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Impact of socio-economic characteristics on post-harvest management technologies of selected horticultural crops among farmers in Kogi State, Nigeria

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Abstract
The study assesses impact of socio-economic characteristics on postharvest management technologies of selected horticultural crops (fruits and vegetables) among rural farmers in Kogi state, Nigeria. A sample size of 205 respondents was selected using stratified and simple random sampling technique. A well-structured questionnaire was used for data collection. Data collected were analysed using both descriptive and inferential statistics. The Result of socio-economic characteristics of the farmers showed that majority (76.5%) of the respondents were between the age ranges of 41-60 years. Most (57.5%) of the respondents were male and 67.5 % were married. Majority (62.5%) of the horticultural farmers has no formal education. The result also showed that about half (57%) of the respondents cultivated three (3) hectares of land. Most of the farmers (58%) had at least 26 years of horticulture farming experience. The result equally revealed that most (61%) of the respondents had annual income between ₦100000 and ₦150000. Six (6) traditional method of postharvest management technologies were mostly practiced (use of hot water for washing and cleaning ($\bar{x}$=3.14), use of hand for sorting and grading ($\bar{x}$ =2.99), use of head and truck for transportation of produce ($\bar{x}$ = 2.83), use of woven basket for packaging ($\bar{x}$= 2.76) and hand picking for harvesting ($\bar{x}$ = 2.72). Evidence from the study also shows that the use of modern postharvest management technologies by horticultural farmers was generally low. There were three major challenges faced by horticultural farmers in reducing post-harvest losses of their produce namely: socio-economic challenges: environmental challenges, and infrastructural challenges. Results showed Ordered Logistic Regression Estimates Showing Relationship between Socio-economic Characteristics of Farmers and their Level of Use of Modern Postharvest Management Technologies in the Study Area. The model fitting χ^2 value of 253.683 was significant ($p < 0.01$). This implies that the socio-economic factors included in the model are significantly related to the level of use of modern postharvest management technologies It was therefore recommended that Gender disparities should be avoided to enable both male and female farmers have access to farm inputs.

***Key Words:** Socio-economics, Characteristics, Post-harvest, Management, Technologies, Horticulture.*

Introduction

Horticultural crops are crops which are not staple cereals or major industrial crops, but are mainly eaten for their contribution to the flavour and interest of food with flexible consumption based on price, quality and supply (Alazar, 2007). This according to Choudhury (2006) includes fruits, vegetables, flowers, spices, medicinal and aromatic plants and plantation crops. Some components (phytochemicals) of fruits and vegetables are strong antioxidants such as vitamin C, one of the quality parameters, of antioxidant that can protect cells from cancer causing agents (Nandi and Bhattacherjee, 2005; Hassan *et al.,*2010). Production of fresh fruits and vegetables

has its own complexity. The perishability of horticultural crops makes it difficult to manage easily during postharvest period compared to dry grains. The perishable nature of the produce and lack of knowledge as well as shortage of capital in horticultural industry in Nigeria, Kogi State in particular is still at its infant stage (Hailu, 2015). Postharvest management is a set of post-production practices that deals with harvesting, selection, washing, grading, disinfection, drying, packing and storage. These eliminate undesirable elements and improve product appearance as well as ensuring that the product complies with established quality standards for fresh and processed products (El-Ramad *et al.,* 2015). Postharvest practices include the management and control of variables such as temperature and relative humidity, the selection and use of packaging and application of such supplementary treatments as fungicides. (FAO 2009).

Socio-economic characteristics of farmers that affect postharvest management of fruits and vegetables crops include the following: sex, age, income, level of formal education, household size, Cosmo politeness and social status (Tanyanyiwa and Chikwanha, 2011).

The magnitude of postharvest loss in Nigeria is very high, ranging from 5 to 26% for different crops. Many developing countries of Africa such as Nigeria, though richly blessed in agricultural resources have acute fruits and vegetable shortages thus cannot meet up with the food and nutritional requirements of its citizenry due to improper postharvest management technologies of these fruits and vegetables (Carrasco and Urrestarazu, 2010).

Despite the huge advantages in using modern postharvest technologies in processing horticultural crops which boost agricultural production and reduce wastage, farmers in rural areas have little or no access to modern postharvest management technologies which are considered of great benefit to them. The above scenario indicates that even when farmers have access to these modern postharvest management technologies, they may lack the technical knowhow on its operation. However, baseline information on utilization of modern postharvest management technologies is scarce. It is against this backdrop that this study was carried out.

