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ASSESSMENT OF UTILIZATION OF POST-HARVEST MANAGEMENT PRACTICES AMONG TOMATO FARMERS IN BENUE STATE, NIGERIA.

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ABSTRACT

*The study assessed utilization of post-harvest management practices among tomatoes farmers in Benue State, Nigeria., Multi-stage sampling procedure was used to select a sample size of one hundred and eighty (180) tomato farmers for the study. Data were collected through a questionnaire. Data collected were analyzed using both descriptive and inferential statistics (z-tests). Findings revealed that, the most effective post-harvest management practice used by the tomato farmers was storage in wooden crates or woven cane baskets($\bar{x}$ =3.35), The Z-test result showed a significant differences in the effectiveness in utilization of traditional ($\bar{x}$=2.179) and modern ($\bar{x}$=1.436) post-harvest management practice, with a Z-calculated of (3.413), The Z-test result showed a significant differences in extent of utilization of traditional ($\bar{x}$= 2.7933) and modern ($\bar{x}$ = 1.6071), Since Z-calculated of (3.208)*** was greater than the Z-tabulated of (1.96). The study concluded that traditional post-harvest management practices of tomatoes were the most effective and utilized in the study area, It was recommended that, government and technology developers should consolidate farmers' traditional knowledge to improve on post-harvest management practices to reduce spoilage of tomatoes in the study area.*

Keywords: Assessment, utilization, post-harvest, management, practices.

1.0 Introduction

Tomato (*Lycopersicum esculentum*) is one of the most popular produced and extensively consumed vegetable crops in the world. It can be eaten raw in salads or as an ingredient in many dishes, and in drinks (Alam, and Goyal (2017). Tomatoes and tomato-based foods provide various nutrients and many health-related benefits to the body. In places where it is being cultivated and consumed, it constitutes an essential part of people's diet. Tomatoes production accounts for about 4.8 million hectares of harvested land area globally with an estimated output of 162 million tonnes (Food and Agriculture

organization of united state,2014). Tomato production can serve as a source of income for most rural and peri-urban producers in many developing countries.

Tomato tends to improve the lives of small-scale rural farmers in many developing countries of the world. Besides the health benefits derived from tomatoes and tomato-based foods, the crop can serve as a source of income for farmers. The tomato industry can increase the foreign export earnings of many African countries thereby contributing to the country's Gross Domestic Product (GDP). In Ghana for instance, the tomato industry has been identified as an area that has the ability for poverty reduction because of its potential for growth and employment creation (Anang *et al*., 2013) whilst in Nigeria, the production of the crop has improved the livelihood of most rural and peri-urban farmers (Adenuga *et al*., 2013). Tomatoes can be eaten in many ways. Fresh fruits are eaten in salads and sandwiches as a sauce while dry-processed or pasta, preserves, sauces, soups, juices, and beverages (Beckles 2012).

Post-harvest management is a set of post-production practices that deal with bulk handling, , processing, packaging, storage, transportation, and marketing (Food and Agriculture Organization, 2011). The organization comprises interconnected activities from the time of harvest through crop processing, marketing, and, food preparation to the final consumers. These activities eliminate undesirable elements and improve product appearance as well as ensure that the product complies with established quality standards for fresh and processed products. The post-harvest practices by farmers, traders, and processors in Nigeria consist of traditional techniques, which result in considerable loss of .harvested crops, thereby contributing to high food prices and food insecurity.

Physical handling can have a drastic effect on the postharvest quality and shelf life of most harvested tomatoes. For instance, rough handling can cause mechanical injuries (Arah *et al.,* 2015; Burton and Reimers, 2011). It is, therefore, important to know suitable post-harvest handling practices needed to maintain the quality and extend the shelf life of harvested tomatoes. After harvesting, the tomato fruit still remains living and performs

all the functions of a living tissue. However, the postharvest quality of tomato fruits can be enhanced by post-harvest treatment practices (Joas and Lechaudel, 2008; Getinet, *et al,* 2011). Traditional or local post-harvest management practices include; farmers sorting and grading in the field, bulked in woven baskets and transporting by porridge or carts driven by animals, stored in cooled shades and floors in preparation for movement to the markets (Isaac *et al.,* 2016) and they dried into low moisture content for storage. Modern post-harvest management practices include; cleaning/sorting/grading, transportation by tricycle, buses, or vans in boxes without sharp edges, and storage is usually by refrigeration which is one of the most effective methods for preserving the quality of the tomato fruits (Isaac *et al.,* 2016), Precooiling can be done after harvest which minimizes the effect of metabolic activity, respiration rate and ethylene production (Shahi *et al*., 2012, ; Genanew, 2013). Heat treatment using hot air is also advocated. This is done at a temperature of about 37-42°C prior to cold storage to slow down ripening whilst increasing pathogenic resistance when in storage and application of calcium chloride (Akbudak *et al.,* 2017).

Benue State Government's efforts in Agricultural transformation for the past two decades concentrated on encouraging farmer's production of tomatoes led to tomatoes cultivation in the entire state (Sahel Capital, 2015). Smallholder farmers planting on between 0.5 and 4 hectares of land account for 90% of production, with the balance contributed by commercial producers (Sahel Capital, 2015).

