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Differentials in Level of Awareness and Adoption of Good Agronomic Practices (GAP) among Smallholder Cassava Farmers in Okigwe Agricultural Zone, Imo State, Nigeria

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Abstract
Good Agronomic Practices (GAP) is a technological concept for adoption in Nigeria. The study assessed the level of awareness and adoption of Good Agronomic Practices (GAP) among smallholder cassava farmers in Okigwe Agricultural zone of Imo State, Nigeria. Using stratified random sampling techniques, 60 farmers were chosen for the study. The data collected was analyzed using descriptive and inferential statistics. The results revealed that the level of awareness of GAPs technologies was high (85%), but adoption by the respondents was moderate in the study area which could be one of the reasons for poor agricultural productivity, income and livelihood of the respondents. The findings also revealed that, NRCRI, extension agents and training had a significant effect on the awareness of GAP technologies in the study area. It was found that a greater proportion (80%) of the farmers indicated that the presence of NRCRI, Umudike, had a positive impact and provides them with new skills and information**.** The respondents ranked financial constraints, lack of farm inputs, high cost of farm inputs, poverty, poor access to improved technologies, poor market prices, low production and dissemination system as the major challenges of adoption of GAP in the study area. The study thus recommended that the Federal Ministry of Agriculture should provide more funds for research institutions and the State ADPs in order to intensify their efforts towards creating more awareness of the GAP system among rural farmers. It also recommends collaboration between state government and private sectors, this collaboration will help to provide low cost of farm inputs and credit facilities to farming communities for more rapid adoption and sustainability and also to make better informed decisions which will encourage implementation of the GAP system.

Keywords: Good Agronomic Practices, Awareness, Adoption

Introduction

Good Agronomic Practices (GAPs) entail the collection of principles for on-farm production and post-production processes, aimed at delivering in safe and healthy food and non-food agricultural products, while taking into account economic, social and environmental sustainability (FAO, 2010; Lefebvre *et al*., 2015; Sennuga, 2019). GAPs cover a range of areas including maintaining soil fertility, water resource and irrigation management, crop land management, degraded land restoration, animal production and welfare, integrated pest management, integrated fertilizer management and conservation agriculture (FAO, 2010; Montagne *et al*., 2017). GAPs explicitly aim to increase the supply of safe and high-quality food by promoting more sustainable crop production (Sennuga, 2019), while also helping to improve market access and farmers' livelihoods (Poole and Lynch, 2013). 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. GAPs were introduced and implemented by the FAO in many agricultural producing countries across the globe in order to guide the production systems towards an ecologically safe and sustainable agriculture, which produces harmless products of higher quality, contributes effectively to food security, generating income through access to markets and upsurge on the working conditions of farming families (FAO, 2010).

The awareness of GAPs is relatively low in rural Nigeria due to dependence on traditional farming which results in low productivity among smallholder farmers (Oladele and Adekoya, 2006). Evidence from studies conducted among smallholder producers indicates limited adoption of improved technologies (Omonona *et al*., 2016, Oyewole and Sennuga, 2020, Sennuga and Fadiji, 2020). However, for maximum benefit, it is imperative to couple adoption of GAP innovations with an accompanying market uptake pathway for sustainable agricultural development and food security

(Kassie *et al*., 2010; Sennuga *et al*., 2020). As a result, it is evident that the adoption of market-driven GAPs, agricultural production technologies coupled with natural resource management practices is essential for enhancing agricultural productivity in rural Nigeria.

Cassava (*Manihot esculenta*), which has its origin from Latin America (Agwu *et al*., 2015) has gained global attention as an important root crop in Africa with Nigeria producing the highest quantity (54mt annually) globally (FAO, 2013). Its roots are good sources of ethanol Agwu *et al*. (2015). Global production of cassava was about 291mt in 2017, out of which Africa produces 60.82% (177mt) with Nigeria taking the global lead of 59mt (FAO, 2019). Cassava is a staple crop of choice across cultures and social divides in Nigerian households. It is the most important crop by production, and the second most important by consumption (FAO, 2014). The collaboration between IITA Ibadan, NRCRI Umudike and other partners had led to the development of improved cassava varieties, which are disease and pest resistant, low cyanide content, drought resistant, early maturing and high yielding. These improved cassava varieties and recommended practices were disseminated to farmers. Therefore, this study aims to assess the level of awareness and adoption of good agronomic practices (Gap) among smallholder cassava farmers in Okigwe Agricultural Zone of Imo State, Nigeria.

