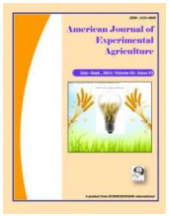

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Assessment of Factors Associated with Low Yield of Cashew among Farmers in Growing Areas of Nigeria

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Authors' contributions

The research work was carried out in collaboration with authors from different areas of specializations. Author AEA conceptualized the study. All authors were involved in field data collection while authors AEA and EOU performed the statistical analyses. Author AEA wrote the manuscript and authors OSI, EOA and FOO reviewed it. All authors read and approved the final manuscript.

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ABSTRACT

The study assessed the factors affecting low yield of cashew among farmers in Kwara and Edo States between March and April, 2014. It examined the socio-economic characteristics, factors contributing to cashew low yield, sources of cashew planting materials and sources of information on cashew cultivation among farmers in the study areas. Data collection was through structured questionnaire administered on 160 respondents selected through multistage sampling procedure. Descriptive statistics and chi-square were used in data analysis. Results showed that majority of the farmers were ageing with a mean age of 52 years and 60% of them had more than 16 years of cashew farming experience. Most (69%) cashew farms were less than 15 years indicating that the cashew trees were of average age and are still in their productive years. The mean yield of respondents was 10 bags using 80kg bag which was low because this number is not economical considering other inputs of production. Majority of respondents obtained cashew planting materials from fellow farmers and their own farms and got information on cashew cultivation from fellow farmers. Chi-square results revealed that there was significant relationship ($p<0.05$) between insect pest attack, poor cashew price, lack of improved variety, farm abandonment, high cost of farm

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labour, inadequate farm maintenance, no government support and yield of cashew. Efforts should be made by stakeholders in the cashew value chain to address relevant factors affecting low yield through a holistic government intervention programme such as Agricultural Transformation Agenda (ATA).This will develop a sustainable marketing strategy that will guarantee good prices of cashew nuts.

Keywords: Cashew low yield; farmers; socio-economic characteristics.

1. INTRODUCTION

Cashew plant is native to Brazil, from where the Portuguese explorers introduced it to Nigeria in the 15th and 16th century [1]. It is held with great esteem and value in many customs and cultures. It is known by many names across some parts of the world. In Mozambique, the Maconde tribe refer to it as the 'Devil's Nut'. In Nigeria (English) is called cashew, Potuguese-*caju,* French-*cajou,* Spanish-*maranon,* Italian-*anacardio,* Dutch-*acajou* and Indonesia-*jambu mente.* According to [2], Cashew nuts are offered at wedding ceremonies as a token of fertility and are considered by many to have aphrodisiac properties.

Cashew is a major product for millions of small-scale farmers in Sub-Sahara Africa. Globally, the annual production is about 2.1 million tons of raw nuts with an estimated value of US$ 1.5 to 2 billion [3]. The main cashew production regions are Africa, Vietnam, India and Brazil.

Cashew grows almost everywhere in Nigeria with production spanning across 27 out of 36 States in all the geo-political zones. Irrespective of the predominance of this crop in many states, yield per hectare is not encouraging. Nigerian yield in terms of nuts with shell is 22,855.19 kg/ha in 2012. When compared to yields from other countries within the same period like Peru (51,136.36 kg/ha), Philippines (46,807.81 kg/ha), Vietnam (38,944.84 kg/ha) and Mexico (30,088.44 kg/ha) according to [4] the yield in Nigeria is relatively low. Its product potentials had not been well harnessed due to varied factors ranging from low yielding plantations to inadequate farm management, processing facilities and marketing problems. Most cashew trees start bearing fruit in the third or fourth year, and are likely to reach their mature yield by the seventh year with favourable condition. The average nut yield of a mature tree is in the range of 7-11 kg per annum [2].

Nigeria is rated among the top five cashew producing countries. It is now ranked world's 2nd largest producer after Vietnam which is the highest producer with 1,190,900 tonnes. Nigeria currently produces 836,500 tonnes of cashew [4]. Three main cashew products are traded on the international market: raw nuts, cashew kernels and cashew nut shell liquid (CNSL).

In terms of annual trade, cashew earned Nigeria ₦24b in 2012 and provides about 600,000 jobs to people engaged in its production [5]. In the area of health benefits, cashew apple contains five times more vitamin C than an orange which makes it unique among other fruits [11]. The apple is also used traditionally as a curative for scurvy and stomach ailments like dysentery and diarrhoea. Fresh or distilled, it is a potent diuretic, possessing antiscorbutic properties and is useful for kidney troubles and in advanced cases of cholera [7]. Clinically, cashew nut consumption has also been proven to improve sperm count and reduce infertility among couples [8]. Cashew nut contains 47% fat, 21% protein and 22% carbohydrate according to a study carried out by [9].

