

ATTITUDE OF OPENFIELD TOMATO FARMERS TOWARDS POSTHARVEST HANDLING ACTIVITIES OF THE CROP IN KANO STATES, NIGERIA

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ABSTRACT

Postharvest losses of tomato in Nigeria are high due to poor postharvest handling activities. Attitude of openfield farmers towards postharvest handling activities of tomato in Kano state was examined. Multistage sampling procedure (purposive and random sampling) was used to select 213 tomato farmers. Interview schedule was used to obtain data on respondents' personal and enterprise characteristics as well as their attitudinal disposition towards postharvest handling activities of tomato. Age of open-field farmers was 47.7±7.6 years, majority (92.0%) of the open-field farmers were married with 16.8±6.9 years of farming experience. Larger percentage (66.2%) of openfield farmers inherited their farmland and majority (74.2%) of openfield farmers generated their working capital through personal savings. Majority (60.1%) of openfield farmers were not favourably disposed to postharvest handling activities of tomato. Majority (54.9%) of openfield farmers incurred high rate of tomato postharvest losses. There was significant relationship ($r = -0.152$, $p < 0.05$) between openfield farmers' attitude towards postharvest handling activities of tomato and the rate of postharvest losses incurred. The study therefore recommends that, since attitude and rate of postharvest losses are correlated, government and other NGOs should organise seminars and training on postharvest handling activities for openfield farmers to influence their attitudinal disposition towards postharvest handling activities of tomato to ensure reduction in the rate of tomato losses for improved rural livelihood and adequate food security.

Keywords: Postharvest handling activities, Tomato postharvest losses, Open-field farmers

INTRODUCTION

Postharvest losses of fruits and vegetables are estimated at about five to twenty percent in technologically advanced countries and twenty to fifty percent in less developed and developing countries (Mashav, 2010). In Nigeria alone, postharvest losses of fruits and vegetables amounts to about thirty-five to forty-five percent of the total annual production because postharvest handling activities of fruits and vegetables are not practiced by stakeholders involved (farmers and marketers). It was recorded that about sixty percent of tomato in Nigeria is lost due to high occurrence of pests and diseases as well as inadequate postharvest handling activities (FAO, 2011).

Nigeria is one of the largest producers of tomato and other fruit vegetables grown in its several agricultural and ecological zones. This is because the country is blessed with fertile farmland that supports the growth of crops every year. These agricultural products are lost at rapid rate of thirty to fifty percent annually due to improper postharvest handling activities. In Africa, the losses are even higher between thirty and fifty percent and occur mainly along the supply chain, where fruits and vegetables losses are estimated to be fifty percent or more (FAO, 2011). Fruits and vegetables are major sources of vitamins and minerals essential in human diet. However, the dietary values of horticultural crops mostly fruits and vegetables are greatly affected by postharvest handling activities as they are usually harvested when fresh with high moisture content which

makes their management difficult. It is especially so in the tropical regions where the temperature is very high when compared with the temperate regions (Sablani, Andrew, Davies, Walter and Mohekar, 2010).

The population of the world in general is increasing at an alarming rate, it is estimated to reach about 8.6 billion by the year 2030. This increase is likely to approach 9.8 billion by the year 2050 and 11.2 billion by the year 2100. This population explosion will further increase food security concerns specifically in the developing and under developed nations of the world (United Nations Department of Economic and Social Affairs, UNDESA, 2017). Most importantly, the predictable increase in the world's population could be credited to high fertility rate in most of the developing countries, or with countries with already large populations. This population growth translates into thirty-three percent more people to be fed with the greatest demand growth in the poor communities of the world. As a result of this, food supplies needed to be improved by sixty percent to meet the food demand by the year 2050. Availability and accessibility to food would increase by producing more food, improving food distribution, and reducing the rate of postharvest losses of food along the supply chain. Thus, reduction of food losses is a critical factor of ensuring future adequate food security. Universal efforts in combating hunger among the Nigerian populace, raising handlers' income and livelihood to improve food security especially in the world's



poorest countries should give priority to the concern of food postharvest losses (United Nations (UN), 2013; Alexandratos and Bruinsma, 2012; Food and Agricultural Organisation (FAO), 2010 and Department of Economic and Social Affairs (DESA), 2010). Globally, about one-third of food produced for human consumption is lost along the supply chain of food distribution which aggregates to almost 1.3 billion tonnes annually (Gustavsson, Sonneson and Meybeck, 2011). About thirty to forty percent of food produced in the world are never consumed as a result of spoilage and rotting caused by pests and diseases which affect food crops during and after harvest. Postharvest losses of food is therefore regarded as one of the major causes of food insecurity in developing countries. Nigeria, for instance, is losing about 2.4 billion tonnes of food annually as a result of inadequate postharvest handling activities. Thus, the losses connected with the inefficient postharvest handling activities limit the prospective earnings of farmers and marketers; lowers farmers' and marketers' standard of living; threatens all the components of food security and increase conditions of poverty among rural households whose revenue sources depend exclusively on capability to preserve extra farm produce for future use (Okoruwa, Ojo, Akintola, Ologhobo and Ewete, 2010).