Methodology

The study was carried out in Okigwe Agricultural zone of Imo State, Nigeria. Okigwe Agricultural Zone comprise of six (6) Local Government Areas (LGAs) namely; Okigwe, Onuimo, Isiala Mbano, Ehime Mbano, Ihitte Uboma and Obowo. A multi-stage purposive and stratified random sampling procedure was used for the selection of the study area. The First stage was the selection of Okigwe Agricultural Zone from the three (3) Agricultural zones in Imo State. The Second stage involves the selection of two (2) LGAs from the six (6) LGAs in the study area namely; Ehime Mbano and Ihitte Uboma LGAs. The third stage comprises the selection of one (1) community each from the two (2) LGAs (Umualumaku in Ehime Mbano and Umuezegwu in Ihitte Uboma). The last stage was the selection of Sixty (60) respondents from the two (2) communities in the ratio of 30 farmers per community. A well-structured questionnaire was used to elicit information from the respondents in the study area. The choice of the study areas was due to the presence of NRCRI trials and interventions in the communities.

Data Analysis

Simple descriptive statistics (mean, frequency, percentages) was used to analyze the demographic characteristics of respondents, sources of information for GAPs and the prevailing problems confronting the implementation of GAPs by the respondents.4-point and 5-point methods were used to analyze the respondent's level of awareness of GAPs, and level of implementation of GAPs. The statistical package SPSS version 24 was employed for the analysis of the data.

Results and Discussion

Demographic characteristics of the Farmers

Table 1 shows the frequency distribution of respondents according to sex, age, marital status, household size, education, farming experience, source of capital, and farm size. The results show that 20% of the respondents were male, while 80% were female. This implies that females are fully involved in cassava production more than their male counterparts in the study area. This might be attributed to increased advocacy for women involvement in agriculture. The results indicates that 53.4% of the farmers who form the majority in the study area were within the age range of 20 -40 years, 25% between 41-50 years, also 21.6% were aged 51 years and above. This implies that the majority of farmers are still strong and active. The younger farmers are likely to be more active in farming, and also more receptive to innovations in cassava production than their aged counterparts. (Omoregbee and Banmeke 2014). The result further shows that the majority of the farmers (71.7%) were married, 10% single, and (18.3%) widowed, indicating that married people dominated in agricultural activities in the study area and more reasonable decisions are expected to be made by these farmers. Almost half (48.3%) of the respondents has a household size between 6-10 members, 23.4% less than 5, 21.7% from 11-15, while 6.6% have 16 persons and above. This indicates the prevalence of abundant labour for cassava production in the study area. In terms of education, more than half of the respondents (58.3%) attained secondary, primary (23.3%), post-secondary (13.3%), while 5% had no educational qualification. Educated farmers are expected to be more receptive to improved farming techniques (Okoye *et al*., 2004). Only 16.7% had between 1-10 years of farming experience, while 41.6% between 11-20 years, 30% (21-30) years, and 11.7% above 31 years of farming experience. Experienced people are believed to have learned through several years of trials and errors in the agricultural sector. The result also indicates that the majority (53.4%) of the respondents utilized both household and hired labour in their farming activities, 33.3% used only household labour, while only 13.3% utilized hired labour. About 60% of the respondents are members of cooperatives societies while (40%) do not belong to any cooperative society.

