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Economic Analysis of Yam Production among Smallholder Farmers in Kabba-Bunu Local Government Area of Kogi State, Nigeria

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Abstract

This study was conducted in Kabba-Bunu local government area of Kogi state, Nigeria. It specifically described the socioeconomic characteristics of yam farmers in the area; assessed the cost-benefit of yam production, determined factors affecting yam output, and ascertained constraints to yam production in the study area. A random sampling was used to select 90 yam farmers for the study. Primary data obtained through questionnaire administration were analysed using descriptive statistics, gross margin analysis, Ordinary Least Square (OLS) multiple regression model, and mean score from Likert type scale. Findings indicated majority of the respondents were male (81.1%) with the mean age of 47 years. Most of the respondents were married (84.4%) with a mean household size of 10persons, they had one form of formal education or the other (65.5%), the mean farm size of 1ha with an average farming experience of 22 years. The study further showed that yam production in the area was profitable and viable with a positive gross margin. The benefit cost ratio was ₦1.80K. Estimates of the OLS multiple regression indicated that the coefficient of seed (β = 1.859), fertilizer (β =-2.036), labour (β =-7.904), herbicide (β =37.834), education (β = 3366.806) and age (β = 758.368) significantly influenced yam output at 5%. The major constraints identified to yam production in the study area were high cost of inputs (M= 3.4), inadequate credit facilities (M = 3.2), poor storage and processing facilities (M=3.1). For increased output, the study recommends that production inputs be subsidized to farmer, and credit should be made available specifically for yam farmers to ease their production enterprise.

Keywords: Dioscorea, yam production, socioeconomic, cost-benefit, constraints, smallholder farmers

Introduction

Yam plays significant roles in the social-cultural and economic wellbeing of thousands of people in Nigeria and elsewhere in the world. Yam is among the major cash and most consumed food crops in West African countries like Nigeria (NBS, 2012). Yam belongs to the genus "Dioscorea" and family "Dioscoreaceae. Yam (*Dioscorea* spp) is among the most important food crops grown in Nigeria and across Africa. There are over 60 species of yam out of which six species are mostly grown in Nigeria. These include white yam (*Dioscorea rotundata*), yellow yam (*Dioscorea cayenensis*), water yam (*Dioscorea alata*), trifoliate yam (*Dioscorea dumentorum*), arial yam (*Dioscorea bulbifera*) and Chinese yam (*Dioscorea esculenta*). Out of these six species produced by Nigerian farmers, white yam (*Dioscorea rotundata*) is the most popular, with high social and economic value; hence, the focus of this study. Many important cultural values are attached to white yam, especially during wedding, religious (as thanksgiving items in churches) and other socio-cultural ceremonies. Izekor and Olumese (2010) reported that due to the importance attached to yam, many communities celebrate the new yam festival annually in Nigeria. Traditionally, yam is a prestige crop that is viewed and received with high respect, prominently during special gatherings such as new yam festivals in rural communities of eastern, central and southwest Nigeria (Nahanga and Bečvařova, 2015).

White yam (*Dioscorea rotundata*) is one of the major staple food crop in Nigeria and has potential for livestock feed and industrial starch production (Ayanwuyi et al., 2011). The demand for yam at household level in Nigeria is very high. It is eaten in different forms such as fufu (pounded yam or pound yam and amala in Nigeria), boiled, fried and roasted (IITA, 2009). It is a major source of energy in diet of Nigeria people. It can also be processed into crude flour by drying thin slices in the sun and then pound or ground into flour. Yam can further be processed into instant flakes producing a food similar to instant potato and can also be made into fried chip. Most of starch industries also make use of yam as one of their important raw materials (Ibitoye and Onimisi, 2013). Yam is rich in carbohydrate (75.5 - 83.3%), amino acid and vitamins (Thiamine, riboflavin and ascorbic acid). Yam contains a high value of protein (2.4%) and substantial amount of vitamins and minerals than some other common tuber crops (Ekunwe et al., 2008). White yam contributes about 200 dietary calories daily for more than 95 million

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people in Nigeria and as an important source of income and livelihood security to more than 55% of Nigerians who are involved in various stages of its production, transportation, marketing and processing. Therefore, the objective of Nigerian's food security programme of increasing agricultural production for food self-sufficiency can hardly be achieved without efforts towards increased production of important staple like yam. This is because, white yam is a principal tuber crop in Nigerian economy, in terms of land under cultivation and in the volume and value of production.

