Effects and Control of Postharvest Losses of Selected Horticultural Crops Produce Among Rural Farmers in Benue State, Nigeria

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Abstract

This study examines the effects and control of post-harvest losses incurred by rural farmers in the production of selected horticultural crops namely tomato, mango, pepper and cashew in Benue State was carried out. Two hundred (200) rural farmers were sampled from the here agricultural zones of Benue State. The major effects of post-harvest losses were reduced income (33%) and quality of produce (31%), lack of good storage facilities (45%), poor packaging (45%) and poor transportation network (28%) were the major causes of post-harvest losses, Managerial, infrastructural cum environmental and socioeconomic were he here major constraints to control of post-harvest losses in Benue State. About 116,100kg of crop produce worth ₦11,250,000 were lost by farmers in the study area during the period under review. The researcher recommends adequate education and sensitization of farmers in handling and preservation of horticultural crops and setting up of plants for processing and preservation of horticultural crops as measures that could be taken in controlling post-harvest losses in Benue State.

Keywords: Effects, Post-Harvest, Losses, Selected, Horticultural Crops

INTRODUCTION

According to FAO (2015), 870 million people were food insecure and chronically

undernourished during the 2010-2012. (2015, this literature is too old, 9 years ago update it) Unfortunately, the largest proportion of them lives in developing countries. One of the most important pathways to increase food availability is to reduce post-harvest losses and waste. Age (2017) reported that preventing post-harvest losses and increasing production are the two relative alternatives by which the world can meet its ever rising food demand.

Indigenous fruits and vegetables are source of fat, protein and vitamins; however, these have very short shelf-life after harvest. This calls for urgent and serious attention on the control and

prevention of their post-harvest losses to minimize losses in quality and quantity (El-Ramady *et al*., 2015).

Food waste or losses are huge and increasingly urgent challenge and it is particularly acute in developing countries where food loss reduces income by at least 15% for 470 million small holder farmers and downstream value chain actors (Rockefeller Foundation, 2015).

If food loss is not reduced, food production in Nigeria will need to increase by an estimated 70 percent and this requires an investment of $83 billion per year (Rockefeller Foundation, 2015). Therefore, there is need to ensure food security by increasing food production while reducing losses along supply chain. In spite of several efforts made by the past and present Nigeria government in reducing post-harvest losses in the country, there is still an acute shortage in food supply resulting from post-harvest losses throughout the country. This development is worrisome considering the fact that Nigeria is endowed with superfluous human and material resources, most of which are lying fallow and under exploited (Age, 2009).

Although a lot of research work has been carried out on post-harvest losses of selected horticultural crops produce by various researchers in some parts of Nigeria (State those who have conducted researches in this area in other parts of the country and those who have conducted researches in the same area in Benue State), not much work has been carried out on effect and control of post-harvest losses of selected horticultural crop produce among rural farmers in Benue State, Nigeria.

The main objective of this study is to examine the effects and methods of controlling post-harvest losses of selected horticultural crop produce among rural farmers in Benue State, Nigeria. State your specific objectives.

METHODOLOGY

Study Area

The study area was Benue State, it is one of the thirty six (36) States in Nigeria. The State is located in the Middle Belt region which is a transition zone from the northern and southern parts of Nigeria. It lies between longitude $6^{\circ} 31'$ E and $10^{\circ} 30'$ E of the Greenwich Meridian and latitude $6^{\circ} 30'$N and $8^{\circ} 10'$N of the equator [Benue State Agricultural and Rural Development Authority (BNARDA 2005)].

Benue State shares boundaries with other States namely; Nasarawa to the North, Taraba to the East, Kogi and Enugu to the West, Ebonyi and Cross River to the South. It also shares boundary with the Republic of Cameroon on the South (Costa S.J 2015).

Benue State has a landmass of about 33,955km^2 with twenty three (23) local Government Areas. The State is divided into three agricultural zones namely: Zone (State the Agricultural zones those ones are political zones, they NOT Agricultural zones)

According to [National Population Census (Fonseca J.M, 2009)], Benue State has a population of 4.219 (This population figure is obsolete, use 2006 and compute the current population of Benue State using World Bank growth rate and get the projected population of Benue State in 2023) million given the annual growth rate of 3% (World Bank2011), the estimated population of the State in 2017 was 5.84 million. There are three major ethnic groups in the state namely: Tiv, Idoma and Igede, other ethnic groups are Etulo, Abakpa, Ofia and Jukun.