Awareness of Good Agronomic Practices (GAPs)

Table 2 shows the distribution of respondents according to their level of awareness of Good Agronomic Practices (GAPs) in crop land management, Water Management, Restoration, Integrated pest management, Cassava Seeds and variety selection, and Soil fertility Management. The data indicates that 68.5% of the farmers are aware of Crop land management practices, while 63.7% indicated that they were aware of the use of irrigation and 28.4% highly aware. About 42.4% and 32.6% of the respondents indicated that they were not aware of bunds and terracing practices respectively, and only 10.5% highly aware of terracing. By implication,

this shows that farmers in the study area are aware of water management practices. Results also reveal that the respondents were aware of the use of pesticide (56.9%), tilling (54.3%), resistant varieties (60%) and planting date (55%), while 19.5% were not aware of plot selection layout. The result for seeds and variety selection; 86.6%and 74.7% were highly aware of local varieties and the use of manure respectively, 60.5% and 53% were aware of seed cuttings and improved varieties in that order, 38.4% are remotely aware of seed requirement, while 15.4% are unaware of sowing facility. Also, the level of respondents' awareness of weeding, fertilizer application and mixed cropping were relatively high at 100%, 98% and 86.1% respectively. A little above half of the respondents (59.7% and 54.5%) in the study area indicated they were aware of intercropping and cover cropping practices respectively, with only 8.2% were not aware of sole cropping practices.

Sources of information for Good Agronomic Practices (GAPs) in the study area

Majority of the respondents considered National Root crops Research Institute (NRCRI) Umudike, Extension agents from Agricultural Development Programme (ADP) and trainings as their major sources of information on a range of GAPs like Soil management (55%), seed selection (46%) and crop management (39%) respondents mentioned NRCRI as their major source of information, while mobile phones, Agro dealers, and newspapers were the least source of information. About 35% of the respondents mentioned extension agents as their main source of information for water management. Although to a lesser extent, fellow farmers was also noted by the respondents as an important source of information for crop management (18%) and seed selection (20%), followed by radio (Figure 3). Very few respondents reflected other sources of information such as television, newspapers, mobile phones and agro dealers to be less important sources of information. The findings revealed that the majority of the respondents considered NRCRI to be their most reliable and dependable source of accurate information due to access, relationship and proximity to the institute which has given them enlightenment about better farming practices, access, knowledge about improved technologies and improvement in their income and livelihood within the community.

Good Agricultural Practices among Smallholder farmers

The result in Table 3 shows the distribution of the respondents according to their level of Good Agronomic Practices in the study area. A significant proportion (45%) of the respondents indicated a moderate level of practice, 18% high and 21.7% low implementation or practice of crop land management practices in the study area. About 52% of the respondents specified low level of appropriate water management on their farm land, while 25.6% indicated zero water management. Similarly, a significant proportion of the respondents (45.7%) indicated moderate levels of land restoration, while 30% specified high levels of practice. Result also shows that respondents in the study area indicated the practice of integrated pest management as low (25.4%), zero level of practice (40.5%) and moderate level of practice (23.3%) among the respondents. The result also reveals that respondents indicated moderate and high levels of practice of seed and variety selection, and soil fertility management at 34.9%, 27%, 23% and 33.3% respectively, while very high levels at 13.3% and 20.2% in the study area.

Factors affecting practices/implementation of Good Agronomic Practices (GAPs)

Table 5 shows the factors affecting the practices/implementation of Good Agronomic Practices (GAPs) in the study area. The result reveals that 85% of the respondents indicated inadequate capital as the major challenge they are facing, followed by high cost of farm tools, lack of fertilizer and poverty at 81.4%, 78.5% and 72.3% respectively. Similarly, 72.3% and 70.3% of the respondents noted poor access to improved technologies and poor market prices as another prevailing problem confronting them in practicing GAPs in that mercy. Furthermore, 28.8%, 30.1% and 44.2% of the respondents indicated poor storage facilities, lack of infrastructure and technical know-how respectively, as their minor challenges facing the implementation of GAPs in the study area.