Nigeria is a major producer of yam accounted for over 65% (38 million metric tons) of the world yam production. This is valued at $7.75billion and cultivated about 2.9 million hectares of land in 2012 (FAO, 2013). Udemezue and Nnabuife (2017) also confirmed that Nigeria contributes two-thirds of global yam production yearly. According to the report of IITA (2009), the cultivation of yam is a very profitable farm enterprise despite its high costs of production and price fluctuations in the markets. An average profit per yam tuber, after harvest and storage in most producing areas in Nigeria at the peak period was calculated at over US$13,000 per hectare harvested. According to Philip et al. (2006), the major yam producing areas in Nigeria include the middle belt (Benue, Nasarawa, Kwara, Kogi and Niger), south-eastern and southwestern parts of Nigeria. Kogi State is one of the major yam producing areas in southeastern Nigeria with about 85% of the farm households producing yam.

In recent years with continuous increase in population, yam has become more expensive as its production is not keeping pace with the demand for the commodity. Udemezue and Nnabuife (2017) affirmed that irrespective of the growing attentions given to yam production in Nigeria, its production is still below average and this could be as a result of some limitations occasioned by the activities of yam production coupled with pests and diseases that could retard its growth. Hence, deliberate effort to increase production of yam in Nigeria needs to be urgently put in place if the challenges of food security must be put under control. Nigeria is by far the world's largest producer of yams, accounting for over 70% of the world production. Its cultivar is very profitable despite high costs of production and price fluctuations in the markets (IITA, 2013; Izekor and Olumese, 2010). An average profit per seed yam, after harvest and storage, was calculated at overUS$13, 000 per hectare harvested, and over 60% of people grow yams as a primary source of livelihood in Nigeria (IITA, 2013). The cost of producing yam tubers is observed to be high in the country. This is largely due to the high cost of seed yam and other inputs and that situation has caused yam cultivation to suffer a severe setback.

Despite the importance of yams to people and as a source of food security, the attention to yam production is still questionable, as many rural dwellers are still living in hunger in Nigeria. While yam production issues have been stressed on agronomical practices, a research study carried out on the economic efficiency of this crop grown in this region with small farm holdings, which is labour-intensive, reveals that land, labour and material (fertilizers and chemicals), credit and extension services inputs have a significant bearing on the yield of yam in region (Shehu, et al., 2010).

In Nigeria, some of the factors adduced to low yam production are unavailability of planting materials, soil degradation, poor handling and storability, pest and disease and other environmental factors (Ibitoye and Onimisi, 2013). Seed yam for cultivation has continued to be a problem for the farmers and lack of extension service and inadequate fund. The cost of producing yam is also observed to be higher compared with other tubers in the country. This is largely due to the high cost of seed yam. Some researchers have empirically investigated factors that determine the level of yam production in Nigeria and elsewhere in the world. For instance, Bamire and Amujoyegbe (2005) find a positive relationship between net returns (profitability) in yams output and land improvement techniques in Nigeria. In the same direction, studies by Zaknayiba and Tanko (2013) reveal that lack of access to inputs, finance, poor producer prices, inadequate of storage facilities, incidences of pests and diseases have negatively affected yam production. Similarly, Ike and Inoni (2006); Maikasuwa and Ala (2013) examine some determinants of yam production in particular regions in Nigeria. They find that the factors of production such as labour, finance and material inputs like fertilizer have influenced yam production in the region. In the same direction, Etim et al. (2013) investigated the relationship between farm level and output-oriented technical efficiency indices. The study ascertained the socio-economic characteristics of yam farmers in the study area; determined the cost-benefit of yam production; identified factors affecting the level of yam production; and identified constraints of yam production in study area. In order to encourage increased production among small holders' farmers to meet increasing demand and supply gap for yam, the economic assessment of the production of the commodity must be empirically carried out.

