTION

It is a fact that Nigeria is blessed with rich farmlands and subsequent good harvest each year. The country is one of the leading producer of tomatoes, pepper, plantain, onions, okra and other vegetables that are grown in its diverse agro-ecological zones that range from humid in the south to sub-humid in the middle belt and semi-arid/arid in the north yet, produce are lost at an alarming rate of 30-50% yearly by poor pre and post harvest practices (Charles 2009). However, there is need to store and preserve these farm produce to forestall the seemingly global food epidemics. It has also been pointed out that to achieve self sufficiency in food, there is an urgent need to match all efforts at increasing crop production with equal if not greater efforts of post harvest technology to save the crops that are produced from deterioration and wastages (Hall 1968, Adeniyi 1977, Agboola 1980).

Tomatoes (*Lycopersicon esculentum*), bell pepper (*Capsicum annuum*) and hot pepper (*Capsicum chinense*) are important commodities for the preparation of many local dishes in Nigeria. They play a major role in providing vitamins and minerals for humans (Smith, 1994) and also serve as raw materials for our industries. The production of bulk of the fresh tomato and pepper fruits in Nigeria especially *roma* variety is in the Northern part of

the country whereas the consumption and utilization is done all over the country. They are either used fresh or processed into paste, puree, ketchup etc. Unfortunately, they are not only seasonal but highly perishable and deteriorate few days after harvest, losing almost all their required quality attributes and some could likely result to total waste. Although post-harvest loss estimate figure for fruits and vegetables are difficult to substantiate especially in developing countries like Nigeria, it is however estimated that losses as high as about 40 – 50% of tomatoes and about 20 – 30% of bell and hot pepper are lost at post harvest stage every year (Okunoya, 1996). The losses which most often than not are not caused by insect pests but by microbial infection, physiological breakdown due to natural ripening processes and environmental conditions such as heat, drought. Furthermore, improper postharvest sanitation, poor storage and packaging practices and mechanical damage during harvesting, handling and transportation resulting from vibration by undulation and irregularities on the road mechanical can enhance wastages (Jones *et. al.*, 1991, Idah *et. al.*, 2007). It is distressing to note that much is being devoted to planting crop, so much resources spent on irrigation, fertilizer application and crop protection measures only to be wasted in few days after harvest, therefore this survey was conducted in order to source for

information (extent of such losses, mode of transporting it to retailers, the type of technologies used and what the farmers do with their produce in times of glut) on the post harvest challenges they face yearly and the possibility of reducing them.

MATERIALS AND METHODS

The survey was conducted in four (4) Local Government Areas namely Danbatta, Bunkure, Kura and Dawakin Tofa Local Government Areas of Kano State, Nigeria. Kano State is in the Sudan savannah of the vegetation zones and very close to the boundaries of Nigeria (Fejokwu, 1992)

A total of one hundred and twenty (120) farmers which were randomly selected with the help of extension workers of FADAMA and Hadejia-Jama'are Irrigation Programme were interviewed altogether in the four Local Governments; they are specifically tomatoes, bell and hot pepper farmers with so many years of experience. The survey was conducted using the method of Investigative Survey Research Approach (ISRA) (Anazodo *et. al.*, 1986 as quoted in Chukwu (1994). Information was collected using structured questionnaire which sought for the following information: harvest time, loss during harvest, any on farm structure, mode of transportation and packaging systems. The study also took some personal observation to get salient information that would help identify problems faced by the farmers.

Statistical Analysis

The tools of analysis used for this study is descriptive statistics. These involve the use of central tendency including the mean frequency distribution and percentages.

RESULTS AND DISCUSSION

The results of the responses as to how the farmers have been in the farming business of fresh produce shows 25%, 12.5%, 50%, 12.5% of them have been handling the produce for over 30, 20, 10 and less than 10 years respectively as indicated in Table 1, the farmers level of experience shows that they are vast in the system and so the information obtained from them is largely a true reflections of the farming system. Again, poor management and inadequate knowledge of good farming practices have been known to affect post harvest quality of fruits and vegetables especially tomatoes with high moisture content adversely (Agboola, 1980). The stage of harvest is shown in Table 2 where 75% of respondents harvest their produce when fully ripe. Quality cannot be improved after harvest, only maintained, therefore it is important to harvest fruits and vegetables at the proper stage and at peak quality (Wilson *et. al.*, 1995). Harvest produce when they are mature green because they can tolerate rough handling better than the ripe ones and can stay longer during storage. Tomatoes and pepper are mostly harvested by hand, so care should be taken to avoid mechanical damage which can be an entry point of microorganisms and insects. Mechanical damage also increases loss of moisture content (Wilson *et. al.*

1995). The rate of moisture loss may be increased by as much as 400% by a single bad bruise on tomatoes; they become shriveled after losing only a small percentage of their original weight due to water loss. Water loss represents salable weight loss and reduced profits. (Wilson *et. al.*, 1995).