Conclusion

The study examined the level of awareness and adoption of good agronomic practices (GAPs) among smallholder cassava farmers in Okigwe Agricultural Zone, Imo State, Nigeria. The results of the study show that the respondents were married, strong and active, educated, experienced, with moderate household sizes, and are mainly smallholder farmers. Majority of the respondents indicated their awareness of GAPS at 85% in the study area; the results show that the level of awareness of weeding, fertilizer application and mixed cropping were relatively high at 95 percent. Similarly, Three (3) were most prominent out of the nine (9) sources of information available for GAPs namely NRCRI, extension agents and trainings, while the least sources of information selected by the respondents were mobile phones, agro dealers and newspapers. Ayoade (2010) stated that rural farmers should be encouraged to seek extension information on recommendation and technologies through extension sources at their disposal. Moreover, findings show that a significant proportion (45%) of the respondents indicated a moderate level of practice, 18% high and 21.7% low level of implementation in the study area. The study also revealed that the respondents had numerous challenges which affects them from implementing the identified GAPs in the study area which includes; inadequate capital, high cost of farm tools, lack of fertilizer, poverty among others. This is in agreement with the findings of Pongvinyoo *et al* (2014) among coffee farmers in Thailand, which stated that farmers still lacked farm input, knowledge and experience of GAPs and their conventional farming activities are often conflicting

with the GAPs system. Also, FAO (2010) asserts that financial cost and specialized knowledge make implementation of GAPs such as water purification equipment or record-keeping technology more difficult for smallholder farmers and producers in developing countries.

The study recommends that the Federal Ministry of Agriculture should provide more funds for research institutions and the state ADPs in order to intensify their efforts towards creating more awareness of the GAP system among rural farmers. It also recommends collaboration between state government and private sectors, this collaboration might encourage smallholder farmers to be more aware and make better informed decisions which will encourage implementation of the GAP system. Furthermore, extension agents should embark on massive public enlightenment campaigns and mass information mobilization in the rural communities across the nation. Government must prioritize the GAP related programs so that the farmers could reap more in terms of quality and quantity of produce, and simultaneously maintain a harmonious relationship with the environment. Support from the local, state and the federal governments is imperative to building a sound knowledge of GAP among the agricultural institutes, farmer groups, agricultural cooperatives, and other stakeholders by providing training and other educational programs.

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Table 1: Demographic representation of the socio-economic characteristics of the smallholder farmers (n= 60)

Variables	Frequency	Percentage
Age (years)		
20-30	13	21.7
31-40	19	31.7
41-50	15	25
51-60	9	15
61 & above	4	6.6
Sex		
Male	12	20
Female	48	80
Marital Status		
Single	6	10
Married	43	71.7
Widowed	11	18.3
Household Size		
Less than 5	14	23.4
6-10	29	48.3
11-15	13	21.7
16-above	4	6.6
Educational Qualification		
No Formal Edu.	3	5
Primary Edu.	14	23.3
Secondary Edu.	35	58.3
Tertiary Edu.	8	13.3
Farming Experience		
≥10	10	16.7
11-20	25	41.6
21-30	18	30
≤31	7	11.7
Labour Used		
Family Labour	20	33.3
Hired labour	8	13.3
Both	32	53.4
Membership of Coop. Society		
Yes	39	65
No	24	25

Source: Field Survey, 2021

Table 2: Distribution of respondents according to their level of awareness of GAPs

Agricultural Production Components	Current Practices	Highly Aware	Aware	Remotely Aware	Not Aware
Crop land	Crop Types	18.3	68.5	8.2	5.0
Management	Cropping Systems	25.0	55.1	12.5	7.4
	Tillage systems	30.4	48.0	15.0	6.6
Water	Use of Irrigation	28.4	63.7	7.9	0.0
Management	Bunds	3.3	30.7	23.5	42.4
	Terracing	10.5	36.4	20.5	32.6
Degraded Land Restoration	Re-vegetation	18.2	26.0	30.9	24.9
	Crop Rotation	28.0	43.8	23.5	4.7
Integrated Pest Management	Use of pesticide 20.0	31.6	56.9	11.5	0.0
	Tilling	26.5	54.3	12.8	6.4
	Resistant Varieties	16.2	60.0	20.8	3.0
	Plot Selection and Layout	12.2	43.2	25.4	19.2
	Planting Date	22.5	55.0	19.3	3.2
Seeds and Variety Selection	Sowing facility	18.3	43.5	22.8	15.4
	Sowing Depths	21.1	30.2	35.3	13.4
	Seed Cutting	39.5	60.5	0.0	0.0
	Seed Requirement	16.6	31.2	38.4	13.8
	Supply(Re-planting)	29.2	50.0	20.8	0.0
	Improved varieties	45.9	53.0	1.1	0.0
	Local Varieties	86.6	13.4	0.0	0.0
	Use of Manure	74.7	25.3	0.0	0.0
Soil Fertility Management	Fertilizer application	98.0	2.0	0.0	0.0
	Weeding	100.0	0.0	0.0	0.0
	Herbicide application	36.0	50.0	14.0	0.0
	Cover cropping	41.3	54.5	4.2	0.0
	Sole cropping	20.7	45.7	25.4	8.2
	Intercropping	40.3	59.7	0.0	0.0
	Mixed cropping	86.1	13.9	0.0	0.0

