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Full Length Research Paper

Efficiency Differentials of Farm Size of Cassava Production in Ekiti State, Nigeria.

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The study was conducted to examine the efficiency differentials in farm size of cassava production in Ekiti State. Specifically, it described the socio-economic characteristics of cassava farmers in Ekiti State; determined the cost and revenue structure of cassava production in different farm sizes; examined and compared the resource use efficiency of small, medium and large scale cassava farms. The study was carried out in Ekiti State. Well-structured questionnaire was administered on one hundred and twenty cassava farmers using a multistage random sampling. Descriptive statistics were used to analyze the socio-economic characteristics of the cassava farmers; profitability analysis was used to determine the cost and revenue from cassava production; and stochastic frontier was used to examine and compare resource use efficiency of small, medium and large scale cassava farms. The income distribution of the respondents by small scale, medium scale and large scale was ₦27,699, ₦79,983 and ₦229,290 accordingly. The benefit-cost (BC) ratios were ₦0.83; ₦0.95 and ₦1.06 for small, medium and large scale respectively. The farmers were operating at the region of increasing returns to scales. The mean technical efficiency are 0.73, 0.83 and 0.86 for small, medium and large scale farmers respectively. All the resources were inefficiently utilized as the marginal value products for farm size, stem, fertilizer and herbicide were greater than their respective factor prices for small, medium and large scale farmers while that of labour was less for all categories of farmers. The study therefore recommended that, there should be accessible, affordable and simple agricultural production machineries and equipment for the farmers to ease their over reliance on human labour thus calling for invigoration of farm service centres in the State. Financial institutions and governmental agencies should provide financial assistance that is easy-burdened to cassava farmers to boost the production.

Keywords: Farm size, efficiency differentials, cassava production, stochastic frontier.

INTRODUCTION

Nigeria, like some other developing countries is principally an agrarian nation who still face an ever increasing food crisis as the level of food production is yet to keep pace with demand. There is worsening food insecurity, even with massive food importation as evidenced by rising food import bill (Okoye, *et al.,* 2008). Akinsanmi (2009) reported that Nigeria is one of the worst hit countries globally given her unprecedented level of acute food shortage and its accompanying ravaging malnutrition. Though endowed with vast expanse of arable land for crop production and fresh waters for fish breeding, reports still show that Africa's largest country cannot produce food crops her population requires and had thus been depending on food importation to meet her domestic demands (Adepoju and Awodunmuyila, 2008). One of such important root and tuber crop in Nigeria that contribute significantly to the economy of Nigeria is cassava.

Two varieties of cassava are of economic value: the bitter, or poisonous (*Manihot esculenta)*; and the sweet, or non-poisonous (*Manihot dulcis)* (Microsoft Encarta Premium, 2009). Cassava is the chief source of tapioca and "garri'; its roots are eaten as food, fed to stock, or used in the manufacture of starch and glucose. The leaves are used as vegetable and source of vitamins, mineral and proteins (Alabi & Alabi, 2002). In Sub old Saharan Africa the per capita per kg/year consumption of Cassava is 103, which is far higher than maize (40), banana/plantain (28), sorghum (23), milk (27), meat (11), yam (28) and millet (17) in the same region (IITA, 2004a).

Although, Nigeria is the leading world producer of cassava with production of 33,379 metric tonnes in 2004, there is a shortage in supply of 60 percent; a gap needed to be filled by Nigerian farmers (Babalola, 2002; Aregheore, 2009). Cassava is a staple starch food for millions of people in tropical countries and for livestock feed. It is consumed in form of granules (gari), lafun, farina, pastes, flour, boiled, raw, chips, flakes, cubes, peelers, pellets, adhesives and its leaves consumed as vegetable to supply vitamins A and B and protein. Other uses include confectionery, pharmaceutical, beverages, chemicals, textile, and dry cell, adhesive for paper, plywood and packaging industries. Despite the fact that Ekiti is ranked as one of the highest producers of largest cassava producing States in a country that produces the largest output of cassava in the world, research works bordering on farm size efficiency differentials in the state are scanty. Few works such as Omonoaona (2008) attempted such study but failed to ascertain the differentials of efficiency of cassava in the important agricultural zones of the state. Omonoaona's study did not use adequate econometric tools to enable derivation of meaningful conclusions from the study. There is a need for a study that will identify and compare the efficiency determinants in the various cassava zones of Ekiti State to enable uniform policy or specific policy frameworks be designed for boosting the efficiency of cassava in the study area based on research findings.

