ASSESSMENT OF POST-HARVEST PRACTICES AMONG TOMATO (*Solanum lycopersicum*) FARMERS/PROCESSORS IN ABEOKUTA NORTH LOCAL GOVERNMENT AREA OF OGUN STATE, NIGERIA

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Abstract

*This study was carried out to assess the post-harvest practices among tomato farmers/processors in Abeokuta North Local Government Area of Ogun State, Nigeria. Simple random sampling technique was used to select one hundred and fifty (150) respondents for the study. Descriptive statistics was used to describe the objectives while chi-square was used to test the hypothesis of this study. Result of the findings showed that 50.67% of the tomato farmers were between 31 – 40 years of age and married. Most (93.33%) of the respondents had one form of education or the other with household size of more than 5 members while 62.67% of the tomato farmers had spent 6 – 10 years in tomato farming. 46.67% of the tomato farmers got their capitals from cooperative societies while very few (6.66%) obtained loans from microfinance banks. Majority (76.67%) of the tomato farmers always got information from fellow farmers while very few (12.67%) of the respondents' sourced information from extension service providers. Many (62.00%) of the respondents preferred to harvest tomatoes in the evening while most (80.67%) of the tomato farmers used local woven baskets to package their tomato fruits. Harvested tomatoes were always transported to the markets by Pick-up van (70.00%), motorcycle (59.33%) and Truck (41.33%). The common processing technique adopted for tomatoes was sun drying (*84.67%*). However, there are major constraints militating against tomatoes post-harvest practices in study area which include inadequate financing, strenuous tomatoes processing technique, inadequate extension service support among others. Results of chi-square indicated a significant relationship between age and tomato post-*

harvest practices (x^2 = 27.52, p = 0.00). Based on the findings of this study it is hereby recommended that financial institutions should support tomato farmers while agricultural extension agents should organize training on post-harvest practices in order to increase farmers' incomes and minimize tomatoes wastages in the study area.
Keywords: tomatoes, post-harvest practices, constraints, microfinance, wastages

1.0 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 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 due to poor pre and post-harvest practices (Charles, 2009). Tomato (*Solanum lycopersicum*) is a staple fruit vegetable. Fresh fruits and vegetables are very important source of vitamins and minerals which are essential for human health. Tomato is one of the most important vegetables in the world. It is considered as an important cash and industrial crop in many parts of the world (Babalola *et al.*, 2010). Tomatoes are grown as fresh market and as processing tomatoes. They are important for food industry as they serve as raw material for production of value added products (Soe, 2003). The domestic consumption and demand for tomato is growing due to increase in population. It is very important vegetable with substantial nutritional value. Tomato may be eaten fresh as salad or they may be pressed into pastes or purees, which are used for cooking in soups or stews and producing fruit drinks. Moreover, it is available at low price as compared to other vegetables. 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. In developing countries like Nigeria, storage, packaging, transport and handling techniques are practically non-existent with perishable crops, so this allows for considerable losses of produce. Furthermore, improper post-harvest sanitation, poor packaging practices and mechanical damage during harvesting, handling and transportation resulting from vibration by undulation and irregularities on the road can enhance wastages (Idah *et al*., 2007). It is distressing to note that much is being devoted to planting crop, so many resources spent on irrigation, fertilizer application and crop protection management could only to be wasted in few days after harvest. Post-harvest losses have been highlighted as one of the determinants of the food problem in most developing countries like Nigeria (Babalola *et al.*, 2008). Thus, reduction in post-harvest losses increases food availability hence, alleviation of food

problems. The effect of poor post-harvest practices increases production wastages and lowers marketing efficiency. There is need to store and preserve tomato to forestall the seemingly global food epidemics. It is against this background that this study assesses the post-harvest practices among tomato farmers/processors in Abeokuta North Local Government Area of Ogun State.

1.1 Specific objectives:

i. describe personal characteristic of the respondents in the study area
ii. identify sources of capital of the respondents
iii. ascertain sources of information on post harvest practices of tomato in the study area
iv. examine various tomato post-harvest practices engaged in by the respondents
v. identify constraints to tomato post-harvest practices in the study area

1.2 Hypothesis

H_{01}: There is no significant relationship between socio-economic characteristics of the respondents and tomato post-harvest practices.

