

Determinants of improved maize varieties planting in Ondo and Ekiti states, Nigeria**Adedapo, A. O.**

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Abstract

Maize is one of the most important staple foods in Nigeria; hence, improved varieties are developed to boost its production. The study was carried out to determine the factors influencing the production of maize in Ondo and Ekiti states, Nigeria. Precisely, the study ascertained the socio-economic characteristics of the respondents, sources of seeds, sources of information and the factors influencing the production of maize in the two states. A multi-stage sampling procedure was employed to select 160 maize farmers from Ondo and Ekiti States, while a well-structured interview schedule was used to elicit information from them. The data were analyzed using descriptive statistics and linear regression. The findings revealed that most of the maize farmers in Ekiti and Ondo States were male and within their active age ranges of 43 and 46 years, they were married with an average household size of five and six persons respectively, most of them were literate. They belong to one or more social associations and depended exclusively on family and hired labour for their farming activities. The improved seeds varieties planted were obtained mostly from the agro-allied stores, while friends, radio programmes and extension personnel were their primary source of information across the two states. The regression analysis revealed that the most important variables that determine the planting of improved maize varieties in the two states were similar, (educational background, farming experience, extension contact, farm size and gestation period) with slight variation in age and marital status. The study recommends effective input supply to agro allied stores and effective information dissemination of information on improved seed varieties to farmers to enhance its utilization and enhance maize production.

Keywords: *Adoption, determinant factors, improved maize varieties, smallholder farmers*

1. Introduction

Maize (*Zea mays* L.) is one of the most important staple food crops grown in Nigeria. It is a cereal crop which belongs to Gramineae family; it is a high yielding crop consumed either in a fresh or processed form and it is readily digested with cost advantage when compared to other cereal crops (IITA, 2001; Girei, Saingbe, Ohen and Umar, 2018; Issa, Kagbu and Abdulkadir, 2016). It is an essential source of carbohydrate and if eaten in the immature state, provides useful quantities of Vitamins A, B, C and Iron (Kudi, Bolaji, Akinola and Nasa, 2011; Faleye, 2013). Maize is used extensively as the primary source of calories in animal feeding and feed formulation, as well as raw materials for agro-industries and industrial products such as oil, syrup, drinks, starch, hydrolysed dextrins and sugar (Abdulrahman and Kolawole, 2006; Mignouna, Mutabazi, Senkondo and Manyong 2010). Maize seed is essential and to a great extent, the yield and quality of maize production depend on the quality of the seed planted (Awotide, Diagne and Omonoma,

2012; Adenuga, Omotesho, Ojehomon and Diagne, 2014). Hence, the International Institute of tropical agriculture (IITA) developed improved varieties of maize.

Improved maize varieties enable farmers to cultivate several times within the same planting season. The genetic potentials of the improved maize varieties enhanced quality at harvest, its resistance to pests and diseases, drought and competition with weeds (Africa Rice Center, 2008). As a result of this, Nigeria has witnessed though fluctuating but increases in maize production in recent times. For instance, in 2012, Nigeria produced 8,695 metric tonnes of maize, but reduces to 8,423 metric tonnes in 2013 and increased to 10,059 and 10,562,11,548 metric tonnes in the year 2014, 2015 and 2016 respectively. However, it dropped to 10,420 metric tonnes in 2017 but rose to 11,000 metric tonnes in the year 2018 and 2019 respectively (World Data Atlas, 2020).

Despite the increase in maize production over the years, an estimate of 400, 000 metric tonnes of maize importation is reported in

2018 and 2019 (USDA, 2020). It shows that the demand for maize still outstripped the supply. Although maize is widely grown all over Nigeria, but, the leaders in this crop production are Niger, Taraba, Kaduna, Adamawa, and Plateau states. Despite the fact that Ekiti and Ondo states are agrarian, their production of maize is still at a low ebb, one of the primary factors influencing the yield and production of maize is the planting materials, hence, the study investigate the determinant of the maize production in the two states. Specifically, the study described the socioeconomic characteristics of the farmers, ascertain the sources of seeds and sources of information and the factors influencing the planting of improved maize varieties in the study area.