The study assessed postharvest management technologies of horticultural farmers, and the challenges faced by horticultural farmers on postharvest management of their produce.

Methodology

The study was carried out in Kogi State, Nigeria. The state was created in August 27, 1991. Kogi state has an estimated population of 3,314,043 people and occupies a land area of 35,123 square kilometres (NPC, 2006). The major ethnic groups are Igala, Ebiras and Okuns. The state is made of four agricultural zones namely; Zone A: Aiyeotro Gbedde, Zone B: Anyigba Zone, Zone C: Koton-Karfe and Zone D: Alloma (KGADP, 2011). Kogi State is made up of 21 Local Government Areas namely; Lokoja, Adavi, Ankpa, Idah, Ajaokuta, Bassa, Dekina, Kogi, Yagba east, Ofu, Igalamela-Odolu, Yagba west, Ibaji, Okene, Ijomo, Olamaboro, Okehi, Omala, Ogori-Magongo, Mopa-Moro and KotonKarfe.. The state is one of the major producers of fruit and vegetables crop like orange, tomatoes, lettuce, pepper, mango. (KGADP, 2011).

A sample size of 205 respondents was selected using stratified and simple random sample technique. Two Local Government

Areas were randomly selected from each of the three agro-ecological zones, namely; Olamaboro and Ofu were selected from Alloma Zone, Omalla and Ankpa were selected from Anyigba Zone while Lokoja and Kogi were selected from Koton-karfe Zone. A total of six Local Government Areas were selected. Furthermore, two extension cells were randomly selected from each of the Local Government Areas. A sampling frame was developed for each of the selected Local Government Areas and using a proportional allocation of 10% [0.1] across board, and a total sample size of 205 respondents was selected. A well-structured questionnaire was used for the collection of primary data alongside interview techniques. Data for this study were analyzed using both descriptive and inferential 1statistics; these are: frequency distribution, percentage and mean score, standard deviation, factor analysis, ordered logit regression model was used to test the hypothesis.