Methodology

Kogi State is located between latitude 6º30 N and 8º30'N and longitude 5º51 E and 8º00'E, in the Guinea forest-savanna ecological zone of Nigeria.

The population of the State is 3,314,043 (NPC, 2006). The State has a tropical climate with rainy and the dry seasons. The rainy season lasts from March to October while dry season falls between November and February. The annual rainfall ranges from 1016 mm to 1524 mm (KADP, 1995; KO-SEED, 2004). The study was conducted in Kabba-Bunu Local Government Area of Kogi State, Nigeria. Kabba-Bunu local Government Area is located in the western senatorial district of Kogi State. The Local Government is bounded in the North by Lokoja Local Government Area, Ijumu Local Government to the South, Yagba- East and Mopamuro Local Government Local Government Areas to the west, and to the East by Okehi Local Government Area. It has two major districts namely: Kabba and Bunu. According to the National Population Census (2006), Kabba-Bunu Local Government Area has a population of 145,446 people constituting 74,289 males and 71,157 females. It has land area of about 2,706 km2. The local government usually experience 2 distinct seasons, the wet and dry seasons. The wet season usually spans from the middle of March to October while the dry season covers the period between November and early March. The vegetation of the area comprised of derived savannah and rain forest in some areas. There are vast available lands for farming. Agriculture is the most important economic activities in the Local Government as majority of the population derive their livelihood from it. Agricultural practice in the area is still at subsistence level, which invariably makes the farmers vulnerable to poverty. The soil is viable for growing crops such as yam, maize, cassava, sorghum, cashew, cocoa, oil palm and coffee.

Sampling Procedure

Random sampling technique was adopted in the selection of the respondents (yam farmers) for the study. This was done as follows: three villages each were randomly selected from the two districts making a total of six villages for the study, and fifteen (15) yam farmers were randomly selected from each village, thus making a total of ninety (90) respondents for the study. The selected villages in the districts included: Kabba, Oke, dayo and Otun in Kabba district, while Edumo, Apaa and Iluke from Bunu district. Primary data were collected from the respondent using a structured questionnaire, personal interview, informal discussion and observation. Simple descriptive statistics, gross margin analysis, multiple regression models and mean score using 5 point Likert scale were used to analyse data collected.

Model Specifications

Gross margin analysis

The model is specified as shown below:

GM= GI-TVC.

GI= TPP.PY- TVC

Where GM = gross margin (naira)

PY = unit price of a product (naira)

TVC = total variable cost (naira)

TVP = total value of production (naira)

TPP = total physical product (kg)

GI = gross farm income (naira)

The higher the value of gross margin calculated, the better the business (Ebukiba, 2010, Ibitoye, 2012 and Orebiyi, 2012)

Multiple Regression Model

The Regression is specified as follows

Y = f ($X_1X_2X_3X_4$ and U)……equation (1)

Where Y = total yam yield (kg)

X_1 = Seed Cost (Naira)

X_2 = Fertilizer Cost (Naira)

X_3 = Labour Cost (Man - days)

X_4 = Herbicide Cost (Naira)

X_5 = Education (Years)

X_6 = Age (Years)

X_7 = Household Size (Number)

U = Error term

Explicitly, the functional form is expressed as follows:

Linear form:

$Y = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + U$

……equation (i)

Where B_0 is = constant (intercept), $B_1 – B_4$ = coefficient to be estimated and $X_1 – X_4$ are variables as defined above.

