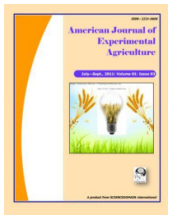

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# Determinants of Flutted Pumpkin (*Telferia occidentalis*) Production and Profitability in Akwa Ibom State, Nigeria

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***Authors' contributions***

*This work was carried out in collaboration between all authors. Author BNE was responsible for data collection and analysis. Authors AAJ and NEE designed the questionnaire, typed the manuscript and assisted in sourcing the literature and source the relevant literature while UTU proofread the final version of the manuscript. All authors read and approved the final manuscript.*

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## ABSTRACT

The study examined the determinants of fluted pumpkin production and profitability in Akwa Ibom State, Nigeria. Data collected through a multi-stage sampling technique from a sample of 60 respondents in the 2013 planting season were analyzed using the profit function, gross margin analysis as well as Ordinary Least Square (OLS) regression technique. Results of the descriptive statistics revealed aged farmers with average of five years experience with high literacy level (83.3%) dominated the study area. Majority were women (61.7%) whose sources of finance were personal savings. Pumpkin farmers had a Gross Margin and Net Income of N251, 953 and N228, 413 respectively. The price parameter for labor, land value, pesticide and output price impacted significantly on the profitability of farmers. Result further revealed that farming experience; household size, age of farmers, land size, capital and organic manure were the major determinants of pumpkin output in the study area. Hence, effort should be directed towards encouraging people

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to venture into pumpkin production, ensuring credit availability through the provision of soft and low interest free loans as well as intensifying campaign on organic agriculture as a way out.

*Keywords: Fluted pumpkin; profitability, production, determinants.*

## 1. INTRODUCTION

Approximately 925 million people in the world were estimated to be hungry in 2010. Of this, about 239 million (30%) were in Sub-Saharan Africa [1]. In 2008, 47 percent of population of Sub-Saharan Africa lived on $1.25 a day or less [2]. This development calls for the evolution of a more proactive and pragmatic strategy towards enhancing agricultural output in the region. However, the potential of vegetable crops in meeting the dietary requirement and enhancing the economic status of people have been highlighted by several authors [3-9], especially in Sub-Saharan Africa where the attainment of food security is intrinsically linked with reversing agricultural stagnation and safeguarding the natural resource base [10]. Vegetable cultivation and marketing provides job, support agribusiness industry and diversified income [11]. It enhances household economic security and investment of farmers and retailers involved in its production [12]. Vegetable is an integral component of our daily food. It forms important condiment in the National diet [9]. Nutritionally, vegetable contains the essential nutrients needed for proper body development. For instance, it is a source of both micro and macro nutrients [13-15,] providing between 20 and 50 percent of iron vitamin in resource poor diets [16]. According to [17], vegetable supplies part of protein, vitamin and minerals needed in diets as well as roughage which promote digestion and prevent constipation. Medicinally, diets rich in fibres from vegetable are sources of omega 3 fatty acids which help in the prevention of heart related diseases. The macro nutrients in vegetable also contribute to reducing incidence of colon and stomach cancer [18]. Vegetables are succulent crops consisting of more than 90% water [19], hence, its yield and quality are water dependent. It belongs to the family *cucurbitacea* and is said to have originated from West Africa.

Fluted pumpkin (*Telferia occidentalis*) is one of the most important vegetable crops grown extensively in almost every State but mostly in the Southern part of the country by most households and consumed by majority of Nigerians because of its dietary importance. It is one of the major income generating crops in many parts of Africa [20]. The crop is often planted in flat land or in mounds. Planting the crop in raised beds has been documented to reduce the effect of flooding during raining seasons [21]. Its yield is believed to be 300% higher in dry than wet season [22]. Harvested pumpkin can be eaten raw or processed by variety of methods and use in diverse ways depending on culture.

Several studies have been done on fluted pumpkin production and profitability in Nigeria. [6] analyzed the socioeconomic determinants of fluted pumpkin leaf production in Ezinihitte Mbaise Local Government Area of Imo State. From his findings, production status, source of land, labour source, household size, educational level, farming experience, farm size and production objective were the major determinants of output. Among the constraints to vegetable production were lacks of credit facilities, unavailability of inputs, pest and diseases infestation, inadequate information about inputs and output prices as well as poor road network. [23] estimated the allocative efficiency among FADAMA fluted pumpkin farmers in Imo State, Nigeria using the maximum likelihood estimation of the translog model. [24] focused on the effect of waste water use on fluted pumpkin crop production in Imo State, Nigeria using the ordinary least square regression technique. Studies such as [25,26] documented significant influence of labour, capital, land size, planting material, fertilizer and manure on vegetable cultivation. Also, other studies such as [27,28] have documented the importance of manure on vegetable production in Nigeria.