2.0 Materials and method

The study was carried out in Ogun State, Nigeria. Abeokuta North Local Government Area is one of the twenty Local Government Areas in Ogun State. It was purposively chosen for this study because of the prime importance of the Local Government Area in terms of arable crops production. Major crops grown are tomato, maize, cassava, yam, etc. A simple random sampling technique was used to select 33% of the wards (i.e. 5 wards out of 15 wards in the study area): Imala/Idi-Emi, Isaga-Ilewo, Olorunda-Ijale, Sabo and Ibara-Orile. Simple random sampling technique was used to select 3 villages each from the 5 selected wards, this gave rise to 15 villages, then 10 farmers were selected at random from the selected 15 villages resulting in a total of 150 respondents for this study.

2.1 Data Collection Method

Data collection was through primary source using interview guide, observations and memory recall. The instrument used for the data collection was subjected to content validity by consulting experts in the field of Agricultural Extension and Rural Development. Items found ambiguous were

removed. Test-retest was carried out with ten (10) tomato farmers/processors who were not part of this study to ascertain the reliability of the instrument.

2.2 Measurement of Variables

Age, household size and processing experience of the respondents were measured at interval level while educational level and marital status were measured at nominal level. Constraints to level of awareness were ranked in order of severity as High Constraints, Moderate constraints and Low constraints with a score of (3), (2), and (1) respectively.

2.3 Data Analysis

Descriptive statistics such as frequency counts, percentage, and mean was used to analyze the objectives while chi-square was used to test the hypothesis.

3.0 Results and Discussion

3.1 Personal characteristics of respondents

Above ninety percent (93.34%) of the respondents were less than 50 years old with mean age of 37.10 years revealing presence of middle aged individuals who are known to be economically active and innovative. This is line with the findings of Oyediran, 2013 in melon production in Oyo State that most Nigerian farmers are within this age group and are economically active part of the population. Majority (70.00%) of the respondents were male, married, and had one form of formal education or the other. This indicates dominance of male folk with high literacy in tomato production in the study area. This finding agrees with Odebode (2007), that adult males engaged in land clearing, planting and weeding. The mean household size was 7 people. This indicates that the household size of respondents were relatively large. This corroborated the findings of Adegbite *et al*. (2007) which stated that the larger the household size, the more the likelihood of sustainable labour supply and efficiency on farmers farms given that, there is constant labour supply all the year round. The result also indicated that 62.67% of the respondents had been in tomato farming for more than 6 years. The mean year of farming experience was 8.05 years. This further shows that tomato farming have been the source of livelihood as people in the study area are not new in this tomato farming business.

Table 1: Personal characteristics of the respondents (n =150)

Variables	Frequency	Percentage	Mean
Age			
Less than 30	30	20.00	37.10
31-40	76	50.67	
41-50	34	22.67	
Above 50	10	6.66	
Sex			
Male	105	70.00	
Female	45	30.00	
Marital status			
Single	15	10.00	
Married	101	67.33	
Separated	34	22.67	
Farming experience (yrs.)			
Less than 5	24	16.00	
6-10	94	62.67	8.05
Above 10	32	21.33	
Educational level			
No formal education	10	6.67	
Primary education	20	13.33	
Secondary education	84	56.00	
Tertiary education	26	24.00	
Household size			
1-5	42	28.00	7.00
6-10	90	60.00	
Above 10	18	12.00	

Source: Field survey, 2013

3.2 Sources of Capital

The capitals used in the tomato production by the respondents were obtained from Cooperative, Personal savings, Banks and borrowing from Friends and Family. Result in Table 2 revealed that 46.67% of the respondents got their capital from Cooperative societies while 26.67% got their capital from their friends and relatives. Loans from commercial banks accounted for only six percent. The result showed that banks have not made significant impact as their credit facilities are not readily available to the farmers in the study area. The result corroborates the findings of Omoare *et al*., 2013, Oyediran, 2013, Adekunle, Omoare and Oyediran, 2014 that banks have not made significant impact as their credit facilities are not readily available to the farmers.

Table 2: Sources of capital utilized by the respondents (n = 150)

Variable	Frequency	Percentage
Personal savings	30	20.00
Family and friends	40	26.67
Cooperative societies	70	46.67
Microfinance banks	10	6.66