Results and Discussion

Socioeconomic Characteristics of Respondents

According to Table 1, majority (81.1%) of the sampled respondents were males while the remaining 17.9% were females, with a mean age of 47 years. This finding agrees with Ariyo et al. (2020) who noted that yam production in Ekiti State, Nigeria is dominated by males. According to Ironkwe and Ewuziem (2010), traditionally yam is regarded as ‘‘Man’s crop’’. The high percentage of males can be attributed to the strenuous nature of the various operations involved in yam production. The mean age of 47 years implies that the respondents are still in their active and energetic age to carry out various operations involved in yam production. This finding agrees with Ariyo, et al. (2020) who reported similar age among yam farmers in Ekiti State.

Household size of the sampled respondents indicated an average household size of 10 persons. It is a common believe that members of the household will serve as source of labour in agricultural production. According to NBS (2007),

the national average household size is 5. The size of the household is an importance variable especially in a situation where human power is a major source of power for carrying out farming activities. This agrees with Ariyo et al. (2020) who stated that the mean household size in his study area was 5 persons. The table further showed that 78% of the sampled yam farmers in the study area could read and write while 22% could not. This also agrees with Ariyo et al. (2020) who also found that education affect the speed with which new technologies are being diffused and accepted by farmers. Literate farmers find it easier to interpret extension messages and as well adopt an innovation. Formal education enables farmers to obtain useful information from media and other sources. This finding also agrees with Onuche et al. (2014) when they reported an average schooling years of 7.2 which is equivalent to secondary education among small scale farmers in Kogi State. This is in line with the findings of Abubakar (2000) who reported that the ability and readiness with which a particular producer accepts or rejects an innovation depends on his or her educational background. According to Akinbile and Ndaghu (2000), education has an important implication particularly for the adoption of new technology and practice.

The mean farm size of the farmers was 1 hectare; this implies that yam farmers in the study area still farm at subsistence level. This implies that most of the farmers were operating on subsistence level. The result agrees with Ariyo et al. (2020) who found that the mean farm size cultivated by the respondents was 1.83 hectares. This could be attributed to the difficulty in acquiring land for farming purposes. Studies have shown that most rural farmers in Nigeria operated on small scale (Aniedu, 2006; Emodi, 2009). According to CBN/NISER (2002), the average farm size per farmer was put at 2 hectares. It should be noted that the lands are fragmented into patches in various locations. While the mean farming experience was 22 years. This is an indication that yam farmers in the area are well experienced and should be able to understand the various techniques in yam production for increased productivity. It could also have a multiplier effect on their ability to manage agricultural inputs if accessed. Years of experience are a measure of the period an individual has been involved in yam cultivation. Farming experience is an important ingredient to enjoying greater yield that will translate to higher profit. The result agrees with Ariyo et al. (2020) that the mean year of experience of the respondents was 10 years. Farming experience enables farmers to set realistic targets. This finding corroborates the finding of Ironkwe et al. (2007) that experience improves farmers' production skills such as good planting methods and the use of improved seeds.

Table 1: Distribution of Respondents According to Socioeconomic Characteristics

Socioeconomic variables	No. of Respondents	Percentage	Mean
Sex			
Male	73	81.1	
Female	17	17.9	
Age			
21 – 40	26	28.9	
41 – 60	46	51.1	47 years
61 – 80	18	20.0	
Marital Status			
Single			
Married	12	13.3	
Widow	76	84.4	
	02	2.2	
Educational Status			
No formal education	22	24.4	
Formal education below six years	0	0	
Primary education	10	11.1	
Secondary education	38	42.2	
Tertiary education	20	22.2	
Household size			
1 – 5	22	24.4	10 member
6 – 10	28	31.2	
11 – 15	40	44.4	
Other Occupation			
None	7	7.8	
Civil service	36	40.0	
Trading	45	50.0	1 hectare
Artisan	2	2.2	
Farm Size			
0.5 – 1	68	75.6	
1.5 – 2	12	13.3	
2.5 – 3	6	6.7	
Above 3	4	4.4	
Farming experience			
1 – 10	33	36.7	
11 – 20	8	8.9	
21 – 30	41	45.5	22 years
Above 30	8	8.9	
Annual Income from Yam Farming			
Below 50,000	8	8.9	
50,000 – 100,000	22	24.5	
101,000 – 150,000	20	22.2	
151,000 – 200,000	20	22.2	167,128.89
Above 200,000	20	22.2	