The study area

The study was conducted in Ekiti State, Nigeria. The state is one of the states in the South Western Region of Nigeria. The state is within the tropics. The state was created on the 1st of October, 1996 and comprises of 16 Local Government Area (LGAs). Ekiti State occupies a land mass of approximately 6,6028km^2 and a population of 2,432,321 (NPC 2006). Ekiti state is predominantly an agricultural area whose main cash crops are cocoa, timbers, oil-palm and kolanuts. The food crops grown are cassava, yam, cocoyam and grain crops such as maize and rice. The State has two main seasons i.e. the rainy season and dry season.

Data collection

Data were collected from the respondents with the aid of well-structured questionnaire. The information obtained include socio-economic characteristics of the respondents, costs and returns of farmers in various scales of production, the utilization of farm resources by farmers in different farm sizes, factors affecting resources use efficiency among the various farm sizes and constraints to cassava production in the study area.

Sampling techniques

A multi-stage random sampling technique was used to select respondents for the study. At first stage, three local government areas (LGAS) were selected randomly, at second stage two communities were also selected randomly from each local government making a total of 6 communities, at the third stage 20 cassava farmers were randomly selected from each of the communities. Thus a total of 120 cassava farmers in the study area were surveyed for the study.

Data analysis

Descriptive statistics

Descriptive statistics was used to describe the socio-economic characteristics and identify production constraints.

Budgetary analysis

Budgetary analyses were used to determine the profitability of production. A farm budget is divided essentially into the sections of revenue, variable cost, fixed cost, and return to management. The total fixed cost was calculated using straight-line method with the value of the used-up material assumed to be zero. Gross margin (GM) analysis was used to estimate the cost, return and profitability of cassava production in the study area. The GM model was represented as follows:

GM = TR – TVC

TC=TFC+ TVC

Where GM = Gross margin in Naira; TR = Total receipts/returns to cassava output in Naira; TVC= Total variable cost, TFC= Total fixed cost

TVC = Total variable cost in Naira (the cost incurred in the use of variable inputs).

Resource use efficiency

The efficiency of the factors of production was determined from the coefficients. Knowing the price of each

input and output, the marginal value product was calculated.
The efficiency of resources used in cassava production was determined using Cobb-Douglas function as shown below:
R = MVP/UPI
Where,
R = resource use efficiency
MVP = Marginal Value Product
UPI = Unit Price of Input
If r = 1, resource is efficiently utilized
R< 1, resource is under utilized
R > 1, resource is over utilized
The values of MVP and MPP on Cobb-Douglas production function (double log) was estimated as follows:
MPP = by/x
MVP = MPP.Py
UPI = Pxi
Where: Y = average yield of cassava (kg)
X = arithmetric mean value of the input xi
Bi = estimated regression coefficient
Py = unit price of output
MPP = Marginal Physical Product of input x
MVP = Marginal Value Product of input x
UFC = Pxi (unit price of input xi)
The Stochastic Frontier Production function using the Cobb –Douglas functional form was be used to analyze the technical efficiency of cassava of the farmers. This function has been employed in other studies to determine technical efficiency of agricultural production (Simpa, 2014, Osundare, 2017, Nmadu and Simpa, 2014). The production function model is explicitly specified as:

$$\ln Y = \ln \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \varepsilon i$$

where, ln = Natural logarithm, Y = Quantity of cassava produced (Kg/ha), X_1 = Farm Size (Ha), X_2 = Cuttings (Nos/ha), X_3 = Quantity of Fertilizer used (Kg/ha), X_4 = Quantity of Agro Chemicals used (Litres/ha) and X_5 = Labour (Man days/ha).
$\beta 0$, β_1-β_5 = vectors of technology parameters to be estimated (Regression coefficients). εi= Composite error term defined as Vi – Ui
Vi= Random variables which are assumed to be independent of Ui, identical and normally distributed with zero mean and constant variance N (0, Sv_2).
Ui = Non–negative random variables which are assumed to account for the technical inefficiency in production and are often assumed to be independent of Vi such that Ui is the non-negative truncated normal distribution.
The inefficiency of production, Ui is modeled in terms of the factors that are assumed to affect the efficiency of production of the farmers. The factors are the socio-economic characteristics of the farmers. The determinant of technical inefficiency is defined by:

$$Ui = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6 + \delta_7 Z_7 + \delta_8 Z_8 + \varepsilon i \quad (3)$$

Where;
Ui = technical inefficiency, Z_1 = Farm Size (Ha), Z_2 = Cuttings (Nos/ha), Z_3 = Quantity of Fertilizer used (Kg/ha), Z_4 = Quantity of Agro Chemicals used (Litres/ha), Z_5 = Labour (Man days/ha), εi= Error term and δ_0 – δ_8 = parameters estimated.