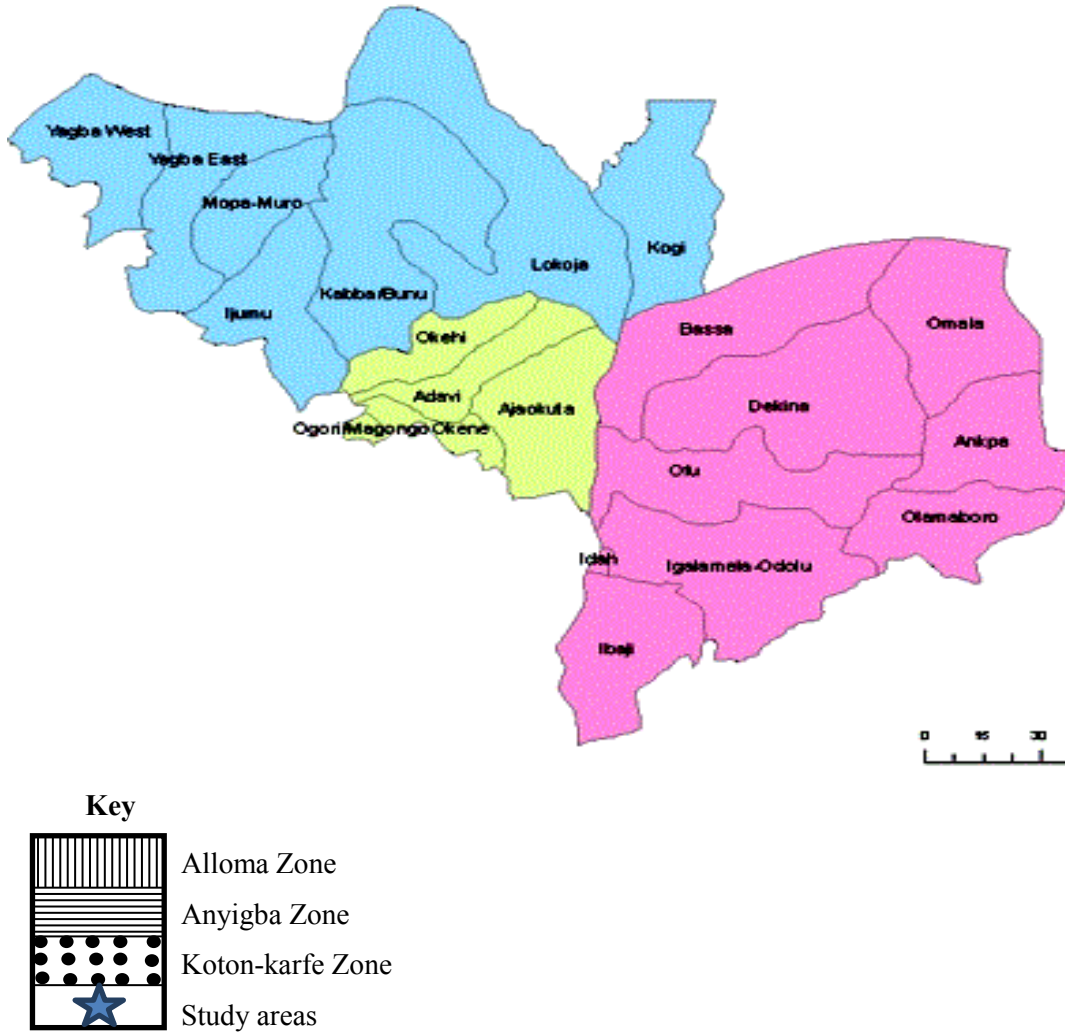

Figure 1: Map of Kogi State Showing the Location of the Study Areas

Result and Discussion

Socioeconomic Characteristics of Respondents

The socioeconomic characteristics of respondents revealed that 19.5% of respondents were between the productive years. This agrees with the findings of Adewumi *et.al* (2007) which stated that farming is between active age's brackets of 21-60 years, most of them can contribute actively to postharvest management practices since the age of farmers has a relationship with the quality and quantity of work, he/she can carry out on the farm. Results also revealed that over half (57.5%) of the respondents were male while 42.5% were female. This implies that men being the head of families have man-hour and also, farming activities are considered as tedious for women who are so concerned with domestic activities. This agrees with the findings of Aidoo *et al* (2014) which observed that male-headed households tend to have many man hours available and more time for farm activities compared to their female counterparts. On marital status, results show that 67.5 % of respondents were married, while 6.5% were separated, 10.5% were widowed,14% were divorced while 1.5 were single. This means that the respondents were stable in farming since they are dominated by married people which also lead to more family labour. This agrees with Ani (2010) who noted that marriage is often associated with occupation stability. The result also revealed that 37% had a household-size of 11-15 persons, 25% had house hold-size of 6-10 persons, while 34% had a household-size of 16 persons, among others. The mean house hold-size was about 14 persons; large household size was their norm. This implies high availability of family labour for farm operations. Farmers who had larger household size tend to have relatively high amount of family labour that facilitate tomato harvesting for processing to be fast and efficient (Aidoo, 2014).

Over sixty-two (62.5%) of the respondents had had no formal education, 22% had primary education, among others (Table 1). This implies that the respondents had low level of formal education which made them to stick to their traditional method of farming. Since the level of education is poor, they find it difficult to adopt modern post-harvest management technologies which enhanced their farming. Obinne (1991) opined that education is a factor in the adoption of new technology. Data in Table 1 show that 57% of the respondents had above 3ha, about 29% had 1-2 ha while 14.5% had <1ha.the mean farm size was 2.6ha. This implies that majority of the respondents were small-holders of farm size. Also, postharvest operations are tedious work if not properly carried out it cause a lot of wastage which led to postharvest loss, that is why majority of respondents used small hectare of land for proper management. This agrees with the findings of Babalola et.al (2010) who reported that the larger the area of land put under cultivation the more quantity harvested and the chances of losses due to poor handling and lack of proper storage. Majority (91.5%) 0f the respondents were farmers, 4.5% were traders, 3.5% were civil servant while 5% were teachers. This implies that farming is the dominant occupation in the study area. This agrees with the finding of Achegbulu and Ujah (2006) that 70% of rural people in Nigeria are farmers. Also, 58.0% of the respondents had a farming experience of above 25years, 32.0% had between 16 and 25 years, among others. The average mean farming experience of the respondents was 27.2 years. This implies that the respondents were averagely good in their traditional method of postharvest

operations which is affordable and less expensive. This is similar to the finding of Onyenweaku and Nwaru (2005) which stated that experience years are known to contribute positively to efficiency in any business. About 67% of the respondents obtained annual income of < #100,000, 30.5% obtained between #100, 000 and #150,000, among others. The mean annual income of the respondents was #98,310.00. This implies that, the majority of the respondents were poor because they had no access to credit facility. This is similar to report of Nwufo (2004) that without credit facility existing business may not expand.