Source: Field Survey, 2020

Cost Benefit in Yam Production per Hectare

Results in Table 2 shows that, an average return of ₦ 325,590.45 was realized from a hectare of yam farm in the area with a total variable cost of ₦181,660.02. The Gross Margin calculated for yam production per hectare of farmland was ₦143, 930.43. A positive gross margin is evident that yam production in the study area is profitable. Additionally, value of the Benefit Cost Ration (BCR) Connotes that a naira invested in yam farming could yield a return of ₦1.80k. The BCR obtained in this study is similar to a BCR of 1.96 reported by Jonathan and Anthony (2012) among yam farmers in Taraba State. However, an earlier study by Ibitoye and Onimisi (2013) reported a BCR of 0.43.

Table 2: Cost Benefit of Yam Production per Hectare

Items	Value (₦)
A. Variable Costs	
Land clearing	6,319.11
Ridging	10,822.22
Yam set/seed	118, 303.50
Planting	5, 455.60
Weeding	4,265.55
Fertilizer	5,077.78
Pesticide	2,355.56
Herbicide	10,544.70
Stalking	1,660.00
Harvesting	6,516.67
Grading and sorting	1,577.78
Loading and transportation	8,761.55
Total Variable Costs (TVC)	181, 660.02
B. Fixed Costs	
Depreciation on farm tools	2, 109.85
Total Fixed Costs (TFC)	2, 109.85
C. Total Costs (A + B)	183, 769.87
D. Return	
Yam tubers	325,590.45
Total Return/Revenue (TR)	325, 590.45
E. Gross Margin, GM = TR – TVC	143,930.43
F. Benefit Cost Ration, BCR = TR/TC	1.8

Source: Computed from Field Survey, 2020

Factors Affecting the Level of Yam Production

The Output of the Ordinary Least Square (OLS) linear regression model on factors affecting the level of yam production in the study area showed that R2 value of 0.699 which implied that almost 70% of the variation in yam output is explained by the explanatory variables identified in the study, while the remaining 30% is attributed to other variables outside the scope of this study (error term) (Table 3). An F-value of 27.162 which was significant at 1% implied that the model is a good fit. The result shows that except for household size, all the variables included in the model significantly influenced yam production in the study area

Seed Cost (Naira)

The coefficient of seed cost was positively related to the output of yam at 1% level of significance. This implies that the higher the amount spent on purchasing seed the higher the output of yam. This finding on seed cost could be in terms of quantity and quality. Improved yam seedlings tend to cost more with a multiplier effect on increased productivity. Also, more quantity of yam seed implies higher cost which could as well translate to more output.

Table 3: Estimates of Ordinary Least Square OLS Linear Regression on Factors Affecting the Level of Yam Production

Variables	Coefficient	t-value
(Constant)	-78123.185	-3.419***
Seed cost	1.859	3.626***
Fertilizer cost	-2.036	-3.523***
Labour cost	-7.904	-6.465***
Herbicide cost	37.834	9.954***
Education	3366.806	4.384***
Age	758.368	2.584**
Household size	674.189	0.775
R^2		0.699
F-Value		27.162***

Source: Computed from Field Survey, 2020; *** and ** = significant @ 1% and 5%

Fertilizer Cost (Naira)

The coefficient of fertilizer was negatively signed and significant at 1%. This implies that the higher the amount of money spent on purchasing fertilizer, the lower the output of yam. This finding could be attributed to the associated high cost of fertilizer in the area which may not necessarily translate to high yield. Additionally, the fertilizer may not be applied at the required or recommended rate which may as well decrease yield as against yield increment. The result agrees with Ariyo et al. (2020) that fertilizer was significantly affected the output of yam.