The State has favourable aggro-climate for arable and tree crops, livestock production and enjoys two distinct seasons; wet and dry seasons, the rainy season begins from April to October, while the dry seasons starts from November to March. Annual rainfall record varies from 1,700mm in the southern part to 1,250mm, in the northern part with annual temperature variation of 30°C and 38°C (Costa S.J 2015). Crops cultivated are yam, cassava, sweet potato, maize, millet, rice, soya-bean, groundnut, beniseed and cow-peas, fruits and vegetable. Livestock, poultry, pigs, sheep and goat are kept in the State.

Data Collection

The population of the study consisted of all selected horticultural crops farmers in the State. Selected horticultural crops included tomato, pepper, as fruited vegetables and fruited pumpkin as leaf vegetables, mango, orange, cashew as fruit crops.

A total of 200 respondents were selected as sample size for the study using purposive, stratified and sample random sampling techniques. The population was stratified into three already existing Agricultural zones A, B and C. One local government area was purposively selected from each of the zone due to high level of production of the crops, in each local government area two communities noted for high production of horticultural crops was selected. A sampling frame was developed for each of the rural communities and using proportional allocation of 1% (0.01) across the board.

Data Analysis

Data were collected from primary source with the use of structured questionnaire, which consists of A, B, C, D, E and F which dealt with the objectives of the study. Data collected were analyzed using descriptive and inferential statistics such as percentages and frequency distribution tables were used to analyze specific objectives 1, 4 and 5. Kruskal Wallis (H) Test was used to analyze specific objective 2 and 3, while factor analysis was used to analyze specific objective 6.

RESULT AND DISCUSSION

Results

Result in Table 1 shows that majority 55% of the respondents were males while 45% of the respondents were females and about 44% of the respondents fall within the ages of 21-30 years. This indicates that male farmers dominated the area and they were more involved because of their physical strength. This result agrees with that of Sexena *et al.* (2004) that men are known to possess physical strength required for farming are largely involved.

In case of marital status, the result also indicated that majority of the respondents (72.5%) were married, this higher percentage of married respondents in the study area may be attributed to the sociocultural and religious belief of the community where marriage is seen as a sign of responsibility and religious obligation.65.1% years of experience, this implies that, they have acquired much skills and knowledge to enhance their productivity and been able to obtain maximum benefit in their business.

Education is crucial in understanding the value and adoption of innovations, for increased farm size, thereby fast tracking development and improve their standard of living. 50% of the respondents were married with mean household size of six persons. This implies that family labour plays a vital role in the supply of family labour in the study area. 65.5% of the respondents were civil servants. This implies that 70% of the population of the rural people in Benue State are farmersat subsistence level.

Most of the respondents had low incomes, this implies that peasant farmers are bound to suffer from absolute poverty. The fundamental constraint to sustainable agricultural development in Benue State is the peasant nature of production system, occasioned by low income with low productivity, poor response to technology adoptive strategies and poor return on investment.

Table 1: Distribution of the Respondents according to their Socioeconomic Characteristics (N=200)

Variables	Frequency	Percentages
Sex		
Male	110	55.0
Female	90	45.0
	200	100
Age (years)		
21-30	88	44
31-40	64	32
41-50	48	24
	200	100
Marital status		
Single	22	11
Married	145	72.5
Widowed	24	12
Divorced	9	4.5
	200	100

Level of education

Non-formal	62	31
Primary	65	32
Secondary	42	21
Tertiary	31	16
	200	100

Household size

1-5	58	29
6-10	101	50.5
11-15	33	16.5
16-20	8	4
	200	100

Farm size (hectares)

1-5ha	99	49.5
6-10ha	89	44.5
11-15ha	6	3
16-20ha	6	3
	200	100

Farming experience (years)

1-9	28	14
10-19	131	65.5
20-29	24	12
30-40	17	8.5
	200	100

Major Occupation

Farming	131	65.5
Civil service	28	14
Trade	24	12
Hunting	17	8.5
	200	100

Annual Income (₦)

100,000	96	48
150,000-200,000	18	9
250,000-300,000	32	16
350,000-400,000	19	9.5
450,000 – above	35	17.5
	(200)	(100)

Source: Field Survey, (2024)

Perceived Causes of Post-harvest Losses of Selected Horticultural Crop Produce in Benue State

There was a significant difference (P<0.5) in the perceived causes of post-harvest losses of selected horticultural crop produce across the three agricultural zones of Benue State. The H-Test shows that H-cal (20.3) > X^2 tab (5.9915) at 0.05 level of provability.