The demand for fluted pumpkin in the study area has increased tremendously due to the diverse ways in which the crop is put to use. [26] linked its popularity to the low cost per unit of resource use in the production, short gestation period and quick returns on invested capital compared to other crop enterprises. The introduction of the FADAMA farming system in the State was aimed at ensuring the availability of vegetables during the dry season. In spite of the aforementioned effort and the potential of fluted pumpkin, production of the crop is still carried out in small

scale. The bulk of pumpkin produced cannot meet the need of Akwa Ibom people, incidence of post harvest losses continue to characterized the pumpkin subsector. There is need to examine those factors that determine fluted pumpkin production and profitability in the study area with view to improving upon its supply and profitability. This therefore forms the basis for the study.

## 1.1 Study Area

The study was carried out in Akwa Ibom State, Nigeria. The State is located between Latitude 4 0 321 and 50 331 North and Longitude 70 251 and 80 251 East. It has a total population of 3,920,208 people out of which 2,044,510 are male and 1,875,698 female [29]. It occupies a total land area of approximately 7,246 square kilometers. The state is an agrarian with six agricultural zones viz: Abak, Oron, Ikot Ekpene, Etinan, Uyo and Eket. Her favorable climate favors the production of both permanent and arable crops.

## 1.2 Sampling Procedure and Data Collection Method

Data used for the study were primary data collected through a multi- stage sampling in the 2013 planting season. The first stage involved the selection of three agricultural zones from the existing six. These were Oron, Uyo and Eket. The second stage involved the selection of one Local Governt Area from each of agricultural zones. The selected Local Government Areas were Eket, Uyo and Oron respectively. Three villages where pumpkin is grown extensively were randomly selected from the three selected Local Government Areas in the ratio of one per Local Government Area (1:1). Uya Oro village was chosen from Oron, Mbiabong Etoi from Uyo, Esit Urua in Eket. Next, 20 pumpkin farmers were selected in each of the villages with the help of key informants from a compiled list of pumpkin growers in the area, making a total of 60 respondents through which structured questionnaire were administered.

## 1.3 Method of Data Analysis

The data collected were analyzed using both descriptive and inferential statistics. Apart from mean and simple percentages, other analytical techniques used were.

### 1.3.1 Gross margin analysis

This was used to examine the returns on fluted pumpkin production in the study area. The formula for computing the gross margin was given as:

$$GM = TR - TVC \quad (1)$$

Where:

GM = Gross margin per hectare (₦)
TVC = Total Variable Cost per hectare (₦)
TR = Total Revenue per hectare (₦)

### 1.3.2 Profit function analysis

To estimate the profitability level of individual resource input used in pumpkin production, the profit function analysis was carried out. The profit function model is specified as:

$$\Pi^* = \pi^*(P_y, P_a, P_b, P_c, P_d, P_e, P_f, \ldots\ldots Z_a, Z_b), \quad (2)$$

Where,

$\Pi^*$ = Amount of variable profit per hectare (₦),
$P_y$ = price of output per hectare (₦),
$P_a$ = Price per unit of labor (₦),
$P_b$ = Price per unit of manure (₦)
$P_c$ = Price per unit of pesticide (₦)
$P_d$ = Price per unit of planting material
$Z_a$ = Capital (measured as depreciated value of fixed assets used in pumpkin production) and
$Z_b$ = land value (₦), (whether purchased, inherited or rented).

### 1.3.3 Production function analysis

The implicit form of the production function analysis for pumpkin production in the study area is implicitly stated as follows:

$$Y = (X_1, X_2, X_3, X_4, \ldots, X_{11}, + U) \quad (3)$$

Where

Y = output of vegetable (₦),
$X_1$ = Educational level of farmers (years)
$X_2$ = Farming experience (years)
$X_3$ = Household size (number),
$X_4$ = Age of farmers (in years),
$X_5$ = land size (hectares)
$X_6$ = labour (mandays)
$X_7$ = Capital (value of depreciated farm tools)
$X_8$ = Organic manure (in kilogramme)
$X_9$ = Quantity of planting material (in kilogramme)
$X_{10}$ = harvesting frequency (number of times)

U = error term

The model can be stated explicitly as:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 \ldots b_{10}X_{10} + U \quad (5)$$

Where

$b_1 \ldots b_{10}$ are coefficients to be examined

and

$X_1 \ldots X_{11}$ are the explanatory variables defined in equation (1) above.

## 2. RESULTS AND DISCUSSION

### 2.1 Socioeconomic Characteristics of Respondents

Table 1 presents the socioeconomic characteristics of pumpkin farmers in the study area. Results revealed that female farmers (61.7%) dominated the study area. The dominance of female farmers is because pumpkin production is not that tedious and can be undertaken by women. Majority (66.7%) were married, 20% single while 11.3% were divorcees. Experience wise, farmers were quite experience with an average experience of 12 years. 25