Labour Cost (Naira)

The coefficient of labour cost was negatively related to yam farmers' output. This relationship was seen to be significant at 1%. By implication, an increase in the Naira spent on labour by yam farmers will decrease the output form yam production. This finding is not surprising as high labour cost does not necessarily imply more man-days of labour which could invariably translate to more output. The finding of this study could be associated with the recent increase in the cost of hiring labour to carryout various activities on the farm.

Herbicide Cost (Naira)

The coefficient of herbicide cost was positively related to yam output at 1% level of significance. This direct relationship implies that an increase in herbicide cost will increase the output of yam produced in the area. High value spent on herbicide

and its application in this case could mean more area of land to be cultivated with its multiplier effect on yam output. Additionally, absence of unwanted plants on yam field could as well increase productivity. This finding is in line with apriori expectation.

Education

The coefficient of number of years spent schooling positively influenced yam output at 99% confidence level (1% level of significance). This is an indication that an increase in the number of years spent schooling will increase yam output. This finding is in line with the apriori expectation. More educated farmers are known to be early adopters of innovation which is centered at improving and increasing agricultural productivity. Educated farmers are also knowledgeable in the efficient allocation of productive resources for increased productivity. Pointedly, education is believed to increase the ability to perceive, interpret and react to new events and improves farmers' managerial skills. This finding agrees with Adejoh et al. (2010) who reported that formal education has helped farmers to obtain useful information from bulletins, agricultural newsletters and other print media sources of information.

Age

The coefficient of age was positively signed and significant 5%. This direct relationship is an indication that older yam farmers have more output. That is, an increase in the age of yam farmers will increase their output. Increase in age could be associated with increased years of experience in yam production. As experience increases, farmers become more skillful in the application and use of productive resources with its resultant effect on increased output.

Constraints to Yam Production

The constraints to yam production indicated that except for inadequate market, all the items included as constraints were serious and affect yam production in the study area. This is evident their respective mean scores ranging from 2.5 and above. High cost of production inputs (such as seed/yam mini-set, fertilizers, and pesticides) (M=3.4 respectively), were rated as serious constraints to yam production in the area. The high cost of fertilizers (M=3.4) as well as its scarcity negatively affects yam production and this often time leads to low productivity. This finding agrees with Samusi and Salimonu (2006) who reported labour input (81.7%) as a major constraint to yam production in Oyo State. The role of credit access in agricultural production cannot be out of place. Yam farmers in the study area also rated inadequate credit access for yam production as a serious constraint with mean score of 3.2. Credit (M=3.2) is identified as a constraint too. Credit is required for the purchase of productive resources. This finding agrees with the work of Ajijola, et al. (2014) who in their study found out that inadequate finance is the major problem facing yam production in Oke-Ogun, Oyo state, Nigeria. Other serious constraints identified by yam farmers in the area included poor storage and processing facilities (M =3.1), low price of produce (M = 2.9), disease and pest infestation (M = 2.7), high transportation cost (M = 2.6) and low productivity (M = 2.6). Finding on transportation cost agrees with Zaknayiba and Tanko (2013) who reported that 80% of yam farmers in Nassarawa State complained of cost transportation.

Table 4: Mean Distribution of Respondents According to Constraint

Constraints	VS (4)	S (3)	NS (2)	NP (1)	Total	MS	Decision
Low price of produce	27	32	23	8	90	2.9	Serious
Transportation cost	9	32	48	1	90	2.6	Serious
High cost of inputs	35	54	1	0	90	3.4	Serious
Disease and pest infestation	20	20	49	1	90	2.7	Serious
Inadequate credit facilities	27	59	1	3	90	3.2	Serious
Poor storage and processing facilities	46	23	1	20	90	3.1	Serious
Inadequate market	0	26	42	22	90	2.1	Not Serious
Low productivity	20	32	22	16	90	2.6	Serious

Source: Field Survey, 2020 VS=Very Serious, S=Serious, NS=Not Serious, NP=Not a Problem, MS=Mean Score

Conclusion and Recommendations

The study revealed that that yam production is a profitable enterprise. Though, dearth of productive resources such as seed, labour, herbicide and fertilizer significantly influenced the output of yam. Evidence abound that if farmers are given the enablement and enlightenment on the need to scale up their productive capability the much sought food security will be assured.

