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ASSESSMENT OF FACTORS INFLUENCING COCOYAM PRODUCTION AMONG FARMERS IN SOUTHEAST ZONE OF NIGERIA

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ABSTRACT
This study assessed factors influencing cocoyam production in southeast Nigeria. The data for the study were collected from 288 farmers. An interview schedule with a well structured questionnaire was used for the study. The data were analyzed by means of descriptive statistics such as frequency, percentages and mean. Ordinary least square regression analysis was used for the analysis of factors influencing cocoyam production. The result of the multiple regression analysis of the factors influencing cocoyam production shows an R^2 value of 0.822 which indicates that 82.2% of the total observed variations in the dependent variable were accounted for. F–statistics was significant at1% indicating the fitness of the model used. The result also revealed that seven variables were statistically significant and conforms to the researcher's a prior expectation. The major production related factors influencing cocoyam production output were land, access to credit, farm size, farming experience, fertilizer and planting materials. Result of the three point likert scale on the constraints militating against cocoyam production showed inadequate fund with the mean of (X =2.71) and high mortality rate of cocoyam (X=2.68) as the major constraints to cocoyam farming. It was recommended that Agricultural credit should be made available and accessible to cocoyam farmers for increased farm size and for increased cocoyam production.

Keywords: cocoyam production, tuber crops

INTRODUCTION
Cocoyam *(Xanthosomamaffafa* and *Colocasiaesculanta)* is one of the major tuber crops in which Nigeria is the largest producer in the world, producing about 5.39 million metric tons per annum (Food and Agriculture Organization, 2008; FAO, 2009). Nigeria accounts for an average production figure of 37 percent of total world output of cocoyam, but the average production rate is still low. Two major species of cocoyam cultivated in Nigeria are *Xanthosoma maffafa and Colocasia esculanta.* The production of cocoyam in Nigeria however, had stagnated in the last few decades due to several production constraints among which are various pre-harvest and postharvest challenges (Nwakor *et al*., 2015). The average yield has remained relatively low ranging between 5.0 and 7.5tons /ha in Nigeria. This discrepancy is a clear indication that current yield of cocoyam is currently far below its potential yield of 15-20 tons per hectare in farmers field (Onyeka, 2014). There is problem of diseases including the taro leaf blight caused by fungi *Phytophoracolocasine*. The cultivation of cocoyam in most African countries including Nigeria is essentially in the hands of resource poor farmers with minimum inputs (NRCRI, 2011). Okoye *et al.* (2009) established that cocoyam have yield potential of 30-60 tons per hectare which indicates that there is much room for improvement on the farmers output through research and development of the crop. Cocoyam is grown extensively in the eastern States but it does best in places with high humidity, good water supply and good soil throughout the growing period (Okereke*et al.,* 2009). Before the civil war, Imo State was the largest producer of cocoyam in

South-eastern Nigeria, but now the output of this crop has declined Eze and Okorji (2003). The management practices of the crop in the past are no longer in use in the cocoyam growing communities as supposed, due to emphasis on modern agriculture, yet the output of cocoyam has continued to decline in the face of modern technologies. High cost of labour, poor extension of modern agricultural technologies and many other factors may have contributed to the poor output of cocoyam in the recent years. The demand for cocoyam has continued to increase with increase in population. In spite of considerable increase in hectarage cultivation of the crop so as to increase the output, yet the poor average yield of about 170,000 tons per annum continue to prevail (Ohajianya, 2005). It was against this background that it becomes imperative to assess the factors influencing cocoyam output among farmers in the study area.

OBJECTIVES OF THE STUDY

The general objective of this study was to assess factors influencing cocoyam production among farmers in Southeastern Nigeria.

Specific objectives:

1) Ascertain the farm size, labour cost and membership of co-operative societies of farmers.
2) Ascertain the production output, unit price and annual income from cocoyam.
3) Analyze the influence of some production factors on cocoyam output

