Utilization of Technology in Good Agricultural Practices (GAP) among Fruit and Vegetable Farmers in Osun State Nigeria

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ABSTRACT: *The study focused on utilization of technologies in Good Agricultural Practices (GAP) among fruit and vegetable farmers in Osun State. A structured interview schedule was administered to a total of 270 respondents using multi stage sampling technique. The GAP technologies identified on the utilization increasing ranking order include: timely harvest of fruits and vegetables (WMS=3.00), looking for varieties which are pest and disease resistant (WMS=2.97) and do not use empty fertilizer bags for carrying fruits and vegetables (WMS=2.93) ranked third. The least GAP utilized was avoiding use of refuse dumping site for cropping (WMS=0.43) which ranked last. The major constraints faced by the fruit and vegetable farmers in the area were high cost of cropping technologies (WMS=1.88), lack of credit facilities (WMS=1.81), and inadequate training for GAP (WMS=1.61). Pearson analysis shows that there is significant relationship between selected socio-economic characteristics such as academic qualification ($r=0.541$, $p=0.022$) and the utilization level of technologies in GAP. The study recommended adequate training on GAP technologies should be provided by extension agency.*

Keywords: *Technology, Agricultural Technology, Good Agricultural Practices, Fruits, Vegetables, Fruits and Vegetable Farmers*

Introduction

Agriculture serves as a valuable source of income, it makes a significant contribution in the quest for poverty reduction and represents the main source of livelihood for 1.4 billion smallholder farmers and their families who produce nearly 70% of all food consumed worldwide (Food and Agricultural Organization FAO, 2010; Lowder *et al.* 2014; Onyekwelu *et al.* 2015). Worldwide, there are approximately 2.5 billion people involved in full-or part-time smallholder agriculture, managing an estimated 500 million small farms (International Fund for Agricultural Development IFAD, 2013). The agriculture sector is also the mainstay of the economies of most of the developing world. Furthermore in Sub-Saharan Africa an estimated 75% of resource-poor people rely on agriculture for their livelihoods, the sector employs about 60% of the workforce and contributes an average of 30% to Gross Domestic Product (GDP) (Chowa *et al.* 2013). It is

estimated that nearly 70% of the people in developing countries live in rural areas where agriculture is the main source of livelihood, and there are some 36million smallholder farmers across the continent of Africa (Kalungu *et al.* 2013; Wright *et al.* 2014).

In Nigeria, agriculture contributes about 42% to the GDP, employs 70% of the active population (Osebeyo and Aye 2014). Smallholder farmers are the backbone of agricultural production in Nigeria with over 90% of the agricultural output is derived from resource-poor farming, carried out by smallholder farmers (< 3hectres) who have been the principal source of the national food supply for many decades (Adedipe *et al* 2004). When considering food supply, fruits and vegetables occupy a pivotal role in nutrition requirements of human life.

Fruits and vegetables are considered in dietary guidance because of their high concentrations of dietary fiber, vitamins, minerals, especially electrolytes; and more recently phytochemicals, especially antioxidants (Slavin and Lloyd, 2012). Despite an increasing focus on the health benefits of fruits and vegetables, their consumption is below the recommended intake among adults (Schneider *et al*, 2007). Therefore, considering how nutritional related health problems have risen drastically globally, it seems critical that formal nutrition education aiming to increase knowledge of fruits and vegetables intake be given priority in health education programs and health promotion. Production of healthy fruits and vegetables requires certain agricultural practices otherwise termed as Good Agricultural Practices.

Good Agricultural Practices (GAPs) are collection of practices for on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products while taking into account economic, social and environmental sustainability (Food and Agricultural Organization FAO 2010; Lefebvre *et al.* 2015). GAPs cover a range of areas including maintaining soil fertility, water resource and irrigation management, cropland management, degraded land restoration, animal production and welfare, integrated pest management, integrated fertilizer management and conservation agriculture (Montagn *et al.* 2007). GAPs explicitly aim to increase the supply of safe and high-quality food by promoting more sustainable crop production (Ali, 2014) while also helping to improve market access and farmers' livelihoods (FAO, 2010). Although GAPs have the potential to play a significant role in improving agricultural practices, there is currently limited empirical evidence on the level of awareness and implementation of GAPs. Therefore, the paper examined utilization of technologies in good agricultural practices (gap) among fruit and vegetable farmers in Osun state, Nigeria. Specifically, it described the socio-economic characteristics of fruit and vegetable farmers, identified the technologies of GAP utilized by the fruit and vegetable farmers, and examined the constraints experienced by fruit and vegetable farmers towards utilizing GAPs technologies.