2. Materials and Method

2.1. Study Area

The study was carried out in Ekiti and Ondo States, Nigeria. The two states are in the southwest geopolitical zone. According to National Population Census (2016), the estimated population of Ekiti State was 2,737,186 with land areas of 6,353km², while that of Ondo State was 3,440,000 people with a land area of 15,500 km² (NBS, 2017). The two states altogether have about 34 Local Government Areas with many towns and villages or communities. The average annual rainfall of Ondo and Ekiti States are 1500 to 2000mm and 2000 to 2400, respectively (NiMET, 2019). It has a rainy season (April-October) and dry season (November- March); temperature ranges from 21-28°C with high humidity. The dry season always come with Harmattan cold dry winds from the northern

$Y = f(X_1, X_2, X_3, X_4, \dots, X_{10}, e_i)$

$Y = a_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + e_i$

Where,

Y = Planting of improved maize varieties

X₁ = Age of respondents (years)

X₂ = Sex (Male = 1, Female = 2)

X₃ = Marital status of respondents (married = 1, single/divorced/widowed = 0)

X₄ = Religion practiced

X₅ = Educational background

X₆ = Household size

X₇ = Farming Experience

X₈ = Contact with extension workers.

X₁₀ = Gestation period (Days/weeks)

e_i = Error term

deserts and blow into the southern region around this time.

2.2. Sampling Procedure

A multi-stage sampling procedure was used to elicit information from the maize farmers across the two states. The first stage involved a random selection of four Local Government areas from each state. Secondly, two communities were randomly selected from each of the selected LGAs. Thirdly, ten maize farmers were randomly selected from the selected communities. Thus, a total of 160 maize farmers were selected and interviewed across the two states. A well-structured interview schedule was used to elicit information from the respondents. The data were collected on socio-economic characteristics of the respondents, sources of seed, sources of information and the factors influencing the planting material utilized in the study area.

2.3. Methods of data analysis: Data were analyzed with the use of descriptive statistics such as frequency counts, percentages and mean to describe the socio-economic characteristic, sources seed and of information on seeds planted. Also, Linear Regression Analysis was used to determine the factors influencing the planting of improved maize varieties in the study area.

2.3.2. Regression modeling was used to determine the factors influencing the planting of improved maize varieties among the maize farmers in Ekiti and Ondo State Nigeria.

The implicit and explicit form of the regression model (Greene, 2003) employed is of the form:

3. Results and Discussion

3.1. Socio-economic Characteristics of the Respondents

The result in Table 1 shows that mean age of the maize farmers in Ekiti and Ondo states were 46 and 43 years respectively. It indicated that maize farmers in the two states were within the active age, although the farmers in Ondo State were a little bit younger than their counterparts in Ekiti State. More than half of the respondents from Ekiti (55.00%) and Ondo (58.75%) States were male while 45.00 and 41.25 percentages of them were female, respectively. It shows that both male and female genders were involved in maize production in the two states. Most of the maize farmers from Ekiti (75.00%) and Ondo (76.25%) States were married while 11.25 and 18.75 percentages of them were single, respectively. There is no much difference in the marital status distribution of the respondents across the two states.

More than half of the respondents from Ekiti (57.50%) and Ondo (52.50%) States were Christian while 31.25 and 45.00 percentages of them practiced the Islamic religion with a few percentage (11.25 and 2.50) involved in the African Traditional Religion. It indicated that maize production across the two states has no religion barrier. Over 90.00 percent of the respondents from both states could read and write, showing a high literacy level, which is expected to promote the planting of improved maize varieties. It corroborates the assertion of Adenuga *et al.* (2014) that education tends to improve agricultural productivity significantly. The result in Table 2 shows the source of the seed and sources of information across the two states. Most of the maize farmers in Ekiti (61.25%) and Ondo (68.75%) States got their improved maize seed from the agro-allied stores. A few (18.75%) of the farmers in Ekiti State replant some of their harvested crops, while 13.75 percent of their counterpart from Ondo State got their seed through the extension agents. Hence, maize farmers across the two states have access to improved maize varieties which corroborate the findings of Kudi *et al.* (2011).

The mean household sizes of the respondents from both states were moderate (five and six persons respectively). The average years of farming experience of the maize farmers in Ekiti State were 14 years while that of Ondo state was 11 years. The farmers from both states were highly experienced and are expected to be conversant with the improved maize varieties.

