academicJournals

Vol. 5(11), pp. 470-475, November, 2013
DOI 10.5897/JDAE2013.0484
ISSN 2006-9774 © 2013 Academic Journals
http://www.academicjournals.org/JDAE

Journal of Development and Agricultural Economics

Full Length Research Paper

Economic assessment of yam production in Kabba-Bunu Local Government Area of Kogi State, Nigeria

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Accepted 20 August, 2013

This study examined the economic assessment of yam production in Kabba- Bunu Local Government Area of Kogi State, Nigeria. Data used for the study were obtained using structured questionnaire. The questionnaire was administered to 150 randomly selected yam farmers in the area. Descriptive statistics, multiple regression and gross margin (GM) analysis were used to analyze the data. The regression result showed that, farm income (2.778), age (1.820) and education level (2.334) have significant effects on yam output in the area. The GM analysis also revealed that, yam production is profitable in the study area with an average profit of ₦ 121,200 ha^{-1}. It was therefore recommended that, farm inputs be made available to farmers at subsidized prices as a way of improving income from yam production.

Key words: Yield, profit, farmers, variables and socioeconomic.

INTRODUCTION

Yam *(Dioscorea* spp.) is an annual tuber and monocotyledonous crop. The plant Genus comprises of over 600 species with only 10 species producing edible tuber. Six of these edible species are cultivated in Africa and only 3 of them are available in Nigeria. In Nigeria, the primary species cultivated are the white yam *(Dioscorea rotundata*), yellow yam *(Dioscorea cayensis*) and water yam (*Dioscorea alata*), (Amusa, 2000).

FAO (2002) reported that Nigeria accounted for about 71% (26 000 000 tons) of the total world production of yam harvested from 2,760 ha. Yam production in Nigeria has more than tripled over the past 45 years from 8.7 000 000 tons in 1961 to 31.3 million tons 2006. This increase in output is attributed more to the large area planted to yam than to increased productivity (Izekor and Olumese, 2010). Though the area cultivated to yam production is still being increased, production growth rate declined tremendously from average of 27.5% between 1986 and 1990 to 3.5% in the period between 1991 and 1999 (FAO, 2002). However, between 2001 and 2006 production growth rate increased by 31.3%. Record of yield showed similar trend during the same period. Average yield per hectare dropped from 14.9% between 1986 and 1990 to 2.5% in the period between 1991 and 1999. However, the period between 2001 and 2006 recorded 23.4% increase in the average yield (Izekor and Olumese, 2010).

Yam production trend in Kogi State has been observed to be fluctuating for the past 15 years and has not kept pace with other major yam producing states in the country. The production index was estimated at 1.174 000 000 metric tons in 2000. Yam production output in the State dropped to 1.00331 000 000 metric tons in 2003, there was significant rise to 1.26428,000,000

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Table 1. Area cultivated and production of yam in Kogi State between 1994 and 2010.

Year	Area cultivated ('000 ha)	Production ('000 metric tons)	Yield (mt/ha)
1994	92.15	912.96	9.91
1995	87.50	911.18	10.41
1996	89.25	929.40	10.41
1997	92.09	1093.40	11.87
1998	88.823	11038.74	11.69
1999	110.75	1393.03	12.58
1999	110.75	1393.03	12.58
2000	100.03	1174.00	11.74
2001	94.00	1089.70	11.59
2002	92.20	1015.41	11.01
2003	89.46	1003.31	11.23
2004	91.28	1100.00	12.05
2005	101.89	1153.54	11.32
2006	120.43	1264.28	10.50
2007	100.06	1226.35	12.26
2008	104.56	1286.96	12.31
2009	109.37	1361.60	12.45
2010	114.62	1480.11	12.91

Source; Kogi ADP crop area and yield survey, 2011.

metric tons in 2006 with the cultivated area of 120,400 ha. In 2008, the total area cultivated for the state reduced to 104,560 ha and the corresponding production output was 1286.96 metric tons (Table 1).

The production figure for 2008 marked the beginning of increase yam production in the state as the production of yam increased to 1.36160 000 000 metric tons in 2009 with cultivated area of 114620 ha.