As a way of reducing wastage of fleshy cashew apple on farmers' farms, the Cocoa Research Institute of Nigeria (CRIN) which has mandate for research into cocoa, cashew, coffee, kola and tea crops has so far developed various products from the cashew apple and these include: Top quality thermally stable chocolate from cashew, evaluated and acknowledged internationally. Top quality sweet (8-12% v/v alcohol), dry (17-18% v/v alcohol) wines and improved technique for processing cashew apples into juice, drink and jam have also been developed.

A locally fabricated juice extractor was developed by CRIN to produce cashew apple juice adaptable for use on a cottage industry scale. Also, CRIN is now producing cashew nuts coated with honey. These efforts are already adding value to the socio-economic life of consumers who are having high demand for them within the country. Despite these contributions to the national economy, the issue of declining production has remained a serious

challenge to all stakeholders in the cashew value chain.

Cashew production has not received adequate attention from the Federal Government since the advent of oil in the 1960s. There is abandonment and significant decline in yield of cashew in most growing areas of Nigeria [10]. For instance, it was reported that a farm having 400ha cultivated to cashew in Ogun State needs the intervention of CRIN scientists in rehabilitating and putting it into productive venture. However, the Agricultural Transformation Agenda (ATA) programme of government has added cashew to the existing value chain crops. CRIN in collaboration with the Federal Government distributed 10,000kg of Jumbo cashew nuts to farmers in 22 States of Nigeria from 23rd to 31st July 2014. This support was part of the transformation process in the cashew sub-sector.

It is envisaged that this intervention will boost the yield of cashew in the country. In view of this, the study was designed to address the inherent challenges associated with cashew field production in order to proffer possible solutions.

The main objective of the study was to assess the factors contributing to low yield of cashew among farmers in Kwara and Edo States. The specific objectives were to describe the socio-economic characteristics, ascertain the sources of cashew planting materials and the sources of information on cashew cultivation among cashew farmers.

It was hypothesized that there is no significant relationship between yield and factors affecting low cashew production.

2. METHODOLOGY

A multi-stage procedure was used to select respondents for the study. Stage1: Two States Kwara and Edo were randomly selected across two geo-political zones in Nigeria, South South and North Central. Stage 2: In each State, two Local Government Areas (LGAs) noted for cashew production were chosen. These include Isin and Irepodun in Kwara, Owan East and Etsako East in Edo States. Two villages per LGA where cashew is well produced were selected. Stage 3: Twenty farmers were selected in each village to make eighty per state using simple random sampling technique bringing the total number to 160 farmers. A list of cashew farmers in the two states selected was obtained from the Tree Crop Units (TCU) in the State ministry of Agriculture. A structured interview schedule instrument was used for field data collection from cashew farmers in the study areas. Descriptive statistics and chi-square were used in data analysis. The variables were measured at 0.05 Level of probability.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of Cashew farmers

The results showed that 69% of the respondents were males while 31% were females (Table 1). It means that more men were involved in cashew production than the women in the study areas. This is consistent with the results of [11,12] who reported similar findings. A number of the respondents (29%) were between 55-64 years with a mean age of 52 years indicating that the farmers were aging. This will have negative implication on their ability to increase production of cashew and invariably on yield. Majority (97%) of them were married. In terms of educational status, 42%, 21%, 24% had primary, secondary and tertiary education, respectively. It means that most of the respondents had one form of education or the other which will assist in adoption of technology in cashew production. Generally, education is thought to create a favourable mental aptitude for the acceptance of new practices [13]. The findings in Table 1 further revealed that many respondents (61%) cultivated 1-4 hectares of cashew farms. This indicates the small-scale nature of most of their farm holdings in the study areas. [14] also found that majority of cashew farmers in Oyo State were small holders. Most (69%) cashew farms in Kwara and Edo States were less than 15 years. It implies that the cashew trees were of average age and are still in their productive years. A reasonable percentage of the respondents (60%) had more than 16 years of farming experience. It means that they are experienced in cashew cultivation and this will improve production practices.

3.2 Cashew yield

In Table 2, the mean yield of respondents was 10 bags using 80kg bag. The respondents that obtained 1-5 bags were more than those having 5 and above. This quantity is rather low because a farmer cannot break-even with this number considering what it will amount to in monetary terms. A bag of 80kg of dried cashew nuts sells

for between N4,800 to N5,250 ($29.09 to $31.81) in Kwara and Edo States of Nigeria. It implies that farmers' productivity needs to be improved so as to have more bags that will generate more income and enhanced livelihood.