METHODOLOGY

Idea of the population from which random samples were selected from is always important and justification for such population too. Without these, everything will remain subjective. Random samples must be truly representative of the study population alternatively; the information generated will equally be subjective and may not be a true representation of the facts on the ground. The study was conducted in south east agro ecological zone of Nigeria. The zone is made up of five states which include Abia, Anambra, Ebonyi, Enugu and Imo States. Three (3) states (Abia, Anambra and Imo states) with good popularity in cocoyam cultivation were purposively chosen. Two agricultural zones were randomly selected from each of the three States. Secondly, two blocks were also randomly selected from each of the zones, followed by random selection of three circles in each of the blocks and in each of these circles, eight (8) cocoyam farmers were randomly selected from the list of cocoyam farmers in the area, making it a total number of 288 farmers for the study. Data were collected by means of an interview schedule with well structured questionnaire distributed to these farmers. Data collected were analyzed by means of descriptive statistics such as frequency tables, percentages, mean and inferential statistics using ordinary least square regression analysis. A three point, likert continuum of high (3), low (2), and none (1), were used to determine the constraints to cocoyam production, the value were calculated as follows 3+2+1=6/3=2.0. Anything less than 2.0 was regarded as a non constraint, while score of 2.1-3.0 shows a constraint. The production factors influencing cocoyam output were analyzed using ordinary least square regression analysis. The model for multiple regression analysis on the production factors affecting cocoyam output is stated implicitly below

$Y = f(x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, \ldots + e)$

Where

Y = cocoyam output (kg/₦)

X_1 = Labour (Man/days)

X_2 = credit (₦)

X_3 = land (hectare)
X_4 = Farm size (number of persons)
X_5 = fertilizer (kg)
X_6 = seeds/planting materials (₦)
X_7 = Agrochemicals (₦)
e = Error term

RESULTS AND DISCUSSION

Table 1 showed that the average farm size of respondents was 1.54 hectares of land and the annual cost of labour for cocoyam production was ₦58.500.5. The result also showed that majority (39.2%) of the farmers spent ₦41,000–₦7,100 on farm labour while 38.2% spent ₦10,000– 40,000 on labour. Only 17.4% of respondents spent less than ₦10, 000 on farm labour for cocoyam production while 5.3% of respondents spent above ₦100, 000 on farm labour. The indication is that the farmers were mainly small scale farmers and largely depended on family labour for their agricultural production. This implied that labour cost was one of the problems faced by these farmers on cocoyam production since they were small scale farmers with small farm sizes where majority earned less than hundred thousand naira from cocoyam annually. The same table showed that a good proportion (55.2%) of cocoyam farmers were not membership of cooperative societies. However, as much as 42.7% of the farmers were member of co-operative societies. The implication is that production of cocoyam was expected to be low because production is always higher among people in farmer's co-operative societies. Members of co-operative society have more access to agricultural extension workers than other rural farmers. This is because co-operative society is a way of improving productivity of farmers by encouraging them to accept new production packages, for increased production (Salehu and Oyegbemi 2007).Co-operative society farmers receive information about change earlier than their non-co-operative counterpart.

Table 1: Distribution of farmers according to farm size, labour cost, membership of co-operative society

Variables	Frequency	Percentage
Farm size in (ha)		
< 1.0	163	56.60
1.1.-2.0	71	24.65
2.1- 3.0.	44	15.28
3.1-4.0	10	3.47
Total	**288**	**100**
Mean 1.45		
Cost of labour (₦)		
<10,000	50	17.36
10,000 – 40,000	110	38.19
41,000 – 70,000	113	39.24
71,000 – 100,000	10	3.47
151 – 200,000	5	1.74
Total	**288**	**100**
Mean 58,500.5		
Membership of cooperative		
Member	**129**	44.79
Non-member	**159**	55.21
Total	**288**	**100**

Source: Field survey 2014

Table 2; showed the annual output of cocoyam among the farmers in the study area and their mean annual output was **595.5**. The result showed that majority (74.7%) had less than 1000kg of cocoyam as their annual production output last year whereas 24.3% of respondents produced 1000–2000 kg as their annual cocoyam output. Only 1.0% 0f respondents produced quantities above 2000 kg of cocoyam. This low output may be attributed to taro disease outbreak which had been with the farmers since 2011. These findings agreed with Onyeka, 2011 who reported the urgent need to address the threat of cocoyam disease which has reduced the interest of farmers in the cultivation of the crop and had also affected the livelihoods of Nigerians who depend heavily on the crop for survival as a result of decreased output of cocoyam. The table showed that 51.4% of the cocoyam farmers earned ₦101-N200 in each one kilogram of cocoyam and a small proportion (22.9%) of farmers sold their cocoyam at rate of ₦200-₦300 per kilogram. Yet another few proportion (21.88%) of farmers sold their cocoyam at the price of ₦100.00 per kilogram with only 3.82% of the farmers sold their cocoyam above ₦300.00 per kilogram. This indicated that a farmer who had an increased output of cocoyam stood to make a lot of profit on his sales since a kilogram of cocoyam was sold for at least one hundred naira. This is an indication that cocoyam can serve as a top food security crops like cassava. This was in agreement with Chukwu *et a l*(2009) which revealed that cocoyam command higher price per tonne than most root and tuber crops, he reported that the price of one tonne of cocoyam was 32.5% lower than one tonne of yam but it was higher than one tonne of cassava by 75.7% and one tonne of sweet potato by 38.2%.