Source: Field Survey, 2021

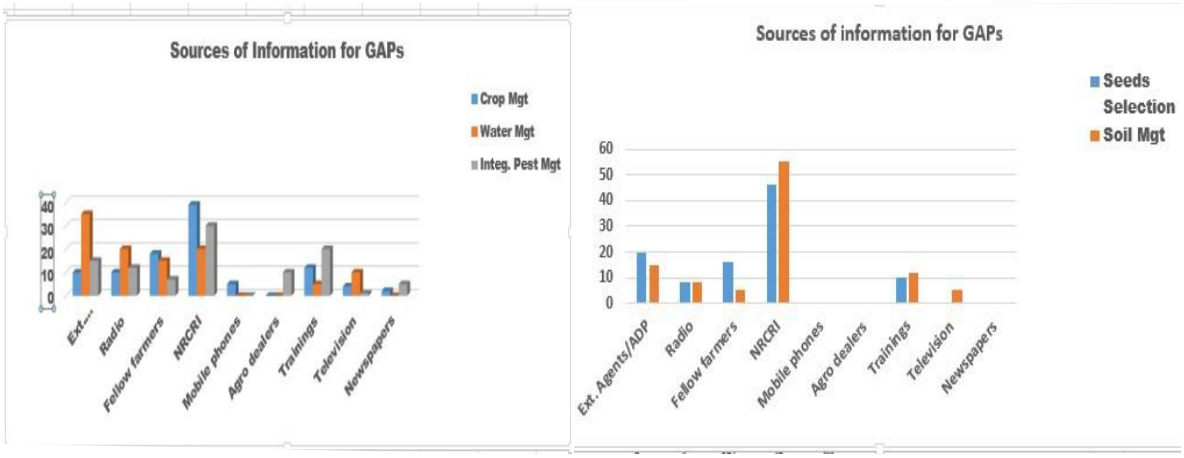

Figure 1: sources of information for GAPs

Table 4: Distribution of respondents according to practice of Good Agronomic Practices

Agricultural Production Component	Very High	High	Moderate	Low	Not at all
Crop Land Management	6.5	18.0	45.2	21.7	8.6
Water Management	3.4	6.6	12.4	52.0	25.6
Degraded Land Restoration	10.8	30.3	45.7	6.0	7.2
Integrated Pest Management	2.0	8.8	23.3	25.4	40.5
Seeds and Variety Selection	13.3	23.0	34.9	18.4	10.4
Soil fertility management	20.2	33.3	27.0	17.7	1.5

Source: Field Survey, 2021

Table 5: Factors affecting the Practice of Good Agronomic Practices (GAPs) in the study area

Problems	Percentage
Inadequate finance/capital	85.0
High cost of farm inputs	81.4
Lack of fertilizer	78.5
Poverty	72.3
Poor access to improved technologies	70.3
Poor market prices	70.0
Inadequate and unreliable rainfall	66.9
Low production	63.6
Poor dissemination system	60.2
scarcity of land	56.3
Inadequate labour	55.0
Poor manure application	53.8
High rate of pest and diseases attack	50.5
Illiteracy	47.5
Lack of irrigation facilities	45.3
Lack of technical know-how	44.2
Lack of infrastructure	30.1
Poor storage facilities	28.8

***Multiple Responses**