METHODOLOGY

The study area is Osun State, Nigeria. Osun is an inland state in south-western Nigeria. Its capital is Osogbo. It is bounded in the north by Kwara State, in the east partly by Ekiti State and partly by Ondo State, in the south by Ogun State and in the west by Oyo State. Agriculture in the State of Osun is predominantly rain-fed with small-scale irrigation limited to Fadama farming. It is dominated by the peasantry and aged people cultivating less than one hectare. Agriculture employs over 70% of the labour force in the state (Osun State Government, 2018). The State was divided into three agro-ecological zones namely Iwo, Osogbo and Ife/Ijesa under the Osun State Agricultural Development Programme (OSSADEP). The list of registered fruit and vegetable farmers was obtained from Agricultural Development Programme (ADP) and All Farmers Association of Nigeria (AFAN) in Olorunda Local Government Area of Osun State. A multistage sampling technique was used to select 270 respondents from the study area.

The study contains both independent and dependent variables. The dependent variable of the study is the utilization of technologies in Good Agricultural Practices among fruit and vegetable farmers. This was measured by asking the respondents to list out the technologies involved in Good Agricultural Practices, and the frequency of utilizing each technology was scored on 4 points rating scale of: Always utilized = 3, occasionally utilized = 2, utilized before but discontinued = 1, not utilized = 0.

Socioeconomic Characteristics of the Respondents

Data presented in Table 1 shows that the mean age of respondents was 60 years. It was also revealed that most of the respondents (61.1%) were married, 47.8% of the respondents were Muslims, and 68.8% of the respondents were males while 32.2% were females. This implies that both males and females were involved in utilizing technologies in Good Agricultural Practices. Also, the mean years spent in schooling was 7 years. This implies that respondents had one form of education or the other which will assist them to understand the needs to utilize technologies in Good Agricultural Practices. Also, on the basis of primary occupation, 55.6% of the respondents were farmers, 8.9% were civil servants. The mean household size being 9 persons, the mean annual income from vegetable and fruits production was ₦ 695,078.00. This means that respondents earned considerable amount above poverty line from fruits and vegetable production.

Table 1: Distribution of respondents according to their socio-economic characteristics
n= 270

Socio-economic characteristics	frequency	percentage	mean
Age(Years)			
≤30	9	3.3	60
31-40	27	10.0	
41-50	30	11.1	
51-60	60	22.2	
61 and above	144	53.4	
Marital status			
Single	12	4.4	
Married	165	61.1	
Separated	30	11.1	
Divorced	-	-	
Widow	63	23.4	
Religion			
Islam	129	47.8	
Christianity	114	42.2	
Traditional	27	10.0	
Gender			
Male	183	167.8	
Female	87	32.2	
Academic qualification (years spent in formal schooling)			
No formal education	105	38.9	7
≤6 years	72	26.7	
7-12 years	51	18.9	
13 years and above	42	15.6	
Primary occupation			
Farming	150	55.6	
Civil servant	24	8.9	
Trading	45	16.7	
Transport services	36	13.2	
Others	15	5.6	
Household size (persons)			
≤5	69	25.5	9
6-10	141	52.3	
11 and above	60	22.2

Annual income from fruits and vegetable production (Naira)

≤300,000	6	2.2	
301,000-600,000	105	38.9	695,078.00
601,000 and above	159	58.9	

Source: Field Survey, 2019.

Utilization of technologies in Good Agricultural Practices (GAP) by the respondents

Table 2 shows the distribution of respondents according to the utilization of technologies in Good Agricultural Practices (GAP). The technologies identified in their increasing ranking order include: timely harvest (WMS=3.00), looking for varieties which are pest and disease resistant (WMS=2.97) and do not use empty fertilizer bags for carrying vegetables (WMS=2.93) ranked third. The least GAP utilized was avoiding use of refuse dumping site for cropping (WMS=0.43) which ranked last. The findings imply that respondents utilized Good Agricultural Practices (GAP) technologies at different levels. Usage could be attributed to several factors such educational, cultural and economic realities. Utilization of GAP could lead to the production of safe and healthy fruits and vegetables which may command high price from selected markets such as supermarkets thereby boosting the income level of farmers.

Table 2: Distribution of respondents according to their utilization level of technologies in GAP

GAP Technologies*	Always utilized	Occasionally utilized	Utilized but discontinued	Not utilized	WMS	Rank
Soil Management						
Cropping System (mixed cropping)	129 (47.8)	60(22.2)	45 (16.7)	36 (13.3)	2.04	12th
Soil testing (indigenous)	30 (11.1)	12(4.4)	9 (3.3)	219(81.1)	0.46	18th
Soil testing (modern)	42 (15.6)	12(4.4)	15 (5.6)	201(74.4)	0.61	17th
Avoid use of refuse dumping site for cropping	21(7.8)	9 (3.3)	36(13.3)	204(75.6)	0.43	19th
Liming acid soil	48(17.8)	30 (11.1)	-	192(71.1)	0.76	15th
Application of sulphur to alkaline soil	48 (17.8)	30 (11.1)	-	192 (71.1)	0.76	15th
Plant/ Seed identification						
Purchasing seed from tested seller	258 (95.6)	3 (1.1)	-	9(3.3)	2.89	6th
Use optimal chemicals for seed preservation	225 (83.3)	9 (3.3)	-	36 (13.3)	2.57	10th