RESULTS AND DISCUSSION

Socioeconomic characteristics of the respondents

The socioeconomic characteristics of the respondents revealed that male (83.3%) dominated cassava production in the study area and 60.80% of them were married. The table showed further that 49.2% of the respondents had less than or equal to 5 persons as their household size. Based on the scale of production, 67.5%, 26.7% and 5.8% of them had ≤3, 3.1-5 and >5 hectares of land as their farm size. Also, 43.2%, 31.2% and 100% of the respondents under small, medium and large categories of cassava production had more than secondary education and above. The result revealed further that 60.5%, 58.0% and 57.1% of the cassava farmers under these categories were more than 50 years old, implying that cassava production in the study area was in hands of ageing people. It was reported that 45.7% of small scale cassava farmers generated ≤₦50,000 per annum, while 53.1% of the medium scale producers generated between ₦50,001-100,000 and 100% of the large scale cassava producers recorded >₦100,000 per annum.

Table 1: Socioeconomic characteristics of cassava farmers in Ekiti State, Nigeria

Variables	frequency	percentage
Sex		
Male	100	83.3
Female	20	16.7
Total	120	100
Marital status		
Single	30	25.0
Married	73	60.80
Widowed	15	12.5
Divorced	2	1.7
Total	120	100
Household size		
≤5	59	49.2
6-10	58	48.3
>10	3	2.5
Total	120	100
Farm size		
≤3	81	67.5
3.1-5.0	32	26.7
>5.0	7	5.8
Total	120	100

Age	small scale Freq. (%)	medium scale Freq. (%)	large scale Freq. (%)	total Freq. (%)
≤30	4(4.9)	2(6.5)	1(14.3)	7(5.8)
31-50	28(34.6)	11(35.5)	3(42.9)	42(35.0)
>50	49(60.5)	18(58.0)	4(57.1)	71(59.2)
Total	81(100)	32(100)	7(100)	120(100)
Educational level				
No formal	18(22.2)	7(21.9)	0	25(20.8)
Primary	28(34.6)	15(46.9)	0	43(35.8)
Secondary	30(37.0)	7(21.9)	5(71.4)	42(35.0)
Tertiary	5(6.2)	3(9.3)	2(28.6)	10(8.3)
Total	81(100)	32(100)	7(100)	120(100)
Income				
≤50,000	37(45.7)	3(9.4)	0	40(33.3)
50,001-100,000	29(35.8)	12(37.5)	0	41(34.1)
>100,000	15(18.5)	17(53.1)	7(100.0)	32(26.6)
Total	81(100)	32(100)	7(100)	120(100)

Note: Figures in parentheses are percentages
Source: Field survey, 2017

Cost and return on cassava production in Ekiti State

Table 2 shows the profitability of cassava production among different farm size categories. The variable costs under this study were cost of planting materials, cost of planting, cost of weeding, cost of fertilizer application, cost of harvesting, cost of herbicides, cost of fertilizers, cost of pesticides and transportation. Land was however not valued because it has little or no opportunity cost in the study area. It revealed the total variable cost to be ₦31, 601 for the small scale farmers, ₦81, 017 for the medium scale farmers and ₦210,710 for the large scale farmers. The total revenue were ₦59, 300, ₦161, 000 and ₦440, 000 for the small, medium and large scale cassava farmers respectively. Also, the gross margins were ₦27,699 (small scale), ₦79,983 (medium) and ₦229,290 (large scale). The benefit-cost ratio for the small scale, medium scale and large scale cassava farmers were ₦0.83, ₦0.95 and ₦1.06 kobo respectively, implying that for every ₦1 invested by the small scale farmers they will get ₦0.83 in return. Also, for every ₦1 invested by the medium scale farmers, they will get ₦0.95 in return, and the large scale farmers will get ₦1.06 for every ₦1 invested in cassava production. This indicates that cassava production is highly profitable. This is similar to the study of Toluwase and Abdulraheem (2013) and Nandi *et al.,* (2011) who noted that the benefit cost ratio was ₦2.19 and ₦1.96 respectively.