On the basis of quantity of root and tuber crops produced in Nigeria, yam ranks second to cassava. Yam is the perfect stable food appreciated in its state and cultural role. It is a major source of energy in diet of Nigeria people. Yam can be eaten when boiled, roasted, baked or fried. 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. It provides job opportunities and income to both the producers and the marketers. Yam peels serve as feed for livestock and as a good component of farm yard manure. It is used as laboratory crop for scientific investigations.

As food crop, the place of yam in the diet of Nigerians cannot be overemphasized. It contribute more than 200 dietary calories daily, for more than 150 million people in West Africa as well as serving as an important source of income (Babaleye, 2003). According to Okenwe, Orewa and Emokaro (2008), yam contains a high value of rotein (2.4%) and substantial amount of vitamins and minerals than some other common tuber crops. It is also comparable to any starchy root crops in energy and the fleshy tuber is one of the main sources of carbohydrates in the diet of most Nigerians. Yam also plays vital roles in traditional culture, rituals and religion as well as local commerce of African people (Izekor and Olumese, 2010). Yam is reported to be part of the religious heritage of several Nigerian tribes and often play key role in religious ceremony (Amusa, 2000). Due to the importance attached to yam, many communities in Nigeria celebrate the new yam festival annually.

In Nigeria, some of the constraints to yam production are unavailability of planting materials, soil degradation, poor handling and storability, pest and disease and other environmental factors (Ibitoye and Attah, 2012). Seed yam for cultivation has continued to be a problem for the farmers. 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. On the average, about 25% of the annual yam harvest is used as seed yam (Kushwaha and Polycarp, 2001). This situation has caused yam cultivation to suffer a severe setback due to high cost of production. It is in light of these problems that, the study assessed the economic performance of yam production in Kabba-Bunu Local Government Area of Kogi State, Nigeria.

MATERIALS AND METHODS

The study area is Kabba-Bunu Local Government Area of Kogi State, Nigeria. Kabba-Bunu local Government Area is one of the 21 Local Government Areas in Kogi State. It is located in the western senatorial district of Kogi State. The Local Government was created

in 1991. It is bounded in the North by Lokoja Local Government and by Ijumu Local Government to the South, Yagba- East and Mopamuron Local Government share boundary with the Local Government to the west and to the East by Okehi Local Government Area. According to the National Population Census (2006), Kabba-Bunu Local Government Area has a population of 145,446 people which is made up of 74,289 males and 71,157 females. It has land area of about 2,706 km^2.

The local government usually experience 2 district seasons, the wet and dry seasons. The wet season usually spans from the middle of March to October while the dry season cover the period between November and early March. The vegetation of the area comprise 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.

A total of 5 communities were purposively selected from the 2 districts of Kabba-Bunu Local Government Area for this study. Odolu and Okedayo were selected in Kabba district while Edumo, Iluke and Apaa were selected in Bunu district. They were purposively selected because of their high levels of involvement in yam production in the area. Twenty five respondents were randomly selected from each of the 5 communities to have a grand total of 150 respondents for the administration of the questionnaire. Well structured questionnaires were used for the collection of primary data. The questionnaire elicits information on the socioeconomic characteristics of the farmers, problems militating against yam production in the area and other related information on the inputs and output of yam production. Descriptive and inferential statics such as age (%), mean, gross margin (GM) analysis and multiple regression were used to analyze the data.

Model specification

The regression model was specified as follows:

$$Y = \alpha + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7$$

Where, Y = Yam output (Tons), α= Constant (Intercepts), X_1 = Farm size (hectare), X_2 = Farm Income (naira), X_3 = Age (years), X_4 = Farming experience (Years), X_5 = Sex (male = 1, female = 0), X_6 = Family size (number), X_7 = Educational level (Years), B_1…..b7= Coefficients of independent variables, ei = Stochastic error term, GM analysis was used to determine the cost and returns in yam production in the studied area. The model used is specified thus:

$$GM = TR – TVC$$

Where, GM = Gross margin, TR = Total revenue, TVC = Total variable cost.

Gross ratio of the farm was also calculated. Gross ratio is a profitability ratio that measures the overall success of the farm. The lower the ratio, the higher the return per naira invested (Ekunwe et al., 2008):

$$GR = \frac{TFE}{GI}$$

Where, GR = Gross ratio, TFE = Total farm expenses and GI = Gross income (total revenue).