However, production of bulk of fresh tomato fruits takes place in the Northern part of Nigeria where it is grown extensively under irrigation system, but it is quite unfortunate that tomato is not only a seasonal crop but highly perishable. It deteriorates few days after harvest thereby losing almost all the required qualities and could result to total waste. It is against this background that this study examined the following objectives:

The general objective of this study was to determine the openfield farmers' attitude towards postharvest handling activities of tomato in the study area, while the specific objectives were to;

1. ascertain the socioeconomic characteristics of the respondents in the study area;
2. determine respondents' attitude towards postharvest handling activities of tomato
3. discover the rate of postharvest losses of tomato incurred by the respondents in the study area

The hypotheses of the study are;

H₀₁: There was no significant relationship between the respondents' socioeconomic characteristics and the rate of losses incurred.

H₀₂: There was no significant relationship between respondents' attitude towards postharvest handling activities of tomato and the rate of losses incurred.

METHODOLOGY

The study was carried out in Kano State, Nigeria. Kano State is located between latitude 10°35' and 13°02' north and between longitude 7°30' and 10°35' east and as such it is part of Sudano - Sahelian zone of Nigeria. Mean annual rainfall in Kano State fluctuates from South to North, between 780mm and 1000mm. Temperature varies sharply depending on the season, reaching up to 38°C and 40°C when it is hot and as low as 25°C in the wet season. The rainy season starts from June to September, while the dry season starts from October to May.

Multistage sampling procedure was used to select the respondents for the study. There was purposive selection of Kano state based on the comparative advantage in tomato production. Purposive sampling technique was also used to select 20% of LGAs prominent in tomato production from the state. Three LGAs in Kano state (Bukure, Makoda and Garunmallam) were selected for the study. Thereafter, 10% of the wards in selected LGAs (Tsambaki, Satame Jigawa and Dakasoye wards from Kano State were randomly selected to give six wards. Lastly, 5% of the registered tomato farmers in each ward were randomly selected for the study to give a total of two hundred and thirteen (213) Openfield tomato farmers. Data was collected from the respondents using interview schedule. Data obtained were analysed using descriptive statistics (frequency and percentage) and hypotheses of the study were tested using Pearson Product Moment Correlation (PPMC).

The attitude of openfield farmers towards postharvest handling activities of tomato was measured using five point Likert-type scale of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. Scores of 5, 4, 3, 2, and 1 were assigned for positive worded statements and was reversed for the negative worded statements. Socioeconomic characteristics of the respondents were measured at ordinal, nominal and interval levels. Respondents' attitude was measured using scores generated and the mean obtained. The mean was then used to categorize the respondents. Therefore, scores within and above the mean were termed favourable while scores below the mean value were termed unfavourable.

RESULTS AND DISCUSSIONS

Socioeconomic characteristics

Result on Table 1 reveals that majority (54.9%) of the respondents were between the ages of 41 and 50 years, with the mean age of 47.7 years. This suggests that the farming population is still active and the finding is in line with that of Tyabo, Ibrahim, Nandanista and Umar (2014) who reported the mean age of 48 years for farmers in related studies across the agricultural zones of Nigeria. It

was also found that majority (94.4%) of the respondents were male. This implies that more males were involved actively in tomato production in the area. This could be linked with the major roles men play in crop production most especially in production and marketing of fruits and vegetables, because of direct ownership of land required for farming in which men have higher advantage than women. The finding is in consonance with earlier study by Azarian, Hassan and Abu (2012) who reported that farming was dominated by men.

The study also found that most (92.0%) of the respondents were married. The findings agree with Suleiman and Jafar-Furo (2010) who recorded higher percentage of married men in vegetable farming and marketing in Niger State of Northern Nigeria. The result shows that 35.2% of openfield farmers had between 1 – 2 acres of tomato farmland. This suggests that tomato farmers in the study area were small holder farmers. This is consistent with the findings of Soneye (2014) in a related study where a large percentage of the farmers had small farm size of less than two acres for tomato farming.