Table 2: Cost and return of cassava production in Ekiti State.

Cost	Small scale(₦)	Medium scale(₦)	Large scale(₦)
Variable cost			
Cost of planting materials	3,500	7,400	12, 500
Cost of planting	2,100	5,300	30,000
Cost of weeding	3,000	15,000	41,000
Cost of fertilizer application	5,500	8,401	12,000
Cost of harvesting	5,700	10,200	15,000
Cost of herbicides	3,100	12,166	29,000
Cost of fertilizers	2,911	7,500	25,710
Cost of pesticides	200	4,850	33,000
Transportation	5,590	10,200	25,000
Total variable cost (TVC)	31,601	81,017	210,710
Depreciation cost on tools	1,950	3,150	5,250
Total cost	33,551	84,167	215,960
Total revenue	59,300	161,000	440,000
Gross margin	27,699	79,983	229,290
BC ratio	**0.83**	**0.95**	**1.06**

Source: Field Survey, 2017.

Resource Use Efficiency

Regression Analysis

Table 3 reveals that all the estimated co-efficient associated with small scale farmers carried the expected positive sign, which indicates that an increase in the quantity of each of the input would lead to increase in the output of cassava by the respective co-efficients. For example, an increase in the stem cutting will lead to 0.2731 increase in the output of cassava. Out of the 5 independent variables estimated, the co-efficient of stem (X_2) and fertilizer (X_3) were significant at 1% and 10% level of probability respectively. The result also reveals that the coefficients of all the inputs used by the medium scale farmers carried the expected positive sign, except for the stem cutting. This implies that an increase in the stem cutting by the medium scale cassava farmers will lead to 0.0565 decrease in the output. The probable reason was that these categories of farmers did not have enough land for cassava production. Therefore, overutilization of the available land made it to be infertile and less productive. For small scale category, coefficients of fertilizer (0.5507) and stem (0.0565) were significant at 1% and 10% levels respectively while that of fertilizers (0.5507) herbicide (0.0939) and labour (0.2118) are significant at 1% each at medium scale category of cassava production. The estimated coefficients for all the inputs used among the large scale farmers except the farm size (-0.1714) are positive and conform with a priori expectation. An increase in farm size by 1 hectare will lead to 17.14 percent decrease in the output, this could be attributable to improper agronomic management, and hence, any addition to the hectares of land will lead to increase cost and definitely lead to decline in productivity. The resources used for purchasing extra farm size could be used for other farm resource(s). The coefficients of fertilizer (0.4597) and herbicide (0.9710) were significant at 5% and 1% while farm size (-0.1714) was significant at 10%.

Elasticity and returns to scale

The elasticity of production with respect to the inputs used were 0.2086, 0.2731, 0.4897, 0.0185, 0.0472 for farm size, stem, fertilizer, herbicide and labour respectively for small scale farmers while the elasticity for medium scale farmers were 0.0943, -0.0565, 0.5507, 0.0939, 0.2188 for farm size, stem, fertilizer, herbicide and labour and for the large scale the elasticity were farm size (-0.1714), stem (0.3335), fertilizer (0.4597), herbicide (0.0971) and labour (0.1738) respectively. The sums of partial elasticity are 1.1037, 1.0142 and 1.0106 for small, medium and large scale farmers respectively. This shows that the farmers were operating at the region of increasing returns to scales which suggests that they are still in stage one in the production process. Large scale farmers were closer to the rational stage (stage two) of production process than other categories of farms.

Allocative efficiency

Given the specification of the stochastic frontiers function, the technical efficiencies of the cassava farmers among the three categories of farmers are predicted. The technical efficiency rating in table 4 reveals that the mean technical efficiency are 0.73, 0.83 and 0.86 for small, medium and large scale farmers respectively. This means that on the average, outputs fall by 27%, 17%, and 14% for small, medium and large scale cassava farmers respectively from the maximum possible level due to inefficiency.

In order to test the efficiency, the ratio of marginal value product (MPV) to the marginal factor cost (MFC) for each input is computed and tested for its equality to 1. The results in table 5 indicates that all the resources were inefficiently utilized as the marginal value products for farm size (X_1), stem(X_2), fertilizer (X_3) and herbicide (X_4) were greater than their respective factor prices for small, medium and large scale farmers while that of labour was lesser for all categories of farmers.