The production can be correlated with the hectarage of the farmers in which most of them have less than 4 hectares. This result is in consonant with the work of [14] who reported similar finding.

3.3 Factors that Contribute to Low Yield of Cashew

Table 3 shows that poor price of cashew (73%), insect pest attack (51%) (Stem girdler, Stem borer, termites and grasshopper), inadequate government support to cashew production (44%), high cost of farm labour (41%) and farm abandonment (35%) were considered to be very serious factors contributing to low yield of cashew while soil problem, farm location, none soil test before planting, lack of fertilizer use,

Table 1. Distribution of socio-economic characteristics of cashew farmers

Variables	Frequency	Percentage	Mean
Sex			
Male	110	68.8	
Female	50	31.2	
Age of farmers (Years)			
15-24	3	1.9	52.4
25-34	10	6.3	
35-44	32	20.0	
45-54	37	23.1	
55-64	47	29.3	
65 and above	31	19.4	
Marital status			
Married	155	96.9	
Single	5	3.1	
Educational status			
No formal Education	9	5.6	
Primary	67	41.9	
Secondary	34	21.2	
Tertiary	38	23.8	
Adult Education	12	7.5	
Farm size (Hectares)			
1-2	52	32.5	6.7
3-4	45	28.1	
5-6	16	10.0	
7-8	16	10.0	
9-10	9	5.6	
11 and above	22	13.8	
Age of cashew farms (Years)			
1-5	15	9.3	14.7
6-10	51	31.9	
11-15	44	27.5	
16-20	20	12.5	
21-25	12	7.5	
26 and above	18	11.3	
Experience (Years)			
3-9			14.7
10-16	39	24.4	
17-23	65	40.6	
24-30	31	19.4	
31 and above	21	13.1	
	4	2.5	

Source: Field survey, 2014 (n=160)

old age of cashew tree were not seen as serious factors. In addition, inadequate farm maintenance (40%) was also serious. It means that the very serious and serious factors constitute important variables to low yield of cashew in the study areas. It therefore implies that for increased cashew productivity, the identified factors must be properly addressed through an articulate programme that will make cashew economy to be more attractive. This could be done via formation of farmers' cooperatives and ATA which will make farmers' voice to be held by the government as well as relevant private partners in the cashew industry. In addition, appropriate integrated pest management scheme will be necessary to combat insect pest infestation in cashew farms.

3.4 Sources of Cashew Planting Materials

In Table 4, most of the respondents got cashew planting materials from fellow farmers and their own farms. Only 1.3% and 11% collected cashew planting materials from CRIN and Ministry of Agriculture in Edo and Kwara States respectively. It implies that majority of cashew in the fields of farmers were from the old varieties planted in their farms. CRIN as the institute with the national mandate on improvement of cashew in Nigeria needs to intensify efforts in making improved cashew varieties available to farmers so that the much desired yield would be achieved. Also, the State ministry of Agriculture in cashew producing States need to supply farmers with good planting materials so that they will get better seeds or seedlings as input for their farms. The implication of obtaining unrecommended genotypes for planting could be grave as they will not only lead to low productivity due to the inbreeding depression but will also break down the genetic potential of the crop.

3.5 Sources of Information on Cashew Cultivation

The results in Table 5 indicates that majority (65%) of the respondents obtained information on cashew cultivation from fellow farmers while others got theirs from other sources. This finding is in line with the work of [15]. They reported that farmers rely on neighbours, friends and relatives in obtaining information on cashew production. The extension agents that were supposed to be farmers' main source of information were quite low (about18%). There is need for increased extension agents' farmer contact in order to disseminate appropriate cultivation practices on cashew to them. This will go a long way in improving better access to information source that will increase production.

3.6 Association between Yield and Factors Affecting Low Cashew Production

The results in Table 6 reveal that there was significant relationship ($P<0.05$) between insect pest attack, poor cashew price, lack of improved variety, farm abandonment, high cost of farm labour, inadequate farm maintenance, no government support and yield of cashew. It implies that these were important factors contributing to low cashew yield in the study areas. All stakeholders in the cashew value chain should note these and work out appropriate interventions in reducing their effect on cashew yield.

