



FACTORS INFLUENCING THE ADOPTION OF AGRICULTURAL TECHNOLOGIES AMONG WATER MELON FARMERS IN ISEYIN LOCAL GOVERNMENT AREA OF OYO STATE

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Abstract

The study was carried out to determine the factors influencing the adoption of Agricultural technologies among watermelon farmers in Iseyin Local Government area of Oyo State. Primary data were collected using well-structured interview guide administered to 108 water melon farmers using multi-stage sampling procedure, Data collected were analyzed using descriptive statistics, Pearson Product Moment Correlation [PPMC] and Chi square analysis. The mean age of the respondents was 57 years, 54.6% were married with mean household size of 6 and majority (87.96%) of the farmers cultivated an average of 6-10 hectares of land in the study area. The result further revealed that hybrid watermelon seedlings (WMS=1.96), pest control and management (WMS=1.95), use of agro chemicals (WMS=1.88) were the available agricultural technology adopted by the respondents. Also, farmer's age with (WMS=1.79), access and nature of extension services provided with (WMS=1.31) and level of education with (WMS=1.13) were the factors affecting the adoption of agricultural technologies. The effects of agricultural technology adoption on watermelon farmers were poverty reduction among farmers (WMS=4.85), Agrochemicals (Seed treatment with insecticide and diseases control (WMS=4.69), and high crop yield with (WMS=4.51). Furthermore, Poor extension services, low farm income, poor government policy on agriculture, lack of awareness of improved technologies were constraints experienced by watermelon farmers in the adoption of Agricultural technologies in the study area. The test of hypothesis on the socio economic characteristics of watermelon farmers and the perceived effects of Agricultural technologies on watermelon production revealed that, age ($r = -0.403$, $p < 0.05$), household size ($r = -0.251$, $p < 0.05$), farming experience ($r = -0.396$, $p < 0.05$) and the amount of loan received annually ($r = -0.343$, $p < 0.05$) were statistically significant with the perceived effects of Agricultural technologies adoption on watermelon production, Therefore, the null hypothesis is rejected. The study therefore recommends that to enhance technology adoption by farmers, policy makers and developers of new technology to understand farmer's problems and needs as well as their ability to adopt affordable technology in order to come up with technology that will suit them.

Keywords: Adoption; technology; agricultural technologies; weighted mean score (WMS)

Introduction

Agriculture plays an important role in economic growth, enhancing food security, poverty reduction and rural development. It is the main source of income for about 2.5 billion people in the developing world (FAO, 2003). However majority of smallholder farmers relies on traditional methods of production and this has lowered the level of productivity. For instance, watermelon productions in many of developing countries, Nigeria smallholders use traditional methods of production (Muzari *et al.*, 2012). These farmers generally obtain very low crop yields because the local varieties used by farmers have low potential yield, most of the crop is grown under rain-fed conditions and irrigation is used only in

limited areas, little or no fertilizers are used and pest control is not adequate (Muzari *et al.*, 2012). This has triggered much of discussion on the need to increase productivity and sustainability in agriculture globally but much less information is available on specific means to achieve this aim (Margaret *et al.*, 2015). Increasing agricultural productivity is critical to meeting expected rising demand and, as such, it is instructive to examine recent performance in cases of modern agricultural technologies (Challa, 2013). Agricultural technologies include all kinds of improved techniques and practices which positively affect the growth of agricultural output (Jain *et al.*, 2009). According to Loevinsohn *et al.* (2013) the most common areas of technology development and

promotion for crops include new varieties and management regimes; soil as well as soil fertility management; weed and pest management; irrigation and water management. By virtue of improved input/output relationships, new technology tends to raise output and reduces average cost of production which in turn results in substantial gains in farm income (Challa, 2013).