Table 2: Kruskal-Wallis Analysis of Causes of Post-harvest Losses of Selected Horticultural Crop Produce in Benue State.

	Zones					
	A		B		C	
Variables	Freq.	R1	Freq.	R2	Freq.	R3
Pest and diseases	60	25.0+	80	38.0+	50	13.5+
High temperature	57	21.5	70	34.0+	47	11.0+
Premature harvesting	61	28.5+	82	41.5+	54	18.5+
Lack of storage facilities	62	31.0+	84	45.0+	50	13.5+
Lack of ago-based industries	62	31.0	80	38.0+	54	18.4+
Poor ventilation	30	4.0	110	8.0	25	3.0
Poor transportation network	61	28.5+	84	45.8+	54	18.5+
Fermentation	50	13.5	60	25.0+	15	1.5
Dehydration	60	25.0+	81	40.0+	45	10.0+
Poor packaging facilities	62	31.0+	84	45.0+	54	18.5+
Poor handling of produce/injuries	60	25.0+	80	38.0+	50	13.5+
Contaminants	40	8.0	75	35.0+	35	6.0
Lack of knowledge of post-harvest produce handling practices	57	21.5+	79	36.0+	31	5.0
Lack of Agric. Extension services	60	25.0+	82	41.5+	51	16.0+
Microbial activities	40	8.0	65	33.0+	15	1.5

H. Cal = 20.3 X²tab = 5.9915	$\sum R_1$=298.0	$\sum R_2$=541.0	$\sum R_3$=168.5

Source: Field Survey, (2024)

Perceived Effects of Post-harvest Losses on Farmers and Selected Horticultural Crop Produce in Benue State

There was a significant difference (P>0.05) among farmers in the three agricultural zones in Benue State in term of post-harvest losses on farmers and selected horticultural crop produce.

The H-test shows that H. Cal (67.7) > X^2 tab (5.9915 at 0.05 level of significance.)

The Kruskal Wallis Analysis shows that mean rank for post-harvest losses across the three agricultural zones where$\sum$R1 = 213.5,$\sum$R2 = 219.5 and$\sum$R3 = 128.6

Table 3: Kruskal Wallis Analysis on perceived effects of post-harvest losses on farmers and selected horticultural crop produce in Benue State.

				Zones		
		A		B		C
Variables	Freq.	R1	Freq.	R2	Freq.	R3
Reduce income of farmers	62	27.5	84	33.0*	54	21.0*
Reduce availability of produce	57	23.0*	70	29.0*	35	14.5*
Reduce quality of produce	60	24.0*	79	31.0*	45	17.5*
Poverty among farm families	61	25.5*	20	7.0	15	4.5*
Low capital income of nation	25	10.0	10	1.0	21	8.0
High level of spoilage	61	25.5	82	32.0*	48	19.0*
Low shell life	55	22.0	72	30.0*	35	14.5*
Food insecurity	40	16.0	62	27.5	15	4.5
Wasted time and labour	30	12.5	15	4,5	12	2.0
High level of economic losses	45	175	51	20.0	25	10.0
Environmental pollution	25	10.7	15	4.5	30	12.5*

H-Cal = 67.7 X^2 tab = 59.9915	ΣR_1=213.5	ΣR_2=219.5	ΣR_3=128.6

Source: Field Survey, 2024.

Perceived Improved Method of Controlling Post-harvest Losses of Crop Produce in Benue State

Major improved method of controlling post-harvest losses of selected horticultural crop produce were to:

* Avoid early harvesting of non-climatic fruits (90%);

* Adequate storage facilities (76%);

* Avoid overloading (68.5%);

* Establishment of ago-based industries (65%);

* Proper sorting before packaging (63%);

* Improved processing techniques (59%).

Table 4: Improved Method of Controlling Post-harvest losses of selected horticultural crop produce in Benue State.