2.0 Objective of the Study

The specific objectives of the study were to:

1. identify the post-harvest management practices of tomatoes available to farmers in the study area;
2. describe the extent of utilization of the post-harvest management practices by the farmers
3. ascertain the effectiveness of utilization of post-harvest management practices by the farmers.

Hypotheses of the study were:

$H0_1$: There is no significant difference in the extent of utilization of post-harvest management practices of tomatoes.

$H0_2$: There is no significant difference in the mean rating of the effectiveness of post-harvest management practices of tomatoes in the study area.

3.0 Methodology

This study was conducted in Benue State, Nigeria. Benue State was carved out of the former Benue-Plateau State in 1976. The State lies between longitude $8^0 44'$ and 59.99" East and between latitude 7°19' and 60.00" North of the equator. The State is made up of 23 Local Government Areas. Benue State comprises three senatorial zones namely: Zone A, Zone B, and Zone C. The agricultural sector provides a very wide opportunity for investment as the major occupation of the people, the State is marked with two distinct seasons in a year; these are wet and dry seasons. The wet season spans between the middle of April and October and the dry season is usually experienced between October and April. The population of the study comprised tomato farmers in Benue State, Nigeria. The study employed a multistage sampling procedure in the selection of the farmers for the study. In the first stage, all the already existing 3 agricultural zones in Benue State were selected, in the second stage, a simple random sampling technique was used to select 6 blocks from each Agricultural zone giving a total of 18 blocks. In the third stage, purposive sampling techniques was used to select 1 cell from each block giving a total of 18 cells. Fourth stage, a simple random sampling technique was used to select 10 farmers from each of the cells giving a sample size of 180 farmers for the study. Primary data were collected through structured questionnaire through interview. A four-point Likert type-scale of often = 4, sometimes = 3, seldom = 2, and Never = 1 was used and the score obtained were summed and divided by 4 and any point equal or above 2.5 was considered high and a three-point Likert type-scale of very effective = 3 points, effective = 2 points and not effective = 1 was also used. The score obtained were summed and divided by 3 and any point equal or above 2.0 was considered high.

The formula below is the Z-test that was used in testing the both hypotheses.

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S^2_1}{n_1} + \frac{S^2_2}{n_2}}}$$

Where Z = Z – calculated

X_1 = Mean score of utilization of traditional postharvest management practices

X_2 = Mean score of utilization of modern postharvest management practices.

S^2_1 = Variance of group 1

S^2_2 = Variance of group 2

n_1 = Total number of farmers in group 1

n_2 = Total number of farmers in group 2

Decision: If the Z- calculated value is greater than the Z - critical or tabulated value we reject the null hypothesis otherwise accept.

$H0_2$: there is no significant difference in the mean rating of effectiveness traditional and modern post-harvest management practices of tomatoes in the study area.

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S^2_1}{n_1} + \frac{S^2_2}{n_2}}}$$

X_1 = Mean outcome of effectiveness of traditional postharvest management practices.

X_2 = Mean outcome of effectiveness of modern postharvest management practices as group 2.

S^2_1 = Variance of group 1

S^2_2 = Variance of group 2

n_1 = Total number of respondents in group 1

n_2 = Total number of respondents in group 2

Decision: If the Z- calculated value is greater than the Z - critical or tabulated value we reject the null hypothesis otherwise accept.

4.0 Results and Discussion

4.1 Post-harvest management practices

Table 1 revealed that storage in wooden crates or woven cane baskets (83.9%), storage on the floor (82.8%), drying into low moisture content for storage (82.8%), and cool storage under tree shades, thatch among others (78.3%) were the most utilized post-harvest management practices of tomatoes in the study area. These were possible because the materials were readily available for their use and they were indigenous knowledge. This finding confirms Olunike (2014) that traditional techniques form part of the culture of the people and constitute a vital part of knowledge handed over from parents to their new generation. Similarly, Akinyele (2017) reported that traditional food preservation techniques were indeed the bedrock of small-scale food processing industries in Nigeria.

Table 1:Post-harvest Management Practices of Tomatoes Available in the study area (n=180)

Post-harvest management practices	*Frequency	Percentage%
Storage in wooden crates or woven cane baskets	151	83.9
Storage on the floor	149	82.8
Drying into low moisture content for storage	149	82.8
Cool storage under tree shades, thatch, among others	141	78.3
Cleaning /sorting/grading	149	82.7
Precooling after harvest	149	82.7
Calcium chloride application	146	81.1
Refrigeration storage processing into paste	136	75.6

*Multiplesresponses

4.2 Extent of utilization

Result in Table 2 revealed that, storage in wooden crates or woven cane baskets (x=3.35), storage on the floor (x=2.60), this is due to availability of materials and easy of affordability since it can be gotten locally and these were above the decision rule of 2.5. This finding confirms Asogwa *et al*. (2017) that the use of traditional postharvest practice is predominant in the study area, and is a source of income and employment for many rural farmers.

