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ADOPTION OF IMPROVED CASSAVA PRODUCTION TECHNOLOGIES AMONG CASSAVA FARMERS IN OGBOMOSO AGRICULTURAL ZONE, OYO STATE, NIGERIA

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Abstract

Despite breakthroughs that have been made worldwide in the area of improved production technologies, Nigerian farmers still rely so much on traditional methods of cassava production which in turn reduces the level of productivity, hence the need for adoption of improved cassava production technologies. This study therefore examined the adoption of improved cassava production technologies among cassava farmers in Ogbomoso agricultural zone. A multistage sampling procedure was employed for the selection of one hundred and ninety-seven (197) respondents for the study. Data were collected using a structured interview schedule. Descriptive statistics such as frequency counts, percentages, mean were used to describe the socioeconomic characteristics and adoption level of improved cassava production technologies. The finding revealed that majority (80.7%) of the respondents were married, and the mean years of farming experience in cassava production was 18 years. All the cassava farmers were aware of improved cassava production technologies and had access to various information sources that aided their awareness status. Also, 83.2% of respondents had awareness of improved cassava production technologies that recommended spacing 1m x 1m or 1m x 0.8m for branching and non-branching cassava. Chi-square analysis reveals that significant relationship exist between sources of and the level of adoption of improved production technologies. The study concluded that cassava farmers in the study area adopted and utilize the improved production technologies with site selection and land preparation. Therefore, the study recommends that extension services should be policy driven to ensure adequate contact with farmers, regular contact with extension agents will enhance adoption of improve production technologies for cassava production.

Keywords: Adoption, Cassava, Technologies.

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Introduction

Agricultural technology is the use of technology in agriculture with aim of improving yield, efficacy and profitability. Consequently, to curtail food and nutritional insecurity, which is a problem in our society today, smallholder farmers as a matter of fact must adopt improved agricultural technologies to increase productivity of food crops (Sennuga, *et al.*, 2020; Jegede, *et al.*, 2021). The improved technologies of Cassava production and processing includes the use of improved varieties, fertilizers, new tillage practices, use of mechanization, the use of herbicides and pesticides, proper spacing motorized graters, motorized flakers, mechanical sifters, etc. Increase in farm productivity which invariably increases farmers income and also reduction of poverty can only be achieved by adoption of these improved technologies (Jegede*et al.*, 2021).If there must be increase in the efficiency of agricultural production through agricultural modernization, farmers must to a large extent adopt improved agricultural technologies into their farming operations. However, agricultural extension communication, in the context of development, is specifically targeted toward improving the livelihoods of the participants (the farmers and extension staff) through the process of exchanging agricultural information between themselves and others (Fadiji and Sennuga 2020; Jegede *et al.*, 2021).

Even though some breakthroughs have been made worldwide in the area of improved food processing technologies, Nigerian farmers still rely so much on traditional methods of processing which in turn reduces the level of productivity. The traditional methods of Cassava processing are so laborious that alternatives in form of improved processing technologies have been put in place in order to reduce the drudgery and labour intensive traditional Cassava processing methods and also to increase output. However, the adoption of improved agricultural technologies is found to be generally slow even though it is a sure way out of poverty in developing countries. Cassava (*Manihot Spp*) is one of the crops that have to be cultivated extensively for human consumption as well as for industrial use. Cassava tubers cannot stay for more than one week after harvesting without rotting in other words; it is highly perishable and therefore needs to be processed immediately after harvest to avoid spoilage. Any nation that is not able to preserve its food output until when needed for consumption is far from achieving food security. Consequently, to ensure that all Nigerians have unrestricted access to adequate food for healthy living round the year, Government should pay attention to the area of food processing.

The inability of smallholder farmers to adopt most technologies aimed at increasing production in Nigeria has been associated with many challenges, these challenges have limited production and market orientation of smallholder farmers (Anumudu *et al.*, 2020). Among these challenges are lack of knowledge on improved and modern production skills which is undoubtedly caused by the poor level of extension services (Eze and Nwibo, 2014). Poor state of infrastructure such as roads, electricity, processing and storage facilities usually lead to high postharvest losses and consequently, reduced profitability. Other issue to be tackled to improved adoption include high cost of labour, inadequate finance, farmer's access to credit, high cost of inputs and low government presence to subsidize farm inputs, heavy reliance on traditional tools, poor extension contact and bad road network (Osuafor, Obianefo and Dike (2020). In earlier study, Gbassey *et al.*, (2020) noted that lack of information, unavailability of land and poor extension services were the obstacles to adoption of improved cassava production technologies. Adoption of improved production technologies such as good site selection, land preparation, improved varieties, method of planting, spacing, time of planting, fertilizer application, weeding and harvesting is essential to increase productivity

among the smallholder farmers (Ehinmowo and Fatuase (2016). The specific objectives were to; describesocio-economic characteristics of the cassava farmers and level of adoption of improved cassava production technologies by the cassava farmers in the study area.