Variables	Frequency	Percentage (%)
	SA(3)	%
Avoid early harvesting unripe fruits	180	90
Adequate storage facilities/packaging	152	76
Proper sorting before packaging	127	63.5
Consumer awareness campaigns	92	46
Improved processing techniques	119	59
Proper cleaning and handling of crop produce	127	63
Effective extension services delivery	122	67
Cutting healthy produce from unhealthy produce	126	63
Provisionofmarketinginformation/improve ruralinfrastructure	199	59
Avoid overloading	137	68

Agricultural insurance	104	54
Establishment of ago-based industry	130	65
Total	**200**	**100**

Source: Field Survey, 2024

Multiple Responses

SA = (3)

Table 5: Quantity of Losses and its Monetary Value of Selected Horticultural Crop Produce in the past three Years (2022-2024).

Crops	2022 losses (kg)	2022 monetary value (N)	2023 losses (kg)	2023 monetary value (N)	2024 losses (kg)	2024 monetary value (N)	Losses (kg)	Monetary value (N)
Tomato	8,100	450,000	5,400	900,000	8,100	450,000	21,600	1,800,000
Fluted pumpkin	8,100	450,000	8,100	900,000	8,100	450,000	24,300	1,800,000
Pepper	8,100	900,000	8,100	900,000	5,400	450,000	21,600	2,250,000
Orange	8,100	900,000	8,100	900,000	8,100	900,000	24,300	2,700,000
Mango	8,100	900,000	8,100	900,000	8,100	900,000	24,300	2,700,000
Total	40,500	36,000,000	37,800	4,500,000	37,800	3,150,000	116,100	11,250,000

Source: Field Survey, 2024.

Constraints to Control of Post-harvest Losses of Selected Horticultural Crop Produce in Benue State namely;

i)   Administrative or managerial constraints;
ii)   Infrastructure cum environmental constraints;
iii)   Socioeconomic constraints. There are several
implications such as:

i)   Lack of incentives to farmers could adversely affect effective control of post-harvest losses of selected horticultural crop produce;

ii)   Farmers who do not have required handling and processing skills can only succeed to cause more injuries to harvested fruits and vegetables;

iii)   Farmers who do not have access to marketing information may not know where there is high demand for crop produce; iv) Absence of legislative policies;

iv)   Lack of storage and processing facilities;

v)   Lack of credit facilities at single digit interest rate.

Table 6: Factor Analysis of Constraints to Control of Post-harvest Losses of Selected Horticultural Crop Produce in Benue State

Variables	Factor 1	Factor 2	Factor 3
Lack of handling and processing skills (LHPS)	0.777*	0.087	0.060
Ineffective marketing channel (IMC)	0.754*	0.107	0.101
Lack of credit facilities (LCF)	0.286	0.323^E.02	0.305***
Lack of training on control of PHL LTC PHL	0.085	0.266	0.699***
Lack of packaging facilities	0.157	0.564**	0.127
Lack of information on post-harvest technologies (LIPHT)	0.116	0.139	0.723***
Lack of marketing information (LMI)	0.687*	0.182	0.031
Lack of data base on post-harvest losses (LDPHL)	0.587*	0.166	0.088
Lack of storage and processing facilities (LSPF)	0.483E-02	0.395	0.236
Climate change (CC)	0.161	0.477***	0.036
Lack of effective transport and distribution (LETDS)	0.161	0.604***	0.240
Lack of quality standard and differential pricing	0.703*	0.100	0.035
Lack of policy framework on post-harvest losses	0.605	0.209	0.061
Lack of incentives to farmers (LIF)	0.742	0.096	0.061
Lack of political will (LPW)	0.516	0.064	0.451

Method: Varimax with Kaiser Normalization

*Factor 1: Administrative or Managerial Constraints
 **Factor2: Infrastructural Cum environmental Constraints

*** Factor 3: Sociology-economic Constraints.

Discussion

The findings regarding the effect and control of post-harvest losses of selected horticultural crop produce among rural farmers in Benue state of Nigeria underscore several key points. Firstly, the study likely revealed that post-harvest losses significantly impact rural farmers' livelihoods, contributing to food insecurity and economic instability. This could be due to factors such as inadequate storage facilities, poor transportation infrastructure, and limited access to markets.

Additionally, the research likely identified specific horticultural crops that are particularly prone to post-harvest losses in Benue state, which could include tomatoes, peppers, onions, and leafy greens. Understanding which crops are most affected allows for targeted interventions and resource allocation.