Traditional/Modern Methods of Post-Harvest Management Technologies

The traditional post-harvest management technologies practiced by horticultural farmers in the study area were use of hot water for washing and cleaning (M= 3.14), use of hands for sorting and grading (M= 2.99), use of head (M= 2.83) and truck (M= 2.43) for transportation of produce, use of woven basket for packaging (M= 2.76) and hand picking for harvesting (M= 2.72), among others. This implies that the farmers were practicing what they know (traditional method) which is easy, accessible and affordable for them. This result agrees with that of Soyebo *et al*. (2005) who reported that, most horticultural farmers were poor and could not afford modern post-harvest management technologies.

Modern Postharvest Management Technologies

Modern post-harvest management technologies practiced by horticultural farmers in the study area were use of motor cycle (M=2.99) and motor car (M=2.07) for transportation of produce, use of chlorine solution for packing house operation (M=1.25), among others. The low use of modern post-harvest management technologies by farmers could be attributed to paucity of technical information on modern post-harvest management technologies among horticultural farmers in the study area. The result of the finding is not surprising since majority of the farmers relied on friends and relatives instead of extension agents as a source of information and advice.

Challenges faced by the Horticultural Farmers on Postharvest Management Technologies in Kogi State

There were three major challenges faced by horticultural farmers in controlling post-harvest losses of their produce namely: socio-economic challenges (Factor 1), environmental challenges (Factor 2) and infrastructural challenges (Factor 3). These findings have several implications as far as control of post-harvest losses of horticultural produce is concerned. Firstly, socio-economic challenges as low level of skilled labour, low level of education, lack of extension services and high cost of transportation may affect effective and efficient handling, processing, storage and transportation of harvested fruits and vegetables produce that are perishable in nature. Secondary, the environmental challenges such as high ambient temperature and high humidity can adversely influence deterioration of fruits and vegetables produce. According to Age (2015), increase in normal physiological changes can be caused by high ambient temperature, low atmospheric humidity and physical injury resulting from careless handling and processing of produce. Water loss in fruits and vegetables produce causes shrinkage and loss of weight. Finally, the infrastructural challenges such as lack of processing and storage facilities can greatly contribute to high rate of post- harvest losses of fruits and vegetables produce in Kogi State.

Table 1: Distribution of Respondents According to Socioeconomic Characteristics of Respondents

Variables	Frequency	Percentages	Mean Score
Sex	-	-	
Male	115	57.5	
Female	85	42.0	
Age (years)	-	-	-
21 – 40	39	9.5	**49.1**
41 – 60	153	76.5	
Above 60	8	4.0	
Marital Status	-	-	-
Single	3	1.5	
Married	135	67.5	
Divorced	28	14	
Widowed	21	10.5	
Separated	13	6.5	
Level of Education	-	-	-
Non-formal Education	125	62.5	
Primary Education	44	22	
Secondary Education	26	13	
Tertiary	5	2.5	
Household size (Number)	-	-	-
<1 – 5	7	3.5	
6 – 10	25.0	13.9	
11 – 15	74	37.0	
Above 15	69	34.5	
Occupation	-	-	-
Farming `	183	91.5	
Trading	9	4.5	
Civil Servant	7	3.5	
Teaching	1	0.5	
Farm size (hectares)	-	-	-
<1	29	14.5	**2.6**
1 – 2	5	28.5	
Above 3	114	57	
Farming Experience (year)	-	-	-
<5	1	5	
6 – 15	19	9.5	**27.2**
16 – 25	64	32.0	
Above 25	116	8.0	
Annual Farm Income (Naira)	-	-	-
≤100,000	133	66.5	
100,001 – 150000	61	30.5	**98,310.00**
150,001 – 200,000	5	2.5	
Above 200,000		10.5	
Member of Association	-	-	-
Member	633	1.5	
Non- Member	137	68.5	

Source: Field Survey (2011)