Table 2. Distribution of cashew yield/80kg bag by respondents

Yield/80kg bag	Frequency	Percentage
1-5	36	22.5
6-10	31	19.4
11-15	29	18.1
16-20	13	8.1
21-25	2	1.3
26-30	24	15.0
31 and above	25	15.6

Source: Field survey, 2014 (n=160)

Table 3. Distribution of factors contributing to low yield of cashew

Factors	Frequency	Percentage
Insect pest attack		
Very serious	81	50.6
Serious	56	35.0
Not serious	23	14.4
Disease infection		
Very serious	42	26.3
Serious	60	37.5
Not serious	58	36.2
Soil problem		
Very serious	7	4.4
Serious	16	10.0
Not serious	137	85.6
Lack of fertilizer use		
Very serious	16	10.0
Serious	19	11.9
Not serious	125	78.1
Farm location		
Very serious	6	3.8
Serious	20	12.5
Not serious	134	83.7
Soil test before planting		
Very serious	9	5.6
Serious	20	12.5
Not serious	131	81.9
Inadequate farm maintenance		
Very serious	33	20.6
Serious	64	40.0
Not serious	63	39.4
No improved variety		
Very serious	45	28.1
Serious	45	28.1
Not serious	70	43.8
Old age of cashew tree		
Very serious	17	10.6
Serious	36	22.5
Not serious	107	66.9
Farm abandonment		
Very serious	56	35.0
Serious	31	19.4
Not serious	73	45.6
Poor price of cashew		
Very serious	116	72.5
Serious	30	18.8
Not serious	14	8.7
High cost of farm labour		
Very serious	65	40.6
Serious	57	35.6
Not serious	38	23.8
Climate variability		
Very serious	42	26.3
Serious	58	36.2
Not serious	60	37.5
Fire outbreak		
Very serious	46	28.7

Factors	Frequency	Percentage
Serious	55	34.4
Not serious	59	36.9
Inadequate government support		
Very serious	70	43.8
Serious	55	34.4
Not serious	35	21.8

Source: Field survey, 2014 (n=160)

Table 4. Distribution of respondents' sources of cashew planting materials

Sources	Frequency	Percentage
Own farm		
Yes	56	35.0
No	104	65.0
Fellow farmer		
Yes	94	58.8
No	66	41.2
Ministry of Agriculture		
Yes	17	10.6
No	143	89.4
Open market		
Yes	9	5.6
No	151	94.4
CRIN		
Yes	2	1.3
No	158	98.7

Source: Field survey, 2014 (n=160)

Table 5. Distribution of respondents' sources of information on cashew cultivation

Sources	Obtained information	Did not obtain information
Agric. Extension agents	28 (17.5)	132 (82.5)
Fellow farmer	104 (65.0)	56 (35.0)
Radio	34 (21.3)	126 (78.7)
Television	38 (23.8)	122 (76.2)
Newspaper	15 (9.4)	145 (90.6)
GSM phone	8 (5.0)	152 (95.0)
Farmer association	31 (19.4)	129 (80.6)
Non Governmental Oganisation (NGO)	3 (1.9)	157 (98.1)

Source: Field survey, 2014 (n=160) Figures in parentheses are percentages

Table 6. Chi square analysis of the association between yield and factors affecting low cashew production

Variables	df	χ^2 Value	p Value
Insect attack	2	31.737	0.000
Disease infestation	2	3.650	0.161
Poor cashew price	2	112.850	0.000
No improved variety	2	7.812	0.020
Farm abandonment	2	16.738	0.000
Fire outbreak	2	1.662	0.436
High cost of farm labour	2	7.212	0.027
Climate variability	2	3.650	0.161
Inadequate farm maintenance	2	11.638	0.003
Inadequate government support	2	11.563	0.003

Source: Field survey, 2014 df Degree of freedom, χ^2 is Chi-square, $p<0.05$

4. CONCLUSION

The study concludes that insect pest attack (stem girdler, stem borer, termites grasshopper), poor price of cashew nuts, inadequate government support to cashew production, high cost of farm labour, farm abandonment, inadequate farm maintenance and lack of improved variety were considered to be important factors contributing to low yield of cashew in producing areas of Edo and Kwara States of Nigeria. Majority of respondents obtained cashew planting materials from fellow farmers and their own farms. They got information on cashew cultivation from fellow farmers. Few respondents received information from extension agents that were supposed to be farmers' main source. Socio-economic variables indicated that men were more involved in cashew production than the women. The farmers were ageing and most of them had long years of farming experience. From the foregoing, efforts should be made by stakeholders in the cashew value chain to address relevant factors militating against low yield through an integrated pest management system, government intervention programme such as Agricultural Transformation Agenda (ATA) and a formidable market strategy that will guarantee good prices of cashew nuts. This will enhance farmers' livelihood and boost production.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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