Table 2: Distribution of respondents according to the output, unit price and income

Variables	Frequency	%
Cocoyam output (kg)		
< 1000	215	74.65
1000 – 2000	70	24.31
2001 – 3,000	02	0.69
3001 - 4,000	01	0.35
4001 – 5,000	0	0.0
Total	**288**	**100**
Mean 595.5		
Unit price of cocoyam (₦/ kg)		
100	63	21.88
101-200	148	51.39
201-300	66	22.92
301-400	9	3.12
400-500	2	0.69
Total	**288**	**100**
Mean 132.5		
Annual income from Cocoyam (#)		
<100,000	140	48.61
100,000-200,000	115	39.93
201,000-300,000	25	8.68
301,000-400,000	8	2.78
Total	**288**	**100**
Mean 120,347.2		

Source: Field survey 2014

Influence of Some Production Factors on Cocoyam Output

Table 3 showed the regression result of the estimates of production factors influencing cocoyam output. The double log functional form was chosen as the lead equation based on higher R^2 value and number of significant variables. The value R^2 thus provides line of best fit. The R^2 (coefficient of multiple determination) value was 0.822 which indicates that 82.2% of the total observed variations in the dependent variable (Y) were accounted for while 18.8% of the variation was due to error. F–statistics was significant at1% indicating the fitness of the model used. The result also revealed that 7 variables were statistically significant and conforms to the researcher's *a prior* expectation. The coefficient of credit was statistically significant at 1% and positively related to output. This implied that increase in farmers' access to credit results to increase in output. The coefficient of land and farm size were statistically significant at 5% and positive implying that a unit increase in land or the size of farm will result to an increase in output. This conforms to the researchers a prior expectation that the larger the farm land, the more the output. The coefficient of farming experience was statistically significant at 1% and positively related to output. It shows that an increase in the years of farming experience will lead to an increase on the output of farmers. Ogoke (2009) observed that the longer the years of farming experience, the more efficient the farmer becomes because the number of years a farmer has spent in the farming business may clearly give an indication of the practical knowledge acquired.

Table 3: Distribution of respondents according to the estimates of production factors influencing cocoyam output

Parameters	Linear	Exponential	Semi log	+Double log
(constant)	-3248.864	8.986	-435377.986	5.181
	(-1.451)	(118.419)***	(7.729)***	(7.729)***
Labour	228.402	0.025	4354.776	0.013
	(1.254)	(4.110)	(0.335)	(0.335)
Credit	0.781	1.614E-5	22143.785	0.290
	(14.544)***	(8.871)***	(11.343)***	(11.343)***
Land	0.072	4.784E-7	5931.678	0.092
	(3.488)***	(.683)	(2.455)**	(2.466)**
Farm size	-7477.535	0.469	-10496.519	0.167
	(-1.952)*	(3.615)***	(2.543)**	(2.543)**
Farming experience	142.373	0.015	3935.004	0.121
	(1.873)*	(5.649)***	(3.100)	(3.100)***
Fertilizer	241.072	0.001	12697.017	0.268
	(19.005)***	(1.203)	(7.383)***	(7.383)***
Planting material	3.816	2.786E-5	11548.872	0.146
	(7.314)***	(1.576)	(3.370)***	(3.370)***
Agrochemicals	-3.610	4.129E-6	4808.727	-.127
	(-6.477)	(0.219)	(-2.520)**	(-2.520)**
R^2	0.946	0.789	0.622	0.822
R-adjusted	0.944	0.783	0.611	0.817
F-ratio	610.204***	130.079***	57.386***	160.750***

Field Survey, 2014

Key: * Significance at 10%,
**** Significance at 5%,**
***** Significance at 1%**
+ = Lead Equation and the values in bracket are the t-values