Table 2: Distribution of Respondents According to Traditional Post-Harvest Management Technologies

Management practices	Methods	Minimum	Maximum	Mena	Std. Deviation
Harvesting	Use knife	1	1	1.0	0.000
Hand picking		1	3	2.72	0.461
Packing house operation	Dumping	1	3	2.26	0.454
Sorting	Use of hand	1	3	2.99	0.158
Grading	Use of hand	1	3	2.99	0.141
Washing and cleaning	Use of cold water	1	2	1.16	0.368
	Use of hot water	1	3	3.14	0.2127
Package containers	Sack	1	2	2.00	0.071
	Woven basket	1	3	2.76	0.652
	Bags	1	3	1.23	0.640
Storage	Sun-drying	1	3	2.60	0.695
	Keep under shade	1	3	2.15	0.376
Transportation	Head load	1	3	2.83	0.390
	Truck	1	3	2.43	0.506
	Use of animal	1	1	1.0	0.000
Post-harvest treatment	Use of hot water	1	2	1.16	0.368

Source: Field survey (2017)

Table 3 Distribution of Respondents According to Modern Postharvest Management Technologies

Management Practices	Method	Minimum	Maximum	Mean	Std.Deviation
Harvesting	Harvester	1	1	1.00	0.000
Packing house operation	use of chlorine	1	2	1.25	0.432
Sorting	Automatic sorting	1	1	1.00	0.000
Grading	Automatic grading	1	1	1.00	0.000
Washing and cleaning	Chlorine solution	1	1	1.00	0.000
Package container	Plastic crate	1	1	1.00	0.000
Storage	Refrigerator	1	1	1.00	0.000
Transportation	Motor car	1	3	2.07	0.282
	Motor cycle	1	3	2.99	0.141
	Train	1	1	1.00	0.000
Postharvest treatment	Use of chemical	1	2	1.11	0.314

Source: Field survey (2017)

Test for hypothesis

Ordered Logistic Regression Estimates Showing Relationship between Socio-economic Characteristics of Farmers and their Level of Use of Modern Postharvest Management Technologies in the Study Area

The model fitting χ^2 value of 253.683 was significant ($p < 0.01$). This implies that the socio-economic factors included in the model are significantly related to the level of use of modern postharvest management technologies. Hence, the null hypothesis that socio-economic characteristics of farmers are not significantly related to the level of use of modern postharvest management technologies was rejected. This means that the farmers' socio-economic factors significantly determined their level of use of modern postharvest management technologies. Specifically, the result showed that age of farmer, annual income, farm size and farming experience were the most determinant factors of level

of use of modern postharvest management technologies in the study area. Evidence from the model as contained in table (3) showed that the set of significant explanatory variables varies across the categories in terms of the levels of significance and signs. The positive signs suggest that an increase in the variable is associated with higher category (in this case, high level of use (3), while a negative and significant parameter means that the independent variable is associated with lower category (in this case, low level of use (1). The result showed that age (0.074) of farmer was found to have positive and statistically significant relationship with level of use of modern postharvest management technologies at 10% level. This implies that older farmers more likely to have high level of use of modern postharvest management technologies than the younger farmers. The coefficient of annual income (3.3E-5) had a direct and significant relationship with level of use of modern postharvest management technologies in the study area suggesting that this variable favors' the higher category of the level of use of modern postharvest management technologies (i.e., high use category). This implies that farming households having more income more likely to have a high use of modern postharvest management technologies. If households have more income, they will probably invest more in modern postharvest management technologies. Similarly, the coefficient of major occupation (2.045) had a direct and significant relationship with level of use of modern postharvest management technologies in the study area suggesting that other occupation apart from farming made farmers to favor higher category of the level of use of modern postharvest management technologies (i.e., high use category).On the other hand, farm size (-1.228) had a negative and significant relationship with level of use of modern postharvest management technologies. This implies that farmers with larger farm sizes tended to use low level of modern postharvest management technologies. This could be a situation where technologies are adopted on smaller piece of land to test them. A similar result was obtained for farming experience (-0.056). This agrees with the findings of Babalola et.al (2010) who reported that the larger the area of land put under cultivation the more quantity harvested and the chances of losses due to poor handling and lack of proper storage.