Table 2:The Extent of Utilization of the Post-harvest Management Practices in the area

Extent of utilization	Often	Sometimes	Seldom	Never	Total	Mean
Storage in wooden crates or woven cane baskets.	125 (500)	24 (72)	0(0) 0(0)	31 (31)	603	3.35
Storage on the floor.	26 (104)	87 (261)	36 (72)	31 (31)	468	2.60
Drying into low moisture content for storage	12 (48)	24 (72)	30 (60)	114 (114)	294	1.63
Cool storage under tree shades, thatch, among others	10(40)	40(120)	31(62)	99(99)	321	1.78
Cleaning/sorting/grading	21(84)	63(189)	0(0)	96(96)	369	2.05
Precooling after harvest	20(80)	39(117)	40(80)	81(81)	358	1.99
Calcium chloride application	26(104)	6(18)	17(34)	131(131)	287	1.59
Refrigeration storage processing into paste	20(80)	8(24)	4(8)	148(148)	260	1.44

Decision Rule of 2.5 and above (Numbers in parenthesis are weighted scores)

4.3 Effectiveness of utilization

Result Table 3 revealed that storage in wooden crates or woven cane baskets ($\bar{x}$=2.24), storage on the floor ($\bar{x}$=2.20), drying into low moisture content for storage ($\bar{x}$=2.10), and cool storage under tree shades, thatch, among others ($\bar{x}$=2.18). This finding confirms Asogwa *et al*. (2017) that the use of traditional postharvest practice is predominant in the study area, and was a source of income and employment to many rural farmers.

Table 3:Effectiveness in the Utilization of Post-harvest Management Practices of Tomatoes

Post-harvest practices	very effective	Effective	Not effective	Total	Mean
Storage in wooden crates or woven cane baskets.	76 (228)	71 (142)	33 (33)	403	2.24
Storage on the floor.	69 (207)	78 (156)	33 (33)	396	2.20
Drying into low moisture content for storage	61 (183)	76 (152)	43 (43)	378	2.10
Cool storage under tree shades, thatch, among others.	74 (222)	65 (130)	41 (41)	393	2.18
Cleaning/sorting/grading	37(111)	14(28)	129(129)	268	1.49
Precooling after harvest	31 (93)	20 (40)	129 (129)	262	1.46
Calcium Chloride (C_aCl_2) application.	35(105)	16(32)	129(129)	266	1.48
Refrigeration storage processing into paste.	23(69)	16(32)	141(141)	242	1.34

Decision Rule of 2.0 and above (Numbers in parenthesis are weighted scores)

Result of Z-test of difference in the extent of utilization of traditional and modern post-harvest management practices of tomatoes showed a significant difference in the utilization of traditional ($\bar{x}$= 2.7933) and modern ($\bar{x}$= 1.6071) postharvest practices, since Z-calculated of (3.208)*** was greater the than the Z-tabulated of (1.96), therefore, reject the null hypothesis and accept the alternative. This result shows that farmers utilized the traditional postharvest practices more than the modern practices. This could be due to not having a proper knowledge of modern practices. The finding is in tandem with Asogwa *et al*. (2017) that the use of traditional postharvest practices is predominant in the study area, and is a source of income and employment to many rural farmers.

Table 4: Z-test of Significant Difference in the Extent of Utilization of Post-Harvest Management Practices of Tomato

Type of management practices	N	mean	Standard deviation	Z-cal	Z-tab
Traditional	180	2.7933	1.13752	3.208***	1.96
Modern	180	1.6071	1.48206		

Result of Z-test of difference in the mean rating of effectiveness utilization of traditional and modern post-harvest management practices of tomatoes showed a significant difference in the effectiveness of traditional ($\bar{x}$=2.1792) and modern ($\bar{x}$=1.4361) utilization of postharvest management practices. Since Z-calculated of (3.413) was greater than the Z-tabulated, therefore, reject the null hypothesis which states that there is no difference in the mean rating of effectiveness utilization of traditional and modern post-harvest management practices of tomatoes and accept the alternative. The finding indicates that the traditional was more effective than the modern practices. This could be due to lack of proper information dissemination on post-harvest by extension agents. The finding conforms Chukwu (2013) that extension contact brings innovative information to farmers that in turns improve their yield thereby causing increasing in income which leads to improve standard of living.

Table 5: Z-test of Significant Difference in Effectiveness of Post-harvest Management Practices of Tomato

Effectiveness of post-harvest management practices of tomatoes	N	mean	Standard deviation	Z-cal	Z-tab
Traditional	180	2.1792	1.01588	3.413***	1.96
Modern	180	1.4361	1.20760		

5.0 Conclusion and Recommendations

The study revealed that traditional post-harvest management practices of tomatoes were the most effective and utilized post-harvest management practices of tomatoes in Benue State, Nigeria. It is recommended that government and technology developers should consolidate farmers' traditional or indigenous knowledge in developing technologies that are acceptable by farmers and government should build a processing factory where the tomatoes can be processed into paste to eliminate spoilage of the produce.

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