Adoption of improved agricultural technologies has been associated with higher earnings and lower poverty; improved nutritional status; lower staple food prices; increased employment opportunities as well as earnings for landless labourers (Kariyasa *et al.*, 2011). Adoption of improved technologies is believed to be a major factor in the success of the green revolution experienced by Asian countries (Ravallion and Chen, 2004). On the other hand, non-adopters can hardly maintain their marginal livelihood with socio-economic stagnation leading to deprivation (Jain *et al.*, 2009). These technologies are particularly relevant to smallholder farmers in developing countries because they are constrained in many ways, which makes them a priority for development efforts. These farmers for instance, live and farm in areas where rainfall is low and erratic, and soils tend to be limited and infertile. In addition, infrastructure and institutions such as irrigation, input and product markets, and credit as well as extension services tend to be poorly developed (Muzari *et al.*, 2012).

Over the years many studies have been conducted on innovation and uptake of new technologies in developing countries. In addition the process of adoption and the impact of adopting new technology on smallholder farmers have been studied. However new agricultural technologies are often adopted slowly and several aspects of adoption remain poorly understood despite being seen as an important route out of poverty in most of the developing countries (Bandiera and Rasul, 2002; Simtowe, 2011). This study examined the factors influencing the adoption of agricultural technologies among watermelon farmers in Iseyin local government area of Oyo state. The specific objectives were to:

- i. describe the socio-economic characteristics of watermelon farmers in Iseyin Local Government Area of Oyo State.
- ii. identify the available agricultural technologies adopted by watermelon farmers in study area.
- iii. identify the factor influencing the adoption of Agricultural Technologies by watermelon in study area.
- iv. examine the perceived effects of agricultural technologies adoption on water melon farmers in study area.

- v. examine the constraint experienced by water melon farmers in the adoption of agricultural technologies.

Hypothesis of the study

The null hypothesis of this study was stated in null form;

H₀: There is no significant relationship between selected socio- economic characteristics of water melon farmer and the effects of agricultural technologies adoption on water melon production.

Research methodology

This study was conducted in Iseyin Local government area of Oyo state, with capital located at Iseyin. The total population in Iseyin Local Government Area as at 2006 (National population census) is 503,261. The primary occupation in the study area is farming, with secondary occupation such as hunting, trading, artisans and civil servant were abound. Multistage sampling technique was used to select the respondent for this study. Agricultural Development Programme (ADP) structure was used. Iseyin Local Government Area of Oyo State falls under a block in ADP structure in Oyo state. Stage 1: There are five (5) active cells among the eight (8) existing cells in the study area; 50% of the active cells were randomly selected to have three (3) cells namely Ajepero, Ado-awaye and Akinwunmi/Osoogun, Stage 2: Out of the three (3) cells selected, there are eight (8) water melon farmers groups in each cell making a total of 24 groups in the selected cell. Then, 50% of the group was randomly selected to have 12 groups in all. Stage 3: There are about 30 farmers in a group, 30% of this group of farmers were randomly selected from the 12 groups selected to have a sample frame of 108 respondents.

Results and discussion

Age: The age distribution of the respondents as shown in Table 1 indicates that 49.26% of the respondents were between 20-30 years of age, 31.50% were between the ages of 31-40 years, 31.50% were between the ages of 51-60 years, while 6.45% of the respondents were above 60 years with the mean age of the respondents' being 57years. This implies that most of the water melon farmers in the study area were still in their active stage.

Sex: The sex distribution of the respondents as shown in Table 1 indicates that 57.40% of the respondents were male, while 42.6% of the respondents were female. This implies that water melon production in the study area was mostly practiced by male.

Marital Status: The result in Table 1 indicates that 41.7% of the respondents were single, 54.6% were married while 2.8% were either a widow or widower. The result indicates that majority of the water melon farmers in the study area were married which suggest more responsibilities that need financial commitment which could be a motivating factor for working harder.

Household size: The result in Table 1 shows that 3.7% of the respondents had between 1-3 household size, 60.7% had between 4-6 household size, while 3.7% of the respondents had above 7 members in their household with mean household size of 6. The result indicates that most of the water melon farmers in the study area had a sizeable number of people in their households which could be available as family labour on the family farm.