Table 1: Distribution of selected respondents' enterprise characteristics (n = 231)

Variable description	Openfield Farmers (n=213)		Mean
	F	%	
Age (Years)			
31 – 40	55	25.8	47.7± 7.6
41 – 50	117	54.9	
51 – 60	30	14.1	
≥ 61	11	5.2	
Sex			
Male	201	94.4	
Female	12	5.6	
Marital status			
Single	4	1.9	
Married	196	92.0	
Divorced	13	6.1	
Size of tomato farm (acres)			
≤ 1	65	30.5	4.1±27.3
1.0 – 2	75	35.2	
2.0 – 3	53	24.9	
3.0 – 4	16	7.5	
> 4	4	1.9	
Qty produced (kg)			
≤ 5000	115	54.0	52.056±35.335
5001 – 10000	42	19.7	
10001 – 15000	30	14.1	
15001 -20000	25	11.7	
> 20000	1	0.5	
Years of formal Education			
Primary school	86	40.4	
Secondary school	78	36.8	
Tertiary education	6	2.8	
Non-formal	43	20.2	
Land acquisition			
Inherited	141	66.2	
Leased	75	35.2	
Purchased	128	60.1	
Years of experience			
≤ 10 years	43	20.2	
11-20	133	62.4	
21-30	32	1.5	
31-40	5	2.3	

The result from Table 1 also reveals that little above the average (54.0%) of the respondents produced tomato of less than 5000kg in the year

2016. The reason for low production was as a result of the outbreak of the disease, Leaf miners (*Tuta absoluta*) that surfaced at the peak of tomato



maturity and harvesting and other diseases that attack tomato on the field. The study further reveals that majority (66.2%) of openfield farmers acquired their farmland by inheritance. This implies that respondents have direct access to farmland without additional costs. The study also found that majority (62.4%) of the respondents had between 11 to 20 years of farming experience. This implies that openfield tomato farming and marketing is an age long profession of the respondents in the study area. This findings is also in line with that of Usman, Mani and Mohammed (2015) in a related study where it was reported that farmers had up to 11 – 20 years of farming experience in fruit farming. Larger proportion (40.4%) of the respondents had primary education.

Respondents' attitude towards postharvest handling activities of tomato

Attitude of openfield farmers has been assessed on postharvest handling activities (harvesting, precooling, sorting and grading, storage, packaging, processing and transportation). The result from Table 2a shows that 98.1% of farmers agreed that harvesting of tomato is best done at the cool period of the day. Majority (77.0%) of agreed that harvesting of overripe tomato will lead to postharvest losses. Few (30.0%) of the farmers consented that precooling is necessary to reducing losses, only 46.0% agreed that precooling reduces the activity of microbial

organisms. This implies that majority of the farmers have no understanding of the effects excessive heat has on fresh tomato. More so, few (46.4%) of the farmers agreed that sorting and grading prevents rotting of fresh tomato. Majority (73.3%) of the farmers also agreed that packaging of fresh tomato should be done with the use of suitable materials. However, 24.9% agreed that chilling injury before storage should be reduced to minimize the rate of losses. larger percentage (55.4%) of the farmers were of opinion that bad road network causes postharvest losses of tomato and 67.7% agreed that they make use of dry season to dry their tomato to reduce losses.

Table 2b summarized the respondents' attitude towards postharvest handling activities of tomato where it shows that majority (60.1%) of openfield farmers had unfavourable attitude towards postharvest handling activities, while only few (39.9%) had favourable attitude to postharvest handling activities of tomato. The reason for openfield farmers' unfavourable disposition could be as a result of their low level of education which limits their accessibility to useful information on postharvest handling activities of tomato in the areas of processing and storage. This agrees with Ladapo, 2010, in a related study where majority of the plantain farmers in southwestern Nigeria had unfavourable attitude towards postharvest handling activities of plantain.

Table 2a: Attitude of openfield farmers towards postharvest handling activities of tomato

Attitudinal statements	SD	D	U	A	SA
Harvesting activities					
Harvesting of tomato is best done at the cool period of the day	0	0	1.9	36.2	62.0
Harvesting of overripe tomato will lead to postharvest losses	20.7	0.5	1.9	36.6	40.4
Precooling activities					
Precooling is not a necessary step in reducing losses	6.1	23.9	41.8	4.7	23.5
Precooling does not reduce the activity of microbial organisms	2.3	43.7	24.4	1.4	28.2
Sorting and grading					
Grading of tomato is not necessary, it is only waste of time	3.8	33.3	2.8	34.7	25.4
Sorting does not prevents rotten of fresh tomato	2.3	44.1	1.4	25.4	26.8
Packaging activities					
Packaging is not an important in reducing losses of tomato	25.4	45.5	14.6	6.6	8.0
Use of suitable packaging materials help to reduce losses	1.4	0.9	24.4	8.5	64.8
Storage activities					
I do not need to monitor environmental temp to reduce losses	12.2	6.1	50.7	24.9	6.1
Reducing chilling injury to tomato before storage is essential	14.1	15.0	46.0	16.0	8.9
Transportation activities					
I will rather sell my tomato than spend on a refrigerating van	25.8	38.5	2.8	0	32.9
Bad road network does not cause postharvest losses of tomato	3.3	52.1	4.2	13.1	27.2
Processing activities					
Sun drying of tomato does not reduce losses	13.6	11.7	23.0	17.4	34.3
I take advantage of the weather during the dry season to sundry tomato	4.7	12.2	16.0	38.0	29.1