Furthermore, the findings probably highlighted various strategies and interventions for controlling post-harvest losses. These could range from simple techniques like proper harvesting practices and packaging to more complex solutions such as the adoption of post-harvest technologies like solar dryers or refrigeration units.

Moreover, the study might have emphasized the importance of empowering rural farmers through education and training on post-harvest management techniques. Strengthening farmers' knowledge and skills can improve their ability to minimize losses and maximize profits.

Overall, the findings likely underscore the need for multi-stakeholder collaboration involving government agencies, NGOs, research institutions, and the private sector to implement effective interventions for reducing post-harvest losses and promoting sustainable agriculture in Benue state.

CONCLUSION

The broad objective of this study was to assess effects and control of post-harvest losses of selected horticultural crop produce in Benue State, the specific objectives were the socioeconomic characteristics, causes, effects, quality and quantity of losses in monetary value, improved method of control of post-harvest losses.
200 respondents were selected using stratified purposive and simple random sampling techniques, questionnaires were administered to generate primary data and descriptive and inferential statistics such as Kruskal Wallis and Factor Analysis were used to analyze the datacollected.

The result of the finding shows that most of the respondents fell within the age range of 21-30 years with farming as their primary occupation. It was found that there is a significant difference in the causes of post-harvest losses among the three Agricultural zones in the study area H. Cal = (20.3) > X^2 = tab = (5.9915) at 0.05 level of probability.

The finding also shows post-harvest losses affects income of rural farmers due to post-harvest losses which hamper production and utilization of both quality and quantity of crops produced.

RECOMMENDATIONS

Based on the finding of this study, it was recommended that:

i)   Government, Non-Governmental Organizations (NGOs) and other well to do individuals should as a matter of urgency assist rural farmers by providing adequate infrastructure such as good roads network, bridges and culverts.

ii)   Processing facilities such as Agro-based industries.

iii)   Effort should be made by the present Governor of Benue State to complete the moribund

Fruits Juice Industry at Wannune, Tarka Local Government Area of Benue State.

iv)   Improved Storage facilities, training and education of rural farmers on best practices, market access for farmers promote the development of local markets and connect farmers with buyers, technology adoption, community collaboration among farmers cooperatives,

and local communities to share resources and knowledge for solution to the problems,

research and innovations.

By addressing these aspects comprehensively, a multidimensional approach can be established to effectively reduce post-harvest losses among farmers and improve overall food security.

REFERENCES

Age, A.I. (2009). Education for rural development and food security: A local response initiative to the global economic crisis WM Bristow, Gboko, P. 26.

Age, A.I. (2007). Sustainable Agriculture and Rural Development: Panacea for National Security Threats and Absolute Poverty. First published by Keray Printing Press, ISBN: 978-978-59744-1-9, P. 102-120.

Benue State Agricultural and Rural Development Authority (BNARDA) (2005) implementing completion report on national programme for food security (NSPFS) Benue state, Nigeria. Pp 1-23

Costa S.J. (2015). Reducing food losses in sub-Saharan Africa. (Improving post harvest management and storage technologies of small holder farmers). An "Action Research" evaluation trail from Uganda and Burkina Faso. August 2013 - April 2014. pp 1-22

El-Ramady, H.R. (2015): Domokos-Szabolesy, E., Abdulla, N.A., Taha, H.S., and Fari, M. (2015). Post-harvest Management of Fruits and Vegetables Storage. Sustainable Agriculture Review 15, Doi 10.1007.978-3-39-09132-7-2. Incomplete reference

FAO (2015). Food and Agricultural Organization. Brief post-harvest losses along value supply chain in the Pacific Island Countries, P. 4.

Fonseca J.M (2009), Post harvest handling under extreme weather conditions in; W.J Florkowski, S.E Prusia, R.L Shewfelt, B. Brueckner, (eds) Post harvest handing: A system approach, Food science and technology series, Academic press, Elsevier Inc, New York USA, pp 539-559

Rockefeller Foundation (2015). Perspectives to reducing post-harvest management losses of agricultural products in Africa. Background paper feeding Africa. An action plan from African agricultural transformation, United Nations and Economic Commission for Africa, P. 12.

Sexena, A. (2014). Insect pest management and socioeconomic circumstance of small-scale farmers for food crop production in Western Kenya: A case study of insect silence apply 10, P. 443-462.