Almost half (40.00% and 47.0%) of the maize farmers from the two states acquired their farmland through inheritance. Also, 20.00 and 47.50 percentages of the maize farmers rent lands in Ekiti and Ondo States respectively. About 55.00 and 51.25 percentages of the maize farmers belong to one or more social associations. Being members of social associations might afford them the opportunities to access useful information on maize production.

The farmers in the two states combined the use of family and hired labour might have moved out or working somewhere else, or looking for a job. Issa *et al.* (2016) affirmed that most maize farmers depend exclusively on family and hired labour for their farming activities on their maize farm. It is expected since most of the family members might be engaged with other activities. For instance, the farmers' children are expected to be in school, while the grown up ones

3.2. Sources of Seeds and Sources of Information

The sources of information on improved seeds were similar with radio, extension agents and agro allied stores having the highest percentages in both states, with more farmers received information from other farmers and researchers in Ondo state. It affirms the findings of Adebo and Apata (2007) that radio still retain its position as a primary source of information to the farmers in the two states.

Table 1. Socio-economic Characteristics of the Respondents

Variables	Ekiti State		Ondo State	
	Frequency	Percentage	Frequency	Percentage
Age (Years)				
Less than 21	6	7.50	0	0.00
21 – 40	32	40.00	40	50.00
41 – 60	25	31.25	39	48.75
Above 60	17	21.25	1	1.25
Mean	46		43	
Sex				
Male	44	55.00	47	58.75
Female	36	45.00	33	41.25
Marital Status				
Single	9	11.25	15	18.75
Married	60	75.00	61	76.25
Divorced	6	7.50	3	3.75
Widow	0	0.00	1	1.25
Widower	5	6.25	0	0.00
Religion				
Christianity	46	57.50	36	45.00
Islam	25	31.25	42	52.50
African Traditional Religion	9	11.25	2	2.50
Educational Background				
No Formal Education	8	10.00	8	10.00
Primary Education	11	13.75	17	21.25
Junior Secondary Education	14	17.50	18	22.50
Senior Secondary Education	19	23.75	18	22.50
Tertiary Education	21	26.25	18	22.50
Household size				
1 – 4	36	45.00	11	13.75
5 – 8	39	48.75	61	76.25
Above 8	5	6.25	8	10.00
Mean	5		6	
Farming Experience (Years)				
1 – 10	37	46.25	44	55.00
11 – 20	18	22.50	29	36.25
21 – 30	12	15.00	7	8.75
31 – 40	6	7.50	0	0.00
41 – 50	4	5.00	0	0.00
Above 50	3	3.75	0	0.00
Mode of Land Acquisition				
Inheritance	32	40.00	22	27.50
Rent/Lease	23	28.75	38	47.50
Bought	16	20.00	16	20.00
Gift	9	11.25	4	5.00
Membership of Social Association				
Yes	44	55.00	41	51.25
No	36	45.00	39	48.75

Source: Field survey, 2018.

Table 2. Sources of Seeds and Information

Sources of Seeds	Ekiti State		Ondo State	
	Frequency	Percentage	Frequency	Percentage
Previous Harvest	15	18.75	9	11.25
Agro-allied shop	49	61.25	55	68.75
Friends	4	5.00	4	5.00
Extension Agent	7	8.75	11	13.75
Research Institute	5	6.25	1	1.25
Sources of Information				
Extension Agents	15	18.75	14	17.50
Researchers	8	10.00	13	16.25
Radio programmes	28	35.00	22	27.50
Television programmes	8	10.00	6	7.50
Other farmers	9	11.25	22	27.50
Seed sellers	12	15.00	3	3.75

Source: Field survey, 2018.

3.3. Determinant of the Adoption of Improved Maize Varieties

Table 5 shows the determinant of the planting of improved maize varieties among the farmers across the two states. The linear function was chosen as the lead equation because it exhibited better diagnostic statistics than other models. Specifically, the coefficient of the age of maize farmers in Ondo State was negative and significant at 5% level of probability. It implies that the older the maize farmers in Ondo State the lower their planting of improved maize varieties. However, the coefficient of the age of maize farmers in Ekiti State was positive but not significant with the planting of improved maize varieties.