Table 3 shows the time of harvest in which 25% of the farmers harvest anytime of the day especially when there is a buyer, 45.8% harvest in the morning so that it can be transported to the market for sale, 16.7% in the afternoon and 12.5% in the evening. Harvest should be completed during the coolest time of the day (at about 20⁰ C) which is usually in the early morning or evening and should be kept shaded in the field to remove field heat (Mary, 1997). Table 4 shows that 90% of the farmers keep their produce under tree shade until buyers from another town or city come to pick them, 10% have little farm structures like a small hut for keeping their produce. The essence of on-farm structure/facilities like a fruit shed is to reduce field heat i.e. pre-cooling. Pre-cooling (end point =12.5⁰C/55⁰F) is the first step in good temperature management. The field heat of a freshly harvested crop—heat the product holds from the sun and ambient temperature—is usually high, and should be removed as quickly as possible before transporting, processing, or storage (Janet and Richard, 2000). Stored food reserves are lost with this heat which means less food value, loss of flavor, loss of salable weight, and more rapid deterioration (Wilson *et. al.* 1995).

Most vegetables require low temperatures and high humidity, two factors that don't come together easily (Janet and Richard, 2000). The optimum relative humidity is between 90.95%, high relative humidity is essential to minimize poor harvest quality and prevent water loss (desiccation). Extended periods of higher humidity or condensation may encourage the growth of stem-scar and surface mould on tomatoes (Trevor and Marita, 1996). Their level of loss during harvest as indicated in Table 3 revealed a huge loss of about 20% of tomatoes, 12% of bell pepper and 8% of hot pepper. This high percentage can be reduced by adopting primary processing method. Primary processing is the conversion of an unstable perishable produce into stable long lasting one like the dehydrating of bell and hot pepper or the production of tomato paste, puree, tomapep e.t.c. Vegetables destined for processing and storage should be as free as possible from skin breaks, bruises, spots, rots, decay, and other forms of deterioration (Mary, 1997). Bruises and other mechanical damage not only affect appearance, but provide entrance to decay organisms as well (Janet and Richard 2000). Though there are several packaging containers used for packing fresh produce for long distance. It was observed from this survey that baskets, jute bags and sack bags with mango leaves are the most common containers used for transportation as indicated in Table 4. The baskets are categorized according to their sizes which also serve as pricing unit in the marketing of the produce.

On the whole, none of the handlers and farmers uses the plastics crate which was designed by Food and Agriculture Organization (FAO) and Nigerian Stored Product Research Institute (NSPRI) to prevent physical damage to produce and is easy to handle as packaging containers. Tomatoes experienced about 28% loss; bell pepper 15% and hot pepper had about 10% loss each during transportation as indicated in Table 3. Table V indicates that the main mode of transportation is by road and this involves the use of open and closed lorry (including buses), 62% of them

use open lorry either for long or short distances. Most of the mechanical damage to fresh tomatoes and peppers results from the vibrations and impacts received by the produce (Singh and Singh 1992), these vibrations are as a result of the irregularities of the road surfaces which are transmitted through the suspension systems of the vehicles to the produce. Also the use of good packaging material that will not restrict ventilation, will not allow the produce to rest directly on each other and will be easy to carry should be adopted for use (Mary, 1997).

Table 1: Farming experience of respondents

Farming Experience (Yrs)	No of Respondent	% respondents
Less than 10	15	12.5
10 -20	60	50
20-30	15	12.5
30-40	30	25
Total	120	100

Table 2: Stage and time of harvest of produce by respondents

	No of Respondent	% respondents
A. Time of harvest		
Anytime	30	25.0
Morning	55	45.8
Afternoon	20	16.7
Evening	15	12.5
B. Stage of harvest		
Matured green	-	-
Fully ripe	90	75
Half ripe	30	25

Table 3: Percentage loss of produce during harvest and transportation by respondents

Produce	No of Respondent	% respondents	% loss
A. During harvest			
Tomato	60	50	20
Bell pepper	30	25	12
Hot pepper	30	25	8
B. During transportation			
Tomato	60	50	28
Bell pepper	30	25	15
Hot pepper	30	25	10

Table 4: Storage facilities utilized by respondents

Structure type	No of Respondent	%
Under the Tree	108	90
Farm Structure	12	10
No Farm Structure	Nil	Nil

Table 5: Mode of transportation and packaging materials utilized by respondents.

Type	No of Respondent	%
A: Transport mode/type		
Open Lorry	75	62.5
Closed Lorry	45	37.5
B. Packaging material during transport		
Baskets (Raffia)	75	62.5
Sack bag with mango leaves	45	37.5
Plastic crates	Nil	-

CONCLUSION

Based on the results and observations made during the survey, it seems the current farming system of

tomatoes, bell and hot pepper are inadequate. The farmers lack some fundamental knowledge and facts about post harvest handling practices.

It also revealed that the level of young people with less than 10 years of farming experience is low indicating that farming is being replaced by white man's collar job. This survey revealed some of the problems the farmers face, such as lack of suitable packaging containers, farm structure and so on. Therefore the following recommendations are made:

- Provision of extension services on post-harvest to the farmers by extension agent of ADP with relevance research inputs.

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- Adopt technologies of some research institutes that will benefit them
 - Provision of farm structures and materials relevant to post-harvest handling and their adoption.
 - Encourage youths to farm by making resources available.
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