The allocative efficiency indices of the resource (AE1 > 1) for X_2, X_3, X_4 for all categories of farmers resources were under-utilized. The Allocative Efficiency Indices (AEI) for labour (AEI < 1) indicates that labour was over utilized in the study area. This is consistent with Osundare and Owoeye (2016).

Table 3: Maximum likelihood estimates of the stochastic frontier function and Technical Efficiency

Parameter	**Co-efficient**			**Standard Error**			**T-Statistics**		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
Constant	1.6650***	1.5073***	1.1921*	0.3448	0.2166	0.6556	4.8283	6.9589	1.8183
Farm Size X_1	0.2086	0.0943	-0.1714*	0.1781	0.1889	0.0997	1.1712	0.4992	1.7191
Stem X_2	0.2731*	-0.0565	0.3335	0.1521	0.1070	0.2114	1.7955	-05280	1.5775
Fertilizer X_3	0.4897***	0.5507***	0.4597**	0.0657	0.1037	0.2265	7.4536	5.3105	2.0295
Herbicide X_4	0.0185	0.0939***	0.0971**	0.235	0.0284	0.0265	0.0787	3.3063	3.6642
Labour X_5	0.0472	0.2188***	0.1783	0.0822	0.0588	0.1121	0.5749	3.7210	1.5905
Gama(γ)	0.3743	0.9999	0.7594						
Log likelihood	0.020	0.03594	0.0499						

Source: Stochastic frontier result of output-input relation 2017

*= significant at 1% level, ** = significant at 5% level, *** significant at 10% level

Table 4: Average distribution of technical rating among cassava producers

	Small	Medium	Large
Minimum value	0.51	0.543	0.52
Maximum value	0.97	0.998	0.98
Mean value	0.73	0.83	0.86

Stochastic frontier result of technical rating 2017

Table 5: Estimates of allocation efficiency for cassava inputs

Variables	Elasticity	Mean	MPP	MVP=MPPPy	MFC(P)	$AEI = \frac{MVP}{MFC}$
Small scale farmer						
Farm size	0.2086	1532,13	-	-	-	-
Cassava stem	0.2731	41.78	9.90	544.50	60	9.075
Fertilizer	0.4897	207.91	3.61	198.55	80	2.482
Herbicide	0.0851	1.72	75.80	4169	1000	4.169
Labour	0.0472	1376	0.56	30.8	350	0.088
Total	1.1037					
Medium scale farmer						
Farm size	0.0943	1681.13	-	-	-	-
Cassava stem	0.0565	28.15	3.58	196.90	60	3.282
Fertilizer	0.5507	253.64	3.65	200.75	80	2.509
Herbicide	0.0939	2.11	71.71	3944.50	1000	3.944
Labour	0.2188	129.59	0.21	11.55	350	0.033
Total	1. 0142					
Large scale farmer						
Farm size	-0.9319	1806.45	-	-	-	-
Cassava stem	0.3335	22.10	26.97	1483.35	60	24.723
Fertilizer	0.4597	271.43	2.26	124.30	80	1.554
Herbicide	0.9710	3. 47	52.06	2863.30	1000	2.863
Labour	0.1783	101. 00	3.04	167.2	350	0.478
Total	1.0106					

Source: Field Survey, 2017

CONCLUSION AND RECOMMENDATIONS

The benefit-cost (BC) ratio for the small scale farmers was ₦0.83; ₦0.95 and ₦1.06 while the BC ratio for medium and large scale respectively. This shows that for every ₦1 invested, there would be ₦0.83; ₦0.95 and ₦1.06 returns for the small, medium and large scale farmers respectively. The sums of partial elasticity are 1.1037, 1.0142 and 1.0106 for small, medium and large scale farmers respectively. This shows that the farmers were operating at the region of increasing returns to scales which suggests that they are still in stage one of the production process. Large scale farmers were closer to the rational stage (stage two) of production process.

All the resources were inefficiently utilized as the marginal value products for farm size (X_1), stem (X_2), fertilizer (X_3) and herbicide (X_4) were greater than their respective factor prices for small, medium and large scale farmers while that of labour is lesser for all categories of farmers.