Source: Field survey, 2013

3.3 Farmers' Sources of information on tomato post-harvest practices

Over the years, rural farmers depend on indigenous or local knowledge for improved farming system. Such knowledge (indigenous or local knowledge) refers to skill and experience gained through oral tradition and practice over many generations (Nnenna, 2011). Acquisition of such primitive skill by our rural farmers has not helped to improve agricultural yield (Nnenna, 2011). Agricultural information are always meant to get to rural farmers via extension workers, community libraries, radio, television, film shows, agricultural pamphlets, state and local government agricultural agencies etc. Result in Table 3 revealed that most (76.67%) of the farmers always got their information on tomato post-harvest practices from fellow farmers. This indicated that farmers in the study area relate well with each other, hence, information regarding tomato production is well circulated among fellow farmers. Farmers union (82.00%) played a very significant role in sourcing information on tomato post-harvest practices among its members. Information ranging from new varieties, its characteristics and advantages, time of planting and harvesting, marketing, utilization and post-harvest practices are sourced and disseminated to their members. Also, majority (75.34%) of the respondents always got the information on tomato post-harvest practices from their friends and neighbour. The results corroborate the findings of Adekunle *et al*. 2014 that farmers relied on information from farmers' union and fellow farmers. Most (70.67%) of the respondents did not get information on agricultural production from radio/television in the study area. Also 66.00% of the farmers never source information on tomato post-harvest practices from extension agents while only a few (12.70%) always sought for information from extension agents in the study area. It implies that extension services have not been an effective means for tomato farmers to source information from, which is quite detrimental to post-harvest practices of tomato in the study area.

Table 3: Farmers' sources of information on Post-harvest practices (n = 150)

Information sources	Always	Occasionally	Never	Mean
Fellow farmers	115 (76.67)	20 (13.33)	15 (10.00)	2.85
Extension agents	19 (12.67)	34 (22.67)	99 (66.00)	1.21
Friends and neighbour	113(75.34)	8 (5.33)	29 (19.33)	2.74
Farmers union	123(82.00)	21 (14.00)	6 (4.00)	2.90
Radio/television	18 (12.00)	26 (17.33)	106 (70.67)	1.18
Research institutes	04 (2.67)	02 (1.33)	144 (96.00)	1.02
Newspapers/magazine	34 (22.67)	19 (12.67)	97 (64.67)	1.47

Source: Field Survey, 2013
Values in parenthesis are percentages

3.4 Tomato post-harvest practices

3.4.1 Picking time of tomatoes

The time of picking is an important factor in post-harvest practices in tomato production. Above half (62.00%) of the tomato farmers picked their tomatoes in the evening. This may be due to distance of markets in urban centres as farmers picked tomatoes in order to make the produce ready for transportation and available for sale in the markets the following dat. However, 38.00% of the tomato farmers picked theirs in the morning. These are farmers who transported their produce to the local and nearby markets. The result agrees with the findings of Muhammad, Hionu and Olayemi, 2012 that harvesting of fruits and vegetables should be carried out during the cool part of day.

Table 4: Distribution based on the picking time of tomatoes (n = 150)

Time of picking	Frequency	Percentage
Morning	57	38.00
Evening	93	62.00

Source: Field Survey, 2013

3.4.2 Packaging materials used for tomatoes

Most (80.67%) of the tomato farmers used woven baskets of 25-75kg to package their tomatoes while 19.33% of the tomato farmers made use of perforated plastics as shown in the result in Table 4. There are different methods of packaging. In the rural area of Nigeria woven baskets of various sizes are considered ideal for packing tomatoes because they are cheap, have holes for aeration, easy to carry, provide good protection from mechanical damage, and convenient for merchandising. Wooden boxes and Jute bags are not common packaging materials for tomatoes in the study area.

Table 4: Distribution according to packaging materials used for tomatoes (n = 150)

Material used	Percentage	Frequency
Woven basket	121	80.67
Perforated plastic bucket	29	19.33
Wooden boxes	0	0.00
Jute bags	0	0.00

Source: Field Survey, 2013

3.4.3 Mode of transportation

Result in table 5 revealed that majority (70.00%) of the tomato farmers always transported their product to markets by pick-up van while 59.33% of tomato farmers used motorcycles and 41.33% of tomato farmers used trucks. Only 22.00% of the tomato farmers always used their cars to convey tomatoes to markets. Bicycle and head are not commonly used to convey tomatoes to the market. The result of this study supports the assertion of Muhammad *et al*. 2012 that transportation of tomatoes should be done in a well-ventilated vehicle, which should be covered at the top to prevent direct sunlight, protection from rainfall other hazards.

Table 5: Distribution based on transportation system (n = 150)

Transportation	Always	Occasionally	Not at all
Pick-up van	105 (70.00)	26 (17.33)	19 (12.67)
Car	33 (22.00)	47 (31.33)	70 (46.67)
Bicycle	0 (0.00)	0 (0.00)	150 (100)
Motorcycle	89 (59.33)	41 (27.34)	20 (13.33)
Truck	62 (41.33)	38 (25.34)	50 (33.33)
Head	0 (0.00)	16 (10.67)	134 (89.33)

Source: Field Survey, 2013
Values in parenthesis are percentages

3.4.4 Tomato processing

To reduce the post-harvest losses and over supply/glut to the markets, it is essential that the surplus and over ripe produce be separated and processed. Most (84.67%) of the respondents sun dried their tomatoes surplus to preserve it while 15.33% of the respondents used grinding and boiling to preserve their tomatoes. These post-harvest processing and preservation techniques are ineffective because large quantities of tomato fruits are harvested, thus high post-harvest wastages. This is in line with findings of Adekunle *et al*. 2014 that modernized food crop processing techniques are generally low in the rural areas of Nigeria.