Return on capital invested (ROI) was also calculated. ROI uses accounting information as revealed by the financial statement to measure the profitability of an investment (Ekunwe et al., 2010). According to Izekor and Olumese (2010), the ROI measure the returns per naira invested. Any investments in which the ROI is greater than 1, indicates a potentially profitable venture and if less than 1, it shows a potentially unprofitable venture. ROI is the GM divided by total variable cost:

$$R1 = \frac{GM}{TVC}$$

Where, R1 = Return on capital invested, GM = Gross margin, and TVC = Total variable cost

RESULTS AND DISCUSSION

The results of socioeconomic variables of the respondents are presented in Table 2. The socioeconomic variables considered includes: Age, family size, sex, farming experience, farm size, educational status, and farm income. The study shows that, majority of the respondents (90%) are still within the productive age bracket of 21 to 60 years. The mean age of the respondent was 46 years. Odinwa et al. (2011) observed similar age bracket among yam farmers in Northern area of River State. The result generally reveals that, majority of the respondents are still energetic to carry on with yam production.

Family size of the respondent shows that majority of them (68%) belong to the family size of 6 to 10 members. The mean family size was found to be 7 members per family. The mean family size recorded for the study is lower than 13 members per family recorded by Pius and Odjurwuedernie (2006) for the Northern part of Nigeria.

Gender distribution of the respondents revealed that, 78% of the farmers are males while the remaining 20% are females. The result of farming experience also showed that, all of them had above 5 years experience in yam production. About 42% of the respondents had no formal education. About 33% others had primary education while about 25% of the remaining respondents attained either secondary or tertiary education. It is then obvious that, the educational standard of the respondents are generally low. Formal education enables the farmers to obtain useful information from media and other sources. Formal education aids farmers to accept new technologies.

The analysis of farm size showed that, 82% of the respondents had between 1 and 5 ha of farmland. The result of farm income of respondents showed that, about 52% of the farmers had less than ₦ 100,000.00 as annual farm income. About 22% had between ₦100,000 and ₦200,000 as annual farm income. The remaining 26% had above ₦ 200,000 as annual farm income. Going by the small farm size of the respondents in this study, couples with their low levels of farm income, it can be conducted that, most yam farmers in the study area are still operating at the subsistence level. This is in

Table 2. Distribution of respondents according to socioeconomic variables.

Socioeconomic variable	Frequency (No)	Age (%)
Age (year)		
Less than 21	0	0
21 – 40	45	30
41 – 60	91	60
Above 60	14	10
Total	150	100
Family size (number)		
1-5	18	12
6-10	101	68
Above 10	31	20
Total	150	100
Sex		
Male	117	78
Female	33	22
Total	150	100
Farming experience (year)		
Less than 6	0	0
6 – 15	88	59
Above 15	62	41
Total	150	100
Farm size (hectare)		
Less than 1	54	36
1 – 5	69	46
Above 5	27	18
Total	150	100
Educational status		
No formal education	63	42
Primary education	49	33
Secondary and above	38	25
Total	150	100
Farm income (naira)		
Less than ₦100,000	78	52
₦100,000 – ₦ 200,000	33	22
Above ₦200,000	39	26
Total	150	100

agreement with the opinion of Izekor and Olumese (2010) that over 90% of the country food supply comes from smallholder farmers.

The effect of socioeconomic variables of respondents on yam production is presented in Table 3. Some of the socioeconomic variables that were regressed on yam output (tones) includes: farm size (x_1), farm income (x_2), age (x_3), farming experience (x_4), sex (x_5), family size (x_6) and educational levels (x_7). The regression result of the estimated double log equation showed that, the coefficient of multiple determinants (R^2) is 0.79 which implies that, 79% variability in the output of yam was explained by the variables in the model while the remaining 21% could be attributed to error and omitted variable. The f-.value of 2.258 is significant at 1% level which confirms the significance of the entire model.

Farm income is positively related to yam output and significant at 1% level. This implies that, an increase in the income level of farmers will translate into increase in yam output. This result validates the findings of Ibitoye et al. (2012), who reported a positive and significant relationship between farmer's income and rice output. The educational level was found to be negatively related to output of yam production and significant at 1% level. This implies that, an increase in the number of years spent in school will lead to reduction in yam output. This may be attributed to the fact that, most of the respondents with higher qualification were not full time farmers but have other major occupations from which they earn their income. The regression result further showed that, age (X_3) is negatively related to yam output and only significant at 10% level. This implies that, as the farmer is ageing their productivity on the farm will decline. The significance of farm income, educational level and age of farmers is in conformity with earlier findings by Ibitoye et al. (2012), Pius and Odjurwuedernie (2006) and Ekunwe et al. (2008). Other variables like farm size (x_1), farming experience (x_4), sex (x_5) and family size (x_6) were found to be insignificant and therefore have no serious impact on yam production in the area.