Methodology

The study was carried out in Ogbomoso Agricultural Zone of Oyo State. Ogbomoso Agricultural Zone has five Local Government Areas (L.G.As), namely Ogbomoso North Ogbomoso South Ogo-Oluwa, Oriireand Surulere L.G.As. The geographical location of Ogbomoso is on latitude 8°.08N and longitude 4°.29E (Wikipedia, 2021). The land area is about 3547.89 square meter which is bounded in the North by Irepodun L.G.A, in the West by Oyo L.G.A, in the South by Ejigbo L.G.A of Osun State and in the East by Asa L.G.A of Kwara State.The estimated population of Ogbomoso during the 2006 population census was 1,200,000 (National Population commission, NPC, 2006). Ogbomoso is situated at the Northern part of Oyo State. It is regarded as a derived Savannah vegetation zone and a low land Rainforest area. A fairly high uniform temperature, moderate heavy seasonal rainfall and high humidity , characterizes the temperature as 26℃ and the lowest temperature is experienced in August with a temperature of 24.3℃ and the highest in March with a mean temperature of 28.7℃. Humidity is highest in July to September and lowest in December to February. The average rainfall lies between 114mm and 1275mm with most of the annual rainfall (about 92 percent) occurring in the months between March and October, with a slight fall in the month of August, and the months spanning through November to February. The mean annual temperature is about 27^0C with very small monthly variation.

The vegetation of the zone is derived savannah. The climatic and soil conditions of the study area favour the extensive production of arable crops like cassava, maize e.t.c, horticultural crops and tree crops. The target population of the study comprises of registered cassava farmers in Ogbomoso Agricultural zone of Oyo State. Multistage sampling method was adopted for this study. Ogbomoso Agricultural zone consists of five local Government Area (LGAs) with each of them representing a block. The first stage involved purposive selection of three blocks from Ogbomoso Agricultural zone which are Ogo-Oluwa, Oriire and Surulere blocks respectively due to their rurality presence of cassava farmers. The second stage involved random selection of 30% of the cells in each blocks therefore Lagbedu, Odo-Oba and Ayetoro were selected from Ogo-Oluwa, Iluju, Tewure and Ajinapa was elected from Orrire block while Iwofin, Orile-Igbon and Abogunde cells was selected from Surulere block. The last stageinvolved the random selection of 20% of respondents from each of the registered farmers in each cell. So, a total of 197 respondents was used for the study as shown in the Table 1 below.

Table 1: Sampling Procedure and Sampling Size

Blocks	Number of cells per selected Block.	Random selection of 30% of cells.	Cells selected per Block.	Number of registered cassava farmers.	Respondents (20%)
Oriire	10	3	Iluju Tewure Ajinapa	176 112 76	35 22 15
Subtotal				364	72
Surulere	10	3	Abogunde Iwofin Orile-Igbon	96 54 108	19 11 22
Sub total				258	52
Ogo-Oluwa	10	3	Lagbedu Odo-Oba Ayetoro	128 142 96	26 28 19
Sub total.				366	73
Grand Total.	**30**	**9**	**9**	**988**	**197**

Source: Oyo State Agricultural Development Programmes (OYSADA 2021).

Data was analyzed using descriptive tools such as frequency counts, percentage, mean, and weighted mean score (WMS), and inferential statistical (Chi-square) was used to test the stated hypothesis.

Results and Discussion

Socio-economic Characteristics of the Respondents

The result of socio-economic characteristics of Respondents were presented in Table 2. It revealed that 80.7% of the respondents were married, 13.2% of the respondents were single, 3.6% of the respondents were widowed. Also, 1.5% of the respondents were separated while 1.0% of the respondents were divorced. This result implies that a high percentage of married respondents suggests that cassava farming likely benefits from family labor.

More than half (52%)of the respondents were Muslims, 46.2% of the respondents were Christians while 1.5% of the respondents were traditional worshippers. This result

implies that the presence of diverse religious groups indicates that farming practices and decision-making might be influenced by religious beliefs, norms, and practices.

Majority (61%) of the respondents had secondary education, 31.4% of the respondents had tertiary education. Also, 6.1% of the respondents had primary education while 1.0% of the respondents had no formal education. This result implies that 92.8% of respondents having at least secondary education. This indicates a generally high literacy level among cassava farmers. A little above 91% of the respondents had contact with extension agent while 8.6% of the respondents indicated no contact with extension agent.