Conclusion and Recommendations

Evidence from the study indicated that majority of the respondents were still within their middle age as well as their active and productive years. had low level of formal education which made them to stick to their traditional method of farming. were poor because they had no access to credit facility. Result equally revealed that there were three major challenges faced by horticultural farmers in controlling post-harvest losses of their produce namely: socio-economic challenges, environmental challenges and infrastructural challenges., the following recommendations are hereby made.

1. Gender disparities should be avoided to enable both male and female farmers have access to farm inputs.
2. Farmers should organize themselves into co-operatives societies in order to have financial assistance from financial institution and from government.
3. Agricultural extension education should be encouraged among rural farmers to enable them know the value of education through extension agents.

4. Agricultural extension workers should regularly organise on -field training for farmers with a view to improving their skills and knowledge on how to handle, process, store and package their produce in such a way that may prevent spoilage during transportation
5. International investors and non-governmental organisations as well as private sector can establish agro-based industries for processing and packaging of fruit and vegetables produce in Kogi State.

Table 4: Factor Analysis of Challenges Faced by the Horticultural Farmers on Post-harvest Management

S/N	Variables	Factor 1	Factor 2	Factor 3
	Inadequate storage facilities (ISF)	0.007	-0.064	0.685***
	Low level of skilled labour (LLSL)	0.362*	0.882E02	-0.027
	Low income/capital (LI/C)	0.733*	0.007	0.003
	Low level of awareness (LLA)	0.915*	0.359E02	-0.011
	Poor access to credit facilities (PACF)	0.733*	0.077	0.175
	Lack of extension services (LES)	0.363*	0.875E03	-0.022
	Low level of education (LLE)	0.887*	-0.243	-0.095
	Poor transportation system (PTS)	0.082	-0.063	0.697***
	Poor packaging facilities (PPF)	0.079	0.224	0.608***
	High cost of transportation (HCT)	0.817*	-0.356E02	0.323E02
	High cost of labour (HCL)	0.909*	0.373E02	0.122
	High temperature (HAT)	-0.013	-0.982**	0.106
	Strong wind (SW)	0.902E02	0.365**	0.118
	Low humidity (LH)	-0.223	0.841**	0.016
	High altitude (HA)	-0.006	0.0018	0.051

Source: Field survey (2018)
Method: Varimax with Kaiser Normalisation (0.30 or above)
*** Factor 1: socio-economic challenges**
**** Factor 2: Environmental challenges**
***** Factor 3: Infrastructural challenges**

Table 5 Ordered Logistic Regression Estimates Showing Relationship between Socio-economic Characteristics of Farmers and their Level of Use of Modern Postharvest Management Technologies in the Study Area

Variables		Estimate	Std. Error	Wald	Df	Sig.
	[Level_use_MPHT = 1]	1.112	1.617	.473	1	.492
Threshold	[Level_use_MPHT = 2]	1.745	1.620	1.159	1	.282
	Age	.074***	.041	3.184	1	.074
	Education	-.121	.248	.239	1	.625
	Annual Income	3.325E-005*	9.714E-006	11.714	1	.001
	Farm size	-1.228*	.369	11.051	1	.001
	House hold sizes	-.055	.054	1.044	1	.307
Location	Farming experience	-.056***	.033	2.801	1	.094
	Awareness of mpmp	-.485	.401	1.464	1	.226
	[Sex = 0, 1]	-.167	.411	.166	1	.684
	[Major occupation = 0, 1]	2.045*	.579	12.464	1	.000
	[Marital status = 0, 1]	-.307	.412	.554	1	.457
	[membership of association = 0, 1]	-.571	.380	2.263	1	.132

Source: Field survey (2017)

References

Achegbulu, J. O. and Ujah, J.S. (2006). Implication of Rural-Usrban Migration on the SocioEconomic and Political Development of Rural Areas in Nigeria." Presented at the National Conference Organized Under the Auspices of Green Earth Resources Network International.September12-16, Nasarawa state University, keffi, Nigeria.

Age A.I. (2015). Agricultural Extension Policy; contemporary cum topical issues. Keney printing press, Makurdi Benue State Nigeria.pp149-152

Alazar, A., (2007). Horticultural Marketing in Ethiopia. M.Sc. Thesis. Haramaya University, Haramaya.