Recommendations

Based on the findings, the following recommendations are made:

1. Yam farmers in the area should be encouraged to form cooperative groups to enable them access credits in form of loans from government and financial institutions.
2. Production inputs such as fertilizers should be provided by government to farmers at more

subsidized rate. This will help reduce the cost of farm inputs and increase output.

3. Considering the role of education in increasing farmers' output, educational trainings such as adult education should be provided by relevant agencies involved in Agricultural and rural development.
4. Infrastructural facilities such as good road and storage/processing facilities should be provided by government in order to ease the movement of yam produce from the farm to the market and in turn reduce the cost of transportation. Availability of storage and processing faculties will help in value addition.

References

Abubakar, H. Economic (2000). Analysis of Egg Production in Birnin Gwari, Jama'a and Igbai Local Government Areas of Kaduna State, Unpublished M.Sc Dissertation, Department of Agricultural Economic and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

Akinbile, L. A. and Ndaghu, A. A. T. (2000). Poverty level and poverty alleviation strategies of farm families Michika L.G.A of Adamawa State, Nigeria. Journal of Economics and Rural Development. 2000;14(2):101-109.

Aniedu, C. (2006). Gender factors in access and use of improved yam technologies by farmers in Southeastern Nigeria. Unpublished PhD Thesis. Department of Agricultural Extension Michael Okpara University of Agriculture, Umudike; 2006.

Ariyo, O.C., Usman, M. B., Olorukooba, M. M., Olagunju, O. E., Oni, O. B., Suleiman, R., Adetunji, A. J. and Ariyo, M. O. (2020). Economics of Yam Production in Gboyin Local Government Area of Ekiti State, Nigeria, Journal of Experimental Agriculture International. 42(4): 99-110.

Ayanwuyi, E., Akinboye, A. O. and Oyetoro, J. O. (2011). Yam production in Orire local government area of Oyo State, Nigeria: farmers perceived constraints. World Journal of Young Researchers, 1(2): 16 – 19.

Bamire, A. S. and Amujoyegbe, B. J. (2005). Economic analysis of land improvement techniques in small holder yam based production system in the agro-ecological zones of southwestern Nigeria. Journal of Human Ecology, 18(1): 1–12.

CBN/NISER (2002). The impact of SAP on Nigerian Agriculture and Rural Life. National Report 1; 2002.

Ekunwe, P. A., Orewa, S. I and Emokaro, C. O. (2008). Resource use efficiency in yam production in Delta and Kogi States of Nigeria. Asian Journal of Agricultural Research,2: 61-69.

Emodi, A. I. (2009). Analysis of rice innovation system in Southeastern Nigeria. Unpublished PhD research findings seminar. Department of Agricultural Extension, University of Nigeria Nsukka; 2009.

Etim, N. A., Thompson, D. and Onyenweaku, C. E. (2013). Measuring efficiency of yam (Dioscorea spp.) production among resource poor farmers in rural Nigeria. Journal of Agriculture and Food Sciences, 1(3): 42–47.

FAO. (2013). FAOSTAT database. [Online]. Available at: http://bit.ly/NmQzZf. [Accessed: 10. April 2014].

Ibitoye, S. J. and Ommisi, J. A. (2013). Economic analysis of yam production in Kabba – Bunu Local Government Area of Kogi State, Nigeria Journal of Development and Agriculture Economics, vol. 5(11) PP.470 – 475.