Nwaobiala and Onumadu (2010) also found that farming experience has shown to enhance the participation and adoption of improved farming techniques by farmers thereby increasing agricultural output. The coefficient of the amount of fertilizer applied was statistically significant at 1% and positively related to output. This implied that the application of fertilizer increases cocoyam output. The coefficient of planting material used by the farmer was statistically

significant at 1% and positively related to cocoyam output. This implied that the quantity and quality of planting materials of cocoyam used influences cocoyam output. The coefficient of agrochemicals used in the production process was statistically significant at 5% and negatively related to output. The inverse relationship implied that an increase in the use of agrochemicals results to a decrease in the farmers output. The F-ration (160.750) which is statistically significant at 1% showed that the model is significant at 99.0% indicating a high goodness of fit.

Challenges to cocoyam production

Table 4 revealed the constraints militating against cocoyam production among farmers in South Eastern Nigeria. The result showed that all the variables considered were serious constraints to cocoyam farming as shown by the mean scores. Inadequate fund (X=2.71), high mortality rate (X=2.68), lack of incentive to farmers (X=2.49) and lack of inputs (X=2.49) were the most serious constraints to cocoyam farmers in the study area. The finding is in agreement with the work of Chukwu (2011) who observed the following as the developmental challenges facing cocoyam in Nigeria, apathy, neglect and lack of interest by scientists and the public for cocoyam, scarcity of high quality planting material, ineffective extension in dissemination of available technologies and low multiplication ratio. Onwubuya and Ajani (2012) reported that major constraints to cocoyam production and processing were high cost of inorganic fertilizer, high cost of hired labour, scarcity of planting materials, lack of finance, low soil fertility, poor extension agent-farmers contact and scarcity of farmland, weed problem and unavailability of organic fertilizer.

Table 4: Distribution of farmers according to constraints to cocoyam production

Constraints	High	Low	None	Total	Mean
Inadequate fund	224	45	19	781	2.71
Lack of fertilizer	99	138	51	625	2.17
Lack of chemicals for diseases control	141	84	63	654	2.27
lack of planting material	160	91	37	700	2.43
Lack of inputs	170	87	31	716	2.49
Poor yield of cocoyam	131	103	54	653	2.27
High cost of labour	166	62	60	680	2.36
Poor storage methods	142	86	60	658	2.28
Poor extension contact	99	112	77	599	2.08
Poor post harvest value	97	121	70	604	2.10
Crude implements	130	103	55	652	2.26
Low adaptability	132	94	62	627	2.18
High incidence of disease	123	84	81	618	2.14
Poor marketability	115	84	89	622	2.16
High mortality rate	210	64	14	772	2.68
Lack of interest among farmers	132	106	50	664	2.30
Lack of incentives to farmers	182	65	41	718	2.49
Poor income from cocoyam	125	115	48	650	2.26

Source: Field Survey, 2014* Mean ≥ 2.0 = agreement

CONCLUSION

The result the study revealed that 7 variables were statistically significant and conforms to the researcher's *a prior* expectation. The major production related factors influencing cocoyam production output were land, access to credit, farm size, farming experience, fertilizer and

planting materials. The coefficient of credit was statistically significant at 1% and positively related to output. This implied that and increase in farmers access to credit results to an increase in the farmer's output. The coefficient of land and farm size were statistically significant at 5% and positively signed to output implying that a unit increase in land or the size of farm will result to an increase in output. This conforms to the researchers a prior expectation that the larger the farm land, the more the output. The coefficient of farming experience was statistically significant at 1% and positively related to output. It shows that an increase in the years of farming experience will lead to an increase on the output of farmers. Constraints/challenges to cocoyam adoption included inadequate fund unavailability, high mortality, lack of incentives of fertilizer, lack of agro chemicals, unavailability of planting material, lack of input high cost of labour, poor storage methods, crude implements, high incidence of disease, low crop adaptability, poor marketability, issue of neglect for cocoyam and lack of interest.

RECOMMENDATIONS

The following recommendations were made based on the findings of this study:

1) Government should subsidize the price of land and agricultural chemicals like fertilizers, in order to increase cocoyam production.
2) Agricultural credit should be made available and accessible to cocoyam farmers for increase farm size and for increased cocoyam production
3) Farmers should be properly educated on the usefulness of cocoyam in order to reduce neglect and lack of interest on the crop for increased adoption to take place.

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