Ani, D.P. (2010). Productive Efficiency of Benue Farmers using food legume as soil fertility restoration agent. University of agriculture Makurdi pp.67

Babalola DA, Makinde Y.O., Omonona B.T., Oyekanmi M.O. (2010). Determinants of postharvest losses in tomato production: A case study of Imeko – Afon local government area of Ogun state. J. Life. Phy. Sci. 3(2):14-18.

Carrasco G, Urrestarazu M. 2010. Green chemistry in protected horticulture: the use of peroxyacetic acid as a sustainable strategy. Int. J. Mol. Sci. 11, 1999–2009 (doi:10.3390/ijms11051999) [PMC free article] [PubMed]

Choudhury, M.L., (2006). Recent developments in reducing postharvest losses in the Asia–Pacific Region. In: Rolle, R.S. (ed.), Postharvest Management of Fruit and Vegetables in the Asia- Pacific Region. Asian Productivity Organization, and Food and Agriculture Organization of the United Nations, Tokyo, p. 312.

El-Ramadi, H.R., Domokos-Szabolcsy, E., Abdalla, N.A., Taha, H.S., and Fari, M., (2015). Post Harvest Management of Fruits and Vegetables Storage. Pp.65-152.https://doi.org/10.1007/978-3-319-09132-7_2

FAO (2009). *Course on agribusiness management for producers' associations*. Module 4 – Post-harvest and marketing. Santacoloma P, Roettger A, Tartanac F (eds) Training materials for agricultural management, marketing and finance, vol. 8. Food and Agriculture Organization of the United Nations, Rome approach to sustainable agriculture. Agriculture, Ecosystems, and Environment. 46 147-160.

Hailu, G. (2015) Extent, Causes and Reduction Strategies of Postharvest Losses of Fresh Fruits and Vegetables – A Review, *Journal of Biology, Agriculture and Healthcare* www.iiste.org ISSN 2224-3208 (Paper) ISSN 2225-093X (Online) Vol.5, No.5,

Hassan, M.D.K., Lal Das Chowdhury, B. and Akhter, N. (2010), Post Harvest Loss Assessment: A Study to Formulate Policy for Loss Reduction of Fruits and Vegetables and Socioeconomic Uplift of the Stakeholders. Final Report PR #8/08. 118-126p

Kogi State Agricultural Development Project (KGADP) (2011). Impact of Fadama Development Project 11 on Rice farmer's Profitability in Kogi State Nigeria, *Journal of Agricultural Extension* Vol, 15 No.1

Nandi, B.K. and Bhattacharjee, L. (2005), *Why Fruits and vegetables? Their contribution to improving nutrition in*

developing countries. Paper presented at the FAO Sub Regional Workshop on Quality and Safety of Fresh Fruits and Vegetables (28 February to 4 March 2005).

National Population Commission (NPC) (2006). Nigeria National Census: Population Distribution by Sex, State, LGAS and Senatorial District; 2006 Census, Priority table Vol. 3.

Nwofor, A.M.E. (2004), Cancer of the Prostate: Experience at Nnewi, Southeast, Nigeria. *Nigeria Journal of Clinical Practice* vol.7 No.2

Obinne C.P.O. (1991) Adoption of Improved Cassava Production Technologies by Small-scale Farmers in Bendel State. *Journal of Agriculture*, Science and Technology.

Onyenweaku, C.E and J.C. Nwaru (2005). "Application of a Stochastic Frontier Production Function to the Measurement of Technical Efficiency in Food Crop Production in Imo State, Nigeria", *Nigeria Agricultural Journal* 36; pp1-12.

Robert Aidoo, Rita A. Danfoku and James Osei Mensah. (2014). Determinants of Postharvest Losses in Tomato Production in the Offinso North district of Ghana, *Journal of Development and Agricultural Economics* Vol. 6(8), pp. 338-344. DOI: 10.5897/JDAE2013.0545

Soyebo K.O. Farinde A.J, and Dionco-Adetayo E.D (2005) Constraints of oil Palm Production in Ife Central Local Area of Osun State, Nigeria, *Journal of Social Sciences* 10(1):55-59 DOI: 10.1080/09718923.2005.11892460Wargovich, M.J. (2000), Anticancer properties of fruits and vegetables. Hort Science, 35:573 575.

Tanyanyiwa, V. I. and Chikwanha, M. (2011). 'The role of indigenous knowledge systems in the management of forest resources in Mugabe area, Masvingo, Zimbabwe', *Journal of Sustainable Development in Africa* 3(3)