About 85% of the respondents have less 5 hectares of land for farming, 6.0% of the respondents have 13 hectares of land, 5.5% of the respondents have between 5-8 hectares of land while 3.5% of the respondents have between 9-12 hectares of land for farming. This result implies that majority (84.7%) of farmers with less than 5 hectares highlights the dominance of smallholder farming in cassava production. Smallholders often rely on family labor and traditional farming methods, which can limit productivity and efficiency. This is agreement with the findings of FAO (2020) documented that smallholder farmers in sub-Saharan Africa dominate cassava production, often managing plots of less than 5 hectares. The report emphasized the importance of improving productivity through access to inputs, credit, and extension services.

49.2% of the respondents had spent 18 years and above in cassava cultivation, 26.3% of the respondents had spent between 13-17 years in cultivating cassava and 16.7% of the respondents had spent between 8-12 years in cultivating cassava while 7.5% of the respondents had spent less than 7 years in cultivating cassava. The mean years in cultivating cassava was revealed to be 41 years. This results implies that almost half (49.2%)of the farmers having over 18 years in cassava farming. This indicates that a deep understanding of local farming conditions, cassava varieties, and cultivation practices. This is in agreement with the findings of FAO (2020) noted that the extensive farming experience among smallholder farmers in sub-Saharan Africa contributes to their resilience to shocks but often limits the uptake of innovations due to entrenched practices.

Table 2: Distribution of respondents by socioeconomic characteristics n=197

Characteristics	Frequency	Percentage	Mean
Marital Status			
Single	26	13.2	
Married	159	80.7	
Separated	3	1.5	
Divorced	2	1.0	
Widow	7	3.6	
Religion			
Islam	103	52.3	
Christian	91	46.2	
Traditional	3	1.5	
Level of education			
No formal education	2	1.0	
Primary education	12	6.1	
Tertiary education	62	31.4	
Secondary education	121	61.4	
Contact with extension agent			
Yes	180	91.4	
No	17	8.6	
Farm Size (Hz)			
≤5	167	84.7	
5-8	11	5.5	3
9-12	7	3.5	
13≥	12	6.0	
Years in cultivating cassava			
≤7	15	7.5	
8-12	33	16.7	18
13-17	52	26.3	
18≥	97	49.2	

Source: Field Survey, 2024
*: Multiple response

Level of Adoption of Improved Cassava Technologies

The result in table 3 below revealed the level of adoption of improved cassava technologies by cassava farmers in the study area. This was measured on a 4-points rating scale of always, sometimes, rarely and never which was scored 3, 2, 1 and 0 respectively. The result shows that site selection and land preparation (tractorization) were ranked 1st and 2nd with a weighted mean score (WMS) of 2.9 and 2.8 respectively. This result implies that cassava farmers utilize technologies introduced to them from the choice of land and preparation of the land to have a bumper harvest, an indication that extension agents adequately transferred the knowledge to them.

Furthermore, weeding at least two times per planting season (WMS=2.7) ranked 3rd; recommended spacing 1m x 1m or 1m x 0.8m for branching and non-branching cassava and careful handling of stem cuttings (WMS=2.6) ranked 4th respectively; time of planting and planting space and depth (WMS=2.5) ranked 6th respectively based on the level of adoption of the improved cassava technologies for cassava cultivation. This result implies that the improved technologies take cognizance of the essential agronomic practices involved in cassava cultivation, this might be a factor that encouraged the adoption of the technologies by the cassava farmers. In addition, input from approved dealer, fertilizer application, planting on ridges and herbicide for weed control were all ranked 8th with each having a WMS of 2.4. This result is an indication that agricultural input dealer are major contributor to the adoption of improved technologies on cassava production in the study area as they make it more accessible to the farmers, hence the easier the adoption stages and level for the farmer.

Moreso, careful handling of stem cuttings and improved soil management technique for erosion control were both ranked 12th with each having a WMS of 2.3; ridge planting and timely harvesting were both ranked 14th with each having a WMS of 2.2 respectively while planting improved cassava varieties was ranked 16th with WMS of 2.1. This result implies that improved technologies introduced to the cassava farmers were both on planting and harvesting stages involved in cassava cultivation. Lastly, use of stem multiplication technology and leave land to fallow were both ranked 17th with each having WMS of 1.9 while practicing of crop rotation was ranked least with WMS of 1.8. This result is an indication that improved technologies to cassava cultivation is a widely accepted innovation in the study area. These are poorly adopted improved production technologies by the cassava farmers and it has a high implication on the productivity of the farmers as the technologies are very germane to profitable cassava production as they enhance rapid growth and vigorous development of cassava that would bring about higher yields. This result conforms to the study of Oyelere (2020), who also reported poor adoption of some of the improved production technologies on cassava production.