Table 2b: Attitude scores of openfield farmers on various postharvest handling activities of tomato, n=213

Attitude to Postharvest Handling Activities	Open field farmers (n=213)	
	F	%
Unfavourable	128	60.1
Favourable	85	39.9
Mean ± SD:	137.76 ± 7.89	
Minimum:	118.00	
Maximum:	162.00	

The rate of postharvest losses incurred by openfield farmers

The distribution on the rate of postharvest losses incurred by the respondents from Table 3 shows that, majority (54.9%) of openfield farmers

incurred high rate of postharvest losses while few (45.1%) incurred low rate of postharvest losses. This may be as a result of their low level of education leading to unfavourable disposition toward postharvest handling activities of tomato.

Table 3: Distribution of respondents by the rate of tomato postharvest losses incurred

Rate of postharvest losses incurred	Openfield Farmers (n=213)	
	F	%
Low level of postharvest losses	96	45.1
High level of postharvest losses	117	54.9
Mean	137.76	
SD	7.90	

Relationship between socioeconomic characteristics and rate of postharvest losses incurred

The result (Table 4) shows that there is significant relationship between respondents' level of education ($r = -0.173, p < 0.05$), years of farming experience ($r = -0.163, p < 0.05$), size of tomato farm ($r = -0.279, p < 0.05$), quantity produced ($r = 0.272, p < 0.05$) and the losses incurred. Openfield farmers' level of education influence their attitude negatively towards postharvest handling activities

which results into high losses. More so, years of experience, size of tomato farm and quantity produced were significantly related to the rate of losses incurred by openfield farmers. This implies that the higher the level of education, the lower the rate of losses. However, the higher the quantity produced the more the rate of losses due to inadequate processing and storage facilities around the production centres where tomato could either be processed or stored for future use

Variables	Openfield farmers (n = 213)		
	r- value	p-value	Decision
Age	0.050	0.467	Not significant
Education	- 0.173	0.041	Significant
Years of experience	-0.163	0.032	Significant
Income from tomato	0.081	0.240	Not significant
Income from other sources	0.006	0.929	Not significant
Size of tomato farm(acres)	0.279	0.042	Significant
Quantity produced (kg)	0.272	0.045	Significant

Relationship between respondents' attitude toward postharvest handling activities of tomato and rate of postharvest losses incurred

The result from Table 4 shows that attitudinal disposition of openfield farmers towards postharvest handling activities of tomato was significantly related ($r = -0.152, p < 0.05$) to the rate of postharvest losses they incurred in tomato

production. This implies that attitude of the openfield farmers dictates the rate of postharvest losses they incurred. This suggests that positive attitude towards postharvest handling activities will bring about reduction in the rate of postharvest losses incurred. This findings corroborated with Ladapo, 2010 on related study.



Table 4 shows that attitudinal disposition of openfield farmers towards postharvest handling activities of tomato and postharvest losses

Variables	Openfield Farmers (n = 213)		
	r- value	p- value	Decision
Attitude to postharvest handling activities of tomato vs. postharvest losses	-0.152	0.027	Significant

CONCLUSION

The results showed that majority of the respondents were male, married, had low level of education and the farmland used for tomato was small and inherited. Attitudinal disposition of respondents towards various postharvest handling activities of tomato was not favourable and this led to high rate of losses they incurred in tomato. Also, openfield farmers' level of education influence their attitude towards postharvest handling activities negatively which resulted into high rate of postharvest losses. More so, years of experience, size of tomato farm and quantity produced were significantly related to the rate of losses incurred by openfield farmers.

The study therefore recommends that, farmers should be encouraged to enrol in adult education classes in order to acquire basic skills of education which could influence their attitude towards postharvest handling activities of tomato to reduce the rate of losses. From the study, it was found that respondents' attitude and the rate of postharvest losses were significantly related. Therefore, government and other NGOs should assist the farmers in the area of education (Adult literacy) to make them to read and write. This will affords them the opportunities to access useful information on postharvest handling activities to improve their rural livelihood and ensure adequate food security.

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