Look for varieties which are pest and disease resistant	261 (96.7)	9 (3.3)	-		2.97	2nd
Keep seed in sealed container	246 (91.1)	9 (3.3)	-	15 (5.6)	2.8	9th
Food Safety						
Non infected animals faeces used as manure for crops	72 (26.7)	21 (7.8)		174 (64.4)	0.97	14th
Timely harvest of crops	270 (100)	-	-	-	3.0	1st
Use of adequate quantity of organic fertilizer	255 (94.4)	3 (1.1)	-	12 (4.4)	2.86	5th
Record keeping	150 (55.6)	57 (21.1)	27 (10.0)	36 (13.3)	2.19	11th
Fertilizer use						
Apply the required level of fertilizer at the right time	252 (93.3)	3 (1.1)	-	15(5.6)	2.81	8th
Use Organic fertilizer and well composted manure	267 (98.9)	-	-	3(1.1)	2.97	2nd
Keep fertilizer in dry, clean and sheltered place	255 (94.4)	3(1.1)	-	12(4.4)	2.86	5th
Do not use empty fertilizer bags for carrying vegetables	264 (97.8)	-	-	6 (2.2)	2.93	4 th
Pesticide Use						
Only purchase and use registered pesticides	231 (81.1)	3 (3.3)	-	42(15.6)	2.5	10th
Do not apply pesticides during heavy rain	141 (52.2)	12 (4.4)	-	117(43.3)	1.66	13th
Adhere to the withholding period on the pesticide label	237(87.8)	3 (3.3)	-	24 (8.9)	2.7	9 th
Hold pesticides in original container	86(95.6)	3 (1.1)	-	9 (3.3)	2.89	6 th
Do not re-use pesticides container for other usage	264 (97.8)	-	-	6 (2.2)	2.93	4th

WMS = Weighted Mean Score

Source: Field Survey, 2019

* Multiple response

Constraints experienced by respondents towards utilization level of technologies in Good Agricultural Practices (GAP)

Table 3 shows the constraints experienced by the respondents towards utilization of technologies in Good Agricultural Practices. In the rank order of severity of the problems, high cost of cropping technologies was ranked first with weighted mean score (WMS) of 1.88. This was

closely followed by lack of credit facilities (WMS=1.81) which ranked second, training needed (WMS=1.61) which ranked third, lack of awareness about technologies (WMS=1.48) which ranked fourth, poor understanding of Good Agricultural Practices (WMS=1.29) which ranked fifth and farm input availability (WMS=1.03) which ranked sixth. This means that respondents were facing enormous constraints in the utilization of GAP technologies in the study area which could adversely affect quality of fruits and vegetables produced.

Table 3: Distribution of respondents according to the constraints experienced towards technologies in GAP

Constraints*	Serious	Mild	Not a constraint	WMS	Rank
Poor understanding of GAP	105 (38.9)	138 (51.1)	27(10.0)	1.29	5 th
Farm input availability	69 (25.6)	141 (52.2)	60 (22.2)	1.03	6 th
Training needed	168 (62.2)	99 (36.7)	3 (1.1)	1.61	3 rd
Lack of awareness about technologies	141 (52.2)	117 (43.3)	12 (4.4)	1.48	4 th
Lack of credit facilities	225 (83.3)	39 (14.4)	6 (2.2)	1.81	2 nd
High cost of cropping technologies	246 (91.1)	15 (5.6)	9 (3.3)	1.88	1 st

WMS = Weighted Mean Score

Source: Field Survey, 2019

* Multiple response

Pearson product correlation analysis of the relationship between selected socio-economic characteristics of the respondents and the utilization level of GAP technologies

Data presented in Table 4 shows that only one of the selected socio-economic characteristics was significant which was academic qualification of the respondents ($r=0.541^*$, $p=0.022$) with the utilization level of technologies in GAP. This means that as respondents added more to their education qualification, there level of utilization of GAP technologies tends to increase. Respondents would have gathered more skills and knowledge during training at various education levels which may be beneficial in the utilization of GAP technologies.

Table 4: Pearson product correlation analysis of the relationship between selected socio-economic characteristics of the respondents and the utilization level of GAP technologies

Socio-Economic Characteristics	r (correlation coefficient)	P-value	Remark
Age	-0.100	0.346	Insignificant
Education qualification	0.541 *	0.022	Significant
Household size	-0.105	0.325	Insignificant
Annual income	0.160	0.133	Insignificant

Source: Field Survey, 2019

***Correlation is significant at the 0.05 level (2-tailed)**

Conclusion and Recommendations

The study concluded that Fruit and vegetable farmers were aware and utilized the following GAP technologies: good cropping system, varieties that were pest and diseases resistant, and avoiding the use of used fertilizer bags for harvested vegetables and fruits while the constraints towards utilization of GAP technology were high cost of cropping technologies, lack of credit facilities, inadequate training and lack of awareness about technologies. Hence, the study recommended that government should subsidize inputs used by fruit and vegetable farmers to enable them explore GAP technologies for safe and nutritive food in the country. Also, adequate training on GAP technologies should be provided by extension agency.

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