Table 6: Distribution based on tomato processing (n = 150)

Processing techniques	Frequency	Percentage
Sun Drying	127	84.67
Grinding and boiling	23	15.33

Source: Field survey, 2013

3.4.5 Constraints to tomatoes post-harvest handlings

The result in Table 7 showed that most (85.33%) of the respondents ranked inadequate financial support as the most serious problem confronting tomatoes post-harvest handling in the study area. This finding corroborates that of Oyediran, 2013 that credit is an important input for expansion of agriculture in Nigeria. This was followed by strenuous tomatoes processing technique (83.3%), inadequate extension service support (70.00%), and low demand of dried tomatoes (66.67%). Other constraints to tomatoes post-harvest handlings were inadequate market information on tomatoes (57.67%), high cost of farm labour (52.67%), Pest and diseases problems (50.00%), lack of technical know-how on post-harvest (46.67%), and Lack of modern processing facilities (44.67%).

Table 7: Constraints to tomatoes post-harvest handlings (n = 150)

Variable	High constraints	Moderate constraints	Low constraints	Mean	Rank
Inadequate financial support	128(85.33)	15(10.00)	7(4.67)	2.82	1st
Processing of tomato into paste is strenuous	125(83.33)	13(8.67)	12(8.00)	2.75	2nd
Inadequate extension service support	105 (70.00)	40(26.67)	5(3.33)	2.67	3rd
Low demand of the dried tomato	100(66.67)	40(26.67)	10(6.66)	2.60	4th
Inadequate market information on tomatoes	86(57.34)	56(37.33)	8(5.33)	2.52	5th
High cost of farm labour	79(52.67)	47(31.33)	24(16.00)	2.41	6th
Pest and diseases problems	75(50.00)	46 (30.67)	29(19.33)	2.32	7th
Lack of technical know-how on post-harvest	70(46.67)	49(32.67)	31(20.66)	2.26	8th
Lack of modern processing facilities	67(44.67)	50(33.33)	33(22.00)	2.23	9th

Source: Field survey, 2013

3.4.6 Relationship between socio-economic characteristics and tomato post-harvest practices

H_{01}: There is no significant relationship between socio-economic characteristics and tomato post-harvest practices.

The results of chi-square in Table 8 indicated that age (x^2 = 27.52, p = 0.00) was significant to tomato post-harvest practices at p < 0.05 level of significance. This implies that the older the farmers the more likely they handle tomatoes post-harvest practices with care because experience of the farmers increase over year in the farming operations. It means that there is significant relationship between socio-economic characteristics and tomato post-harvest practices at p < 0.05 level of significance. However educational status (x^2 = 3.90, p = 0.14), household size (x^2 = 1.26, p = 0.26) and marital status (x^2 = 3.94, p = 0.40) were not significant to tomato post-harvest practices at p < 0.05 level of significance. This indicates that educational status, household size and marital status of the farmers have no influence on the tomato post-harvest practices in the study area. This may be adduced to the fact that constraints and other production factors can affect post-harvest handling. Oyediran, 2013 reported that resources input, socio-economic characteristics and constraints have significant influence on crop production.

Table 8: Relationship between socio-economic characteristics and tomato post-harvest practices

Variables	x^2	df	p-value	Decision
Age	27.52	3	0.00	S
Educational status	3.90	2	0.14	NS
Household size	1.26	1	0.26	NS
Marital Status	3.94	2	0.40	NS

Source: Field survey, 2013

4.0 Conclusion

It can be concluded that the tomato post-harvest practices in the study area was too crude. Also, there was a positive relationship between the age of the farmers and post-harvest practices. Constraints were also major impediments to effective post-harvest practices in the study area.

5.0 Recommendation

Based on the findings of this study it is hereby recommended that:

i. financial institutions should provide affordable financial support tomato farmers
ii. agricultural extension agents should organize training on post-harvest practices in order to increase farmers' incomes and minimize tomatoes wastages in the study area
iii. Tomato farmers should form themselves into cooperatives in order for them to assess inputs and subsidies from the government.

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