The allocative efficiency indices of the resource (AE1 > 1) for X_2, X_3, X_4 for all categories of farmers resources were under-utilized. The AEI for labour (AEI < 1) indicates that labour was over utilized in the study area. The study therefore recommends that;

There should be accessible, affordable and simple agricultural production machineries and equipment for the farmers to ease their over reliance of human labour

Financial institutions and governmental agencies should provide financial assistance that is easy-burdened to cassava farmers to boost the production.

Government, private sector and the Non-Governmental Organizations (NGOs) should help to provide infrastructural facilities especially feeder roads.

Public Private Partnership (PPP) should be explored by government so as to help the education of farmers with regard to new technology and innovations.

Also, new management skills need to be addressed so as to minimize negative tendencies that are capable of aggravating inefficient use of resources.

REFERENCES

Adepoju, A.A. and Awodunmuyila, D.J (2008). Economics of Cocoyam Production and Marketing in Ekiti East Local Government Area, Ekiti State, Nigeria. Research Journal of Applied Sciences 3(2): 95-98.

Akinsanmi, G (2009) Nigeria: Food Security - Transforming Potentials to Empowerment. Thisday National Daily. Retrieved September 16, 2010 from http://www.allafrica.com/nigeria/

Aregheore, E .M (2009). Country pasture/forage resources profile, Nigeria, In Suttie J .M and S .G Regnolds (eds.), Agriculture and education services (pp. 205 210), Apia Samoa, Marfel consulting.

Babalola, O (2002). Nigerian agriculture: Basis for hope, hurdles and hope for tomorrow, University lecture, University of Ibadan, Ibadan, University press.

Ebukiba, E., 2010. Economic analysis of Cassava production (farming) in Akwa Ibom State. *Journal of Agriculture and Biology*, 1(4): 612-614.

International Institute of Tropical Agriculture (IITA) (2004). Preemptive Management of the Virulent Cassava Mosaic Disease through an Integrated Cassava Development Approach for Enhanced Rural Sector Economy in the South-south and South-east zones of Nigeria, IITA, Ibadan, Nigeria.79 pp.

Nandi, J. A., Gunn, P. and Yurkushi, E.N (2011). Economic Analysis of Cassava Production in Obubra Local Government Area of Cross River State, Nigeria. *Asian Journal of Agricultural Science,* 3(3): 205-209. 2011. ISSN: 2041-3890. Available from: https://www.researchgate.net/publication/236298935_Economic Analysis of CassavaProductioninObubraLocal_GovernmentAreaofCrossRiverStateNigeria [accessed Sep 18, 2017].

Nmadu, J. N.and J. O. Simpa, 2014. Rethinking the technical efficiency of small scale yam farmers in Nigeria using conventional and non-conventional inefficiency parameters, 58th Australian Agricultural and Resource Economics Society (AARES) Annual Conference, Port Macquarie, New South Wales, 4-7 February 2014.

Okon, U.E. and A.A. Enete, 2009. Resource use efficiency among urban vegetable farmers in Akwa Ibom State, Nigeria. Tropicultura, *Journal of Agricultural production and management* 27(4): 211-217.

Okoye, B. C. and Ukoha, O.O. (2008). Gender Differentials in Labour Productivity among Smallholder Cassava Farmers in Ideato Local Government Area of Imo State, Nigeria. Munich Personal Repec Archive (MPRA) Paper, 9 pp.

Omonoaona, B. T. (2009). Efficiency of resource - use in cassava production in Kogi State, Nigeria: implications for food security and environmental degradation. Retrieved on 27th April, 2009 from http://www.cababstractsplus.org/abstracts/SearchResults.

Osundare and Owoeye (2016). Appraisal of Efficiency of Fadama Maize Farmers in Osun State, Nigeria Asian Research Journal of Agriculture, 1(4): 1-9; Article no.ARJA.28904

Osundare Foluso Olayinka (2017). Technical Efficiency Differentials of Maize Production Technologies in Southwestern Nigeria. Journal of Biology, Agriculture and Healthcare. Vol. 7 (6), pg 14-20

Simpa, J .O (2014). Technical efficiency of yam producers in Kogi State, Nigeria using conventional and non-conventional parameters, Unpublished M. Tech Thesis, Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria.

Toluwase S. O. and. Abdu-raheem K. A (2013). Costs and returns analysis of cassava production in Ekiti State, Nigeria*. Scholarly Journal of Agricultural Science* Vol. 3(10), pp. 454-457 October, 2013 Available online at http:// www.scholarly-journals.com/SJAS ISSN 2276-7118