Year spent in school: From the result in Table 1, 9.2% of the respondents spent between 1-5 years in school, 60.1% of the respondents spent 6-10 years, 25.9% spent between 11-15 years, while 4.6% spent about 16-22 years. The mean years of education were found to be 11. This implies that majority of the watermelon farmers in the study area can be categorized as being literate to some extent because majority of them had secondary education.

Farming experience: From the result shown in Table 1, it shows that 1.65% of the respondents had between 1-5 years of farming experience, 10.6% had between 6-10 years of farming experience, 84.25% had between 11-15 years of farming experience while 0.72% respondents had above 20 years of farming experience with mean years of farming experience of 12 years. This implies that majority of the watermelon farmers in the study area had secured significant years of experience on watermelon production.

Farm size: The distribution of respondents according to farm size revealed that 87.96% cultivated between 1-5 acres of land, 8.33% cultivated about 6-10 acres, 1.85% cultivated about 11-15 acres while 0.92% of the

respondents cultivated above 20 acres of land with a mean of 15 acres. This implies that majority of the respondents in the study area are medium scale farmers.

Farm land acquisition: From the result in Table 1, 30.6% of the respondents got their land through purchase, 10.2% got their land through rent and 46.3% got their land through inheritance while 9.33 % got their land through gift. This implies land is readily available for most of the watermelon farmers in the study area.

Annual income: The result in Table 1 shows that 9.25% of the respondents had annual income of less or equal to ₦100,000, 2.77% had between ₦100,001- ₦200,000, 38.88% had between ₦200,001- ₦300,000, 46.29% had between (₦300,001- ₦400,000), while 2.77% had between (₦400,001- ₦500,000) as annual income. The mean annual income was found to be ₦281,000 which implies that majority of the watermelon farmers can still be categorized as low income earners.

Agricultural Extension Agent: Table 1 revealed that, about 48.1% had access to an Agricultural extension Agent, while 51.9% of the respondents do not have access to an Agricultural extension agent in the study area. This implies that majority of the respondents don't have access to extension agent as this will affect the adoption of improved technology for watermelon production in the study area.

Amount of loan received annually: Table 1 revealed that about 82.40% of the respondents received a loan of ₦100,000 annually, 5.55% respondents received loan of between ₦100,001 – ₦200,000 annually, 2.77% received ₦200,001 - ₦300,000 annually, 3.70% received ₦300,001 – ₦400,000 annually, while 5.55% of the respondents received above ₦400,000 annually. This result shows that watermelon farmers had limited access to loan facilities for their watermelon production.

**Table 1: Socio economic characteristics of the respondents in the study area**

Variables	Frequency	Percentage	Mean
Age;			57
20 – 30	10	9.26	
31-40	4	3.30	
41-50	34	31.50	
51-60	10	49.07	
>60	7	6.48	
Sex;			
Male	64	57.4	
Female	46	42.6	
Marital Status;			
Single	45	41.7	
Married	59	54.6	
Divorce	1	0.7	
Widow/widower	3	2.8	
Household Size;			6
1-3	4	3.7	
4-6	65	60.7	
>7	39	36.1	
Years Spent in school;			11
1-5	10	9.2	
6-10	28	25.9	
11-15	65	60.1	
16-20	5	4.6	
Farming Experience;			12
1-5	2	1.65	
6-10	11	10.6	
11-15	91	84.25	
16-20	1	0.72	
>20	1	0.70	
Farm Size (acre);			15
1-5	95	87.96	
6-10	9	8.33	
11-15	2	1.65	
16-20	1	0.72	
>20	1	0.72	
Farm Land;			
Purchased	33	30.6	
Rent	11	16.2	
Loan	4	3.7	
Inheritance	50	46.3	
Gift	10	9.3	
Annual Income;			#281,000
₦1- ₦100,000	28.1	9.25	
₦100,001 – ₦200,000			
Access to agric extension agent;			
Yes	52	48.1	
No	56	51.9	
Amount of loan received;			
≤₦100,000	89	82.40	
₦100,001 - ₦200,000	6	5.55	
₦200,001 - ₦300,000	3	2.77	
≤₦400,000	6	5.55	

Source: Field Survey, 2021.**Available agricultural technology adopted by watermelon farmers in the study area**

Result from Table 2 revealed that Hybrid watermelon seedlings with (WMS = 1.96) was available and ranked first in the study area, Pest control/management with (WMS =1.95) was also available, Use of Agro-chemical (WMS=1.88), timely

planting with (WMS=1.69), Fertilizer application with (WMS=1.68), Transplanting with (WMS=1.47), Planting depth with (WMS=1.2). This implies that all the aforementioned Agricultural technologies were available for watermelon farmers. This suggests that the farmers were well exposed to significantly new agricultural technologies in the study area.

Table 2: Available agricultural technology adopted by watermelon farmers in the study area

Variables	Yes	No	WMS	Rank
Hybrid watermelon Seedlings	104(96.3)	4(3.7)	1.96	1 st
Pest control/Management	103(95.4)	5(4.6)	1.95	2 nd
Use of Agrochemical	95(88.0)	13(12.0)	1.88	3 rd
Timely Planting	74(68.5)	34(31.5)	1.69	4 th
Fertilizer Application	73(67.6)	35(32.4)	1.68	5 th
Transplanting	51(47.2)	57(52.8)	1.47	6 th
Storage Facilities	44(40.7)	64(59.3)	1.41	7 th
Improved Line Spacing	24(22.2)	84(77.8)	1.2	8 th
Planting Depth	24(22.2)	84(77.8)	1.2	8 th
Weed control/management	91(64.3)	17(15.7)	1.32	9 th

Source: Field Survey, 2021.

Factors affecting the adoption of agricultural technology by watermelon farmers in the study area

Findings from Table 3 revealed the factors affecting the adoption of agricultural technologies by watermelon farmers in the study area and it was ranked according to their weighted mean score (WMS), Access and nature of the extension service provided with (WMS=1.83), level of education with (WMS =1.79), Income level with (WMS=1.44), farm size with (WMS =1.31), farming experience with (WMS =1.13), social group with (WMS =1.11), farmers' age with (WMS=1.07) while gender with (WMS =1.83). This implies that all these factors affect the adoption of agricultural technologies but access and nature of the extension service provider, level of education, income level, farm size, farming experience were the most significant factors affecting the adoption of Agricultural technologies compared to other factors in the study area.

Table 3: Factors affecting the adoption of agricultural technology by watermelon farmers in the study area

Variables	Yes	No	WMS	Rank
Access and Nature of the Extension Service Provided	33(30.6)	75(69.4)	1.83	1 st
Level of Education	14(12.96)	94(87.04)	1.79	2 nd
Income Level	12(11.1)	96(88.9)	1.44	3 rd
Farm Size	8(7.4)	100(92.6)	1.31	4 th
Farming Experience	4(3.7)	103(95.4)	1.13	5 th
Social Group	47(43.5)	61(56.5)	1.11	6 th
Farmers' Age	85(78.7)	13(21.3)	1.07	7 th
Gender	70(83.3)	18(16.7)	1.06	8 th

Source: Field Survey, 2021

Effects of Agricultural Technologies Adoption on watermelon production

Result from Table 4 revealed that poverty reduction among farmers was among the effects of agricultural technologies adoption on watermelon farmers with highest weighted mean score of (WMS=4.85), use of agrochemicals for seed and diseases treatment with (WMS=4.69), reduction in importation of watermelon with (WMS=4.66), promotion of better weed control and planting methods with (WMS=4.56), keeping food price down with (WMS=4.55), high crop yield with (WMS=4.51), increases farmers' income with (WMS=4.44), reduction of pest and diseases infestation with

(WMS=4.36), reduced compact in natural ecosystem with (WMS=4.35), and enhancement of food security with (WMS=4.27) were the effects of Agricultural Technologies Adoption on watermelon production in the study area. This implies that all variables used to measure the effects of agricultural technology were significant as it affected the productivity and the standard of living of watermelon farmers in the study area. Amobi (2012) postulated that major constraints to adoption of technologies were found to be lack of capital, high cost of fertilizer and lack of market for produce, Moreover, non-adoption of improved water melon production practices negatively affects water melon production in Africa.

**Table 4: Effects of Agricultural Technologies Adoption on watermelon production**

Variables	SA	A	U	D	SD	WMS	Rank
Poverty reduction among farmers	82(75.4)	23(21.3)	1(0.9)	2(1.9)	0(00)	4.85	1 st
Agrochemicals (seed treatment, use of insecticides & fungicides to treat diseases)	81(75.0)	27(25.0)	0(00)	0(00)	0(00)	4.69	2 nd
Reduces Importation of watermelon	71(65.7)	37(34.3)	0(00)	0(00)	0(00)	4.66	3 rd
Promotes better weed control and planting method	61(56.5)	45(41.7)	0(00)	0(00)	2(1.9)	4.56	4 th
Keeps food price down	69(63.9)	33(30.6)	2(1.9)	4(3.7)	0(00)	4.55	5 th
High crop yield	59(54.6)	47(43.5)	0(00)	2(1.9)	0(00)	4.51	6 th
Increases farmers' income	45(41.7)	62(57.4)	1(0.9)	0(00)	0(00)	4.49	7 th
Reduces the infestation of pest and diseases	46(42.6)	58(53.7)	2(1.9)	1(0.9)	1(0.9)	4.36	8 th
Reduced impact in natural Ecosystem	48(44.4)	54(50.0)	2(1.9)	4(3.7)	0(00)	4.35	9 th
Enhances food security	50(46.3)	49(45.4)	2(1.9)	2(1.9)	5(4.6)	4.27	10 th

Source: Field Survey, 2021.

SA- Strongly Agreed, **A-** Agree, **U-** Undecided, **D-** Disagree, **SD-** Strongly Disagree.

Constraints experienced by watermelon farmers in adoption of agricultural technology in the study area

Result from table 5 revealed that poor extension services with the highest weighted mean score (WMS =4.31), low farm income with (WMS =2.89), lack of fund and credit facilities with (WMS =2.83), poor government policy with (WMS =2.75), insufficient land for cultivation with (WMS=2.63), unavailability of improved seed with (WMS=2.44), lack of

awareness of improved technology with (WMS =2.41), and tediousness of the technology and risked involved with (WMS =1.88) were the constraints experienced by watermelon farmers in adoption of agricultural technologies in the study area. This implies that all these constraints affected the adoption of agricultural technologies on watermelon production negatively in the study area thereby reducing their productivity.

Table 5: Constraints experienced by watermelon farmers in adoption of agricultural technology in the study area

Variables	Major Constraint	Minor Constraint	Not a Constraint	WMS	Rank
Poor extension services	108(100.0)	70(64.8)	2(1.9)	4.31	1 st
Low farm income	96(88.9)	12(11.1)	0(00)	2.89	2 nd
Lack of fund and credit facilities	76(70.4)	31(28.7)	1(0.9)	2.83	3 rd
Poor government policy	81(75.0)	27(25.0)	0(00)	2.75	4 th
Insufficient land for cultivation	68(63.0)	40(37.0)	0(00)	2.63	5 th
Unavailability of improved seed	48(44.4)	60(55.6)	0(00)	2.44	6 th
Lack of awareness of improved technology	46(42.6)	60(55.6)	2(1.9)	2.41	7 th



Tediousness of the technology and risk involved	20(18.8)	49(45.4)	39(36.1)	1.37	8 th
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Source: Field Survey, 2021.

Test of relationship between selected socio economic characteristics and the perceived effects of Agricultural Technologies on watermelon production.