Result of cost and return analysis in Table 3 suggests that, an average of 4,000 kg of yam tuber was realized from a hectare of yam farm. About ₦58,800 was spent on hiring labour and this constituted about 21% of total variable costs. The amount spent on procuring yam sett was 200,000 which is about 72% of the total cost of production. The cost of yam sett is still a major concern in yam production. The GM calculated for yam production per hectare of farmland was ₦121,200. This implies that, every one naira invested on yam production in the area generate a revenue of ₦1.43. This shows that, yam production in the study area is profitable.

The cost and return analysis of yam production per hectare in the study area is presented in Table 4:

(i) Gross margin (GM) Analysis of yam production:
Total revenue (TR) – Total variable cost (TVC)
GM = ₦ 400,000 – ₦ 278,800 = ₦ 121,200.
(ii) Return on investment (RI) = ₦121,200 / ₦278,800 = 0.43
(iii) Gross ratio (GR)= ₦278,800// ₦ 400,000 = 0.70

The ROI was 0.43 which implies that, every one naira invested in yam production generated a profit of ₦0.43. The gross ratio was also found to be 0.70 which is less than 1. This further confirmed that, yam production in the

Table 3. Regression results of the effect of socioeconomic variables on yam output.

Variable	Estimated coefficient	t- Statistics	Levels of significance
Farm size (x_1)	21.171	0.483	Not significant
Farm income (x_2)	0.012	2.778	1% level
Age (x_3)	-27.127	1.820	10% level
Farming experience (x_4)	10.233	0.855	Not significant
Sex (x_5)	-122.463	-0.323	Not significant
Family size (x_6)	-47.973	-1.374	Not significant
Educational levels (x_7)	-38.808	2.334	1% level
Constant	1257.523	2.984	
R^2= 0.79	f-value=2.258		

Table 4. Cost and returns analysis of yam production per hectare in the study area.

Items/operation	Unit of measurement	Unit cost (₦)	Total quantity	Total value (₦)
Labor cost				
Land clearing	Man day	800	18	14,400
Land cultivation	Man day	800	18	14,400
Planting	Man day	600	10	6,000
Fertilizer Application	Man day	600	5	3,000
Weeding	Man day	600	15	9,000
Staking	Man day	600	5	3,000
Harvesting	Man day	600	15	9000
Total				58,800
Other farm tools				
Yam sett	Sett	40	5,000	200,000
Fertilizer	50 kg bag	2000	4	8,000
Simple farm tools	Lump sum	-	-	4,000
Transportation	Lump sum	-	-	4,000
Miscellaneous expenses	Lump sum	-	-	4,687
Total farm input cost				220,000
Total variable cost (A + B)				278,800
Yam output				
Revenue				
Yam tuber	Kg	100	4,000	400,000

study area is profitable. This result agrees with the findings of Odinwa et al. (2011) who in their studies found yam mini sett production to be profitable.

CONCLUSION AND RECOMMENDATIONS

Yam is a valuable source of carbohydrate for human consumption. It can be processed into various staple, intermediate and end product forms which are used for direct consumption by both human and animals. It is used as basic ingredient for snacks or made into flour and for making instant chips. Judging by the value of yam in the society coupled with the fact that yam production is a profitable venture in the area, yam production will continue to play a prominent role in the area.

In order to ensure a better profitability level and a rapid improvement in yam production, it is recommended that:

(i) Agricultural mechanization should be encouraged as it would reduce labor cost. This can be achieved through the provision of tractors to farmers groups at subsidized prices and establishment of tractor hiring centre's at affordable prices.

(ii) Agro-chemicals especially fertilizers should also be provided by government to farmers at subsidized rate. This will also help to reduce the cost of farm inputs and increase productivity.

(iii) The cost of planting materials (yam sets) constitutes major part of variable costs of yam production. Government should therefore commercialize yam mini sett technique and make it available and affordable for rural farmers in the state.

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