Ike, P. C. and Inoni, O. E. (2006). Determinants of yam production and economic efficiency among small-holder farmers in South-eastern Nigeria. Journal of Central European Agriculture, 7(2): 337–342.

IITA (2009). International institute of tropical Agriculture (11TA, 2016) information Hand book.

IITA (2013). International institute of tropical Agriculture (11TA, 2010) information Hand book.

Ironkwe A. G., Asiedu R., and Unamma R. P. A (2007). Adoption of yam Minisett technology by women farmers' in Abia State, Nigeria. Journal of Agriculture and social Research (JASR). 2007;7(2):95-100.

Ironkwe, A. G. and Ewuziem, J. E. (2010). Production factor and farmers' output in using yam Minisett technology in South-East Agricultural Zone, Nigeria. Agric. Society of Nigeria (ASN). Proceedings of the 44th Annual Conference LAUTECH. 2010.

Izekor, O. B. and Olumebe, M. I. (2010). Determinants of yam production and profitability in Edo State, Nigeria. African journal of General Agriculture, 6(4), 205-210.

Jonathan, B. and Anthony, B. (2012). Research use efficiency in yam Production in Taraba State, Nigeria Agricultural science, 3(2): 71-77.

Kogi Agricultural Development Project (KADP). (1995). A colossus in agricultural transformation, Lokoja, KADP, 88.

KO-SEEDS. (2004). Kogi State Economic Empowerment and Development Strategy. Ministry of Economic Planning, Lokoja, 101pp.

Maikasuwa, M. A. and Ala, A. L. (2013). Determination of profitability and resource-use efficiency of yam production by women in Bosso local government area of Niger State, Nigeria. European Scientific Journal, 9(16): 196–205.

Nahanga V. and Vera, B. (2014). Yam production as pillar of food security in logo local Government Area of Benue State, Nigeria. European Scientific Journal. 2014;10 (31): 27-42.

N.B.S (2012). Statistical Year Book.2006, Nigeria Bureau of Statistics (N.B.S), Abuja, Nigeria.

National Population Commission (NPC). (2006). Population and housing census of Federal Republic of Nigeria, Kogi State priority Tables, 1.

Onyenweaku, C. E. (1994). "Economics of Irrigation in Crop Production in Nigeria". Issues in African Rural Development 2, Bret, S.A.(ed), Arlington, USA: Win Rock International Institute for Agricultural Development/African Rural Social Sciences Research Network. Pp 129-138.

Onuche, U., Opaluwa, H. I. and Edoka, M. H. (2014). Ill- Health and Agricultural Production: Evidence from Kogi State of Nigeria. African Journal of Food, Agriculture Nutrition and Development.14 (1): 8488-8503.

Orebiyi, J. S., Eze, C. C., Henry-Ukoha, A., Akubude, F. C. and Ibitoye, S. J, (2011). Demand for institutional credit from NACRBD, by small scale farmers in Imo State Nigeria.International Journal of Agricultural Science, Research and Technology, 1(2):83-82.

Philip, O., Adefiloye, K. A. O & Olatunde, G. O. (2006). Principle and practices of crop production ideals and innovations publications, a division of BUM (Nigeria) Ltd. P 198.

Shehu, J. F., Iyortyer. I. T., Mshelia, S. I. and Jongur, A. A. U. (2010). Determinants of yam production and technology efficiency among yam farmers in Benue State, Nigeria. Journal of Soci-science, 24(2); 143-148.

Udemezue, J. C and Nnabuife, E. L. C. (2017). Challenges of Yam (Dioscorea spp.) Production by Farmers in Awka North Local Government Area of Anambra State, Nigeria. British Journal of Research, 4 (2): 1– 4.

Zaknayiba D. B. and Tanko, L. (2013). Cost and returns analysis of yam production among small scale farmers in Karu Local Government Area, Nasarawa, State, Nigeria. Publication of Nasarawa State University, Keffi, pp.73-80.