Generally, this result implies that cassava farmers in the study area are conversant and well aware of improved cassava technologies, and this has contributed to the adoption level of the improved technologies. The rate of adoption of the improved technologies might be attributed to the benefits derived from the use and the situation of the learning experience of the cassava farmers during the course of transfer of the technologies to the cassava farmers by the extension agency. This result does not conform to the finding of Uzochukwu *et al.*, (2021), who reported that respondents have not adopted any of the improved production technologies for cassava production with majority of them being at the interest stage of adoption. The adoption of innovation is hinge on the success of extension service, hence from the result of this study, it can be deduced that extension service/agency has impact in the study area. This result agrees with the findings of Oyelere (2020), who reported that technologies such as selection of suitable land, use of herbicide (weed management), ploughing, use of recommended improved varieties and disease and pest control were highly adopted by cassava farmers.

Table 3: Distribution of respondents by level of adoption of improved cassava production technologies

Cassava Production Technology	WMS	Rank
Site selection	2.9	1st
Land preparation (tractorization)	2.8	2nd
Input from approved dealer	2.4	8th
Planting improved cassava varieties	2.1	16th
Planting on ridges	2.4	8th
Ridge planting	2.2	14th
Time of planting	2.5	6th
Planting space and depth	2.5	6th
Careful handling of stem cuttings	2.3	12th
Weeding at least two times per planting season	2.7	3rd
Fertilizer application	2.4	8th
Herbicide for weed control	2.4	8th
Recommended spacing 1m x 1m or 1m x 0.8m for branching and non-branching cassava	2.6	8th
Careful handling of stem cuttings	2.6	4th
Use of stem multiplication technology	1.9	17th
Improved soil management technique for erosion control	2.3	12th
Practice crop rotation	1.8	19th
Leave land to fallow	1.9	17th
Timely harvest	2.2	14th

Source: Field survey, 2024
WMS: Weighted mean score

Chi-square result showing relationship between source of information to the cassavafarmers and level of adoption of improved production technologies

Chi-square analysis reveals that significant relationship exist between sources of information such as radio (x^2= 11.122; p-value= 0.025); extension officer (x^2= 9.985; p-value= 0.041); social media (x^2= 8.965; p-value= 0.011) and neighbours and friends (x^2= 6.148; p-value= 0.046) and the level of adoption of improved production technologies.Radio and extension officer being significant is evidence that getting information from reliable and dependable source which are widely known to circulate genuine information has a major influence on the rate at which innovation diffuse and got adopted by the target audience. Information gotten through radio and extension agent are known to be from verifiable sources, hence the utilization of such information as cassava farmers believe that experts and professionals engage in the use of these medium to disseminate information.

Social media being significant shows the rate at which farmers have engage in the usage of this communication tool to source for information. The usage of social media to get information on technologies might influence rate of adoption based on the swift rate at which the cassava farmers got to know about improved production technologies. The zeal to try new ideas before other farmers got to know about it might influence the usage of the technologies so as to assert their innovativeness over contemporary farmers and colleague in the farming profession.

Lastly, neighbours and friends being significant might be attributed to the confidence and trust the cassava farmers have in their friends based on trust and believe in their expertise, hence it builds on their confidence to adopt the improved technologies introduced to them. Therefore, the null hypothesis which states there is no significant relationship between selected sources of information available to the cassava farmers and level of adoption of improved production technologies on cassava production in Oyo State is hereby rejected.

Table 4: Chi square analysis showing the relationship between selected sources of information available to cassava farmers and level of adoption of improved production technologies on cassava production in the study area.

Source of information	χ	Df	p- value	Remark
Radio	11.122	4	0.025	Significant
Extension officer	9.985	4	0.041	Significant
Research institute	4.253	2	0.119	Not Significant
Social media	8.965	2	0.011	Significant
Farmers group	6.453	4	0.116	Not Significant
Neighbours and friends	6.148	2	0.046	Significant

Source: Computed Data, 2024

Conclusion and Recommendations

The study concluded that cassava farmers in the study area adopted and utilize the improved production technologies with site selection and land preparation. Therefore, the study recommends that extension services should be policy driven to ensure adequate contact with farmers, regular contact with extension agents will enhance adoption of improve production technologies for cassava production.

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