The result of the relationship between selected socio economic characteristics and the effects of Agricultural technologies on watermelon production was analyzed using Pearson Product Moment Correlation (PPMC) and presented in Table 6. The

result revealed that age ($r = -0.403$, $P < 0.05$), household size ($r = -0.251$, $P < 0.05$), farm size ($r = -0.172$, $P < 0.05$), and amount of loan received annually ($r = -0.343$, $P < 0.05$) were statistically significant with the effects of Agricultural Technologies Adoption on watermelon production. Therefore, the null hypothesis in the direction age, household size, farm size and amount of loan received annually is rejected.

Table 6: Test of relationship between selected socio economic characteristics of watermelon farmers and the effects of agricultural technologies adoption in watermelon production.

Variable	r-value	p-value	Remark
Age	-0.403	0.000	S
Household Size	-0.251	0.009	S
Farming Experience	-0.396	0.000	S
Farm Size	-0.172	0.075	NS
Annual Income	-0.211	0.029	NS
Number of Cooperative Society	-0.200	0.038	NS
Amount of Loan Received annually	-0.343	0.000	S

Source: Field Survey, 2021.

Test showing the significant relationship between constraints experienced by watermelon farmers in adoption of Agricultural Technologies and the effects of Agricultural Technologies on watermelon production.

Chi-square result from Table 7 revealed that low farm income ($\chi^2 = 35.593$, $p < 0.05$), poor government policy ($\chi^2 = 59.259$, $p < 0.05$), unavailability of improved seed

($\chi^2 = 48.000$, $p < 0.05$), poor extension services ($\chi^2 = 65.333$, $p < 0.05$), lack of fund and credit facility ($\chi^2 = 16.333$, $p < 0.05$), tediousness of technology and risk involved ($\chi^2 = 78.370$, $p < 0.05$), and insufficient land for cultivation ($\chi^2 = 187.167$, $p < 0.05$) were statistically significant with the effects of Agricultural Technologies adoption on watermelon production. Therefore, the null hypothesis is rejected.

Table 7: Chi-square test showing relationship between constraints experienced by watermelon farmers in adoption of Agricultural Technologies and the effects of Agricultural Technologies on watermelon production.

Variables	χ^2	Df	p-value	Remark
Low farm income	35.593	1	0.000	S
Poor government policy	59.259	1	0.000	S
Unavailability of improved seed	48.000	1	0.000	S
Poor extension services	65.333	1	0.000	S
Lack of fund and credit facilities	16.333	1	0.000	S
Lack of awareness on improved technology	1.815	1	0.178	NS
Tediousness of the technology and risks involved	78.370	1	0.000	S
Insufficient land for cultivation	187.167	2	0.000	S

Source: Field Survey, 2021.

Conclusion and recommendation

Based on the findings of this study, it can be concluded that, above average (54.7%) of the respondents were male, (54.6%) were married with the mean household size of 6 years and average of 15

years of experience on watermelon production. The result further revealed the available agricultural technologies adopted by the watermelon farmers in the study area were hybrid watermelon seedlings, pest control management, improved line spacing, planting

depth, timely planting. Also, farmers' age, access to extension services and nature of extension services provided, level of education, income level were the factors affecting the adoption of agricultural technologies in the study area.

The result further revealed that poor extension services, low farm income, lack of funds and credit facilities, poor government policy, insufficient land for cultivation, lack of awareness of improved technology were constraints experienced by watermelon farmers in adoption of Agricultural technologies in the study area. The result of the hypothesis revealed that, age, household size, farm size and amount of loan received annually were statistically significant with the effects of Agricultural technologies adoption on watermelon production in the study area.

Based on the findings the following recommendations were made:

- i. It is needed to further promote new agricultural technologies by designing and fabricating based on farmer's problem and need.
- ii. Extension agents should be well involved in disseminating these technologies by using open field days, demonstration and control plots so as to encourage farmers in adopting the technologies.
- iii. Government and other stakeholders need to also invest in extension services in sensitizing watermelon farmers in the study areas of new innovations as this have the potential to increase adoption rate as well as farmers' productivity and income.

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