The coefficient of the marital status of the maize farmers in Ekiti State was positively significant at 5% level of probability with the adoption of improved maize varieties. This is indicative the planting of improved varieties is likely to occur when the farmer is married than when he is not. This affirmed the assertion of Umar *et al.* (2014) that married farmers have more responsibilities to shoulder in terms of providing basic needs of their family. It indicated that their marital status have negative relationship with the use of improved maize varieties in the area, while the marital status of their counterpart in Ondo State was not significant.

The coefficient of the educational background of the maize farmers in Ekiti State was positive and significant at 1% level of probability, while that of their counterpart from Ondo State was negative and significant at 5% level of probability. It was opined that there is a direct relationship between the planting of improved maize varieties and educational status of the maize farmers in Ekiti State. It indicates that as educational status increases, adoption level also increases among farmers. It affirms the findings

of Baruwa *et al.* (2015) and Adekoya *et al.* (2014). However, it was a different in Ondo State where a negative relationship exists between the farmers' educational status and the planting of improved maize varieties.

The coefficients of farming experience of maize farmers across the two states were positive and significant at 5% level of probability. This implies that farmers acquire more experience as the rate of planting of improved maize varieties increases and it corroborate the findings of Kudi *et al.* (2011). The contact with extension personnel across the two states was significant at 5% level of probability. Though, there is a negative relationship with the extension contact in Ekiti State.

The coefficient of the farm size of the maize farmers in Ekiti State was negative and significant at 5% level of probability, while that of their counterparts in Ondo State was positively significant at 1% level of probability. This indicated that the decrease in farm size in Ekiti State the leads to increase in likelihood of adoption of improved maize varieties. It was a different case in Ondo State, where increase in farm size leads to increase in likelihood adoption of improved maize varieties. Also, the gestation period of the improved maize varieties was negatively significant at 10% level of probability in Ekiti State, while it was positively significant at 5% level of probability in Ondo State. This implies that increase in gestation period of the improved maize varieties leads to decrease in likelihood of planting among the maize farmers in Ekiti State, but it was different among the maize farmers in Ondo State.

Table 3 Regression analysis showing the determinant of the adoption of improved maize varieties in the Study Area

Variables	Ekiti State				Ondo State			
	Coefficients	Std. Error	t value	Sig.	Coefficients	Std Error	t value	Sig.
Constant		0.667	4.361	0.000		0.625	5.006	0.000
Age (X ₁)	0.393	0.008	1.563	0.123	-0.312**	0.011	-1.845	0.069
Sex (X ₂)	-0.022	0.135	-0.162	0.871	-0.183	0.161	-1.538	0.129
Marital Status (X ₃)	0.289**	0.090	1.743	0.086	0.116	0.156	0.975	0.333
Religion practiced (X ₄)	-0.208	0.099	-1.553	0.125	-0.158	0.136	-1.418	0.161
Educational Background (X ₅)	0.303***	0.0945	3.203	0.001	-0.065**	0.029	-2.173	0.045
Household size (X ₆)	0.070	0.246	0.495	0.622	-0.078	0.042	-0.674	0.502
Farming Experience (X ₇)	0.293**	0.067	1.715	0.075	0.247**	0.012	1.853	0.068
Extension Contact (X ₈)	-0.227**	0.020	-1.734	0.088	0.213**	0.010	1.872	0.052
Farm Size (X ₉)	-0.262**	0.049	-2.046	0.045	0.477***	0.079	3.266	0.002
Gestation Period (X ₁₀)	1.083*	0.637	1.702	0.088	-0.027**	0.013	-2.044	0.047
R square	0.240				0.286			
F value	1.328				3.122			
Adjusted R ²	0.059				0.195			

Source: Field survey, 2018. *** Significant at 1%, **Significant at 5%, *Significant at 10% levels of probability

4. Conclusion and Recommendation

This study concluded that most of the maize farmers across the two states were mostly male and young. Most of them were married with moderate household sizes with one form of formal education or the other. The primary source of seed planted was agro-allied store and the main channels of information used were radio and friends. The regression analysis revealed that the most important variables that determine the planting of improved maize varieties in Ekiti State were

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- marital status, educational background, farming experience, extension contact, farm size and gestation period. While that of Ondo State were age, educational background, farming experience, extension contact, farm size and gestation period. The study recommends effective input supply to agro allied stores and effective dissemination of information on improved seed varieties to farmers to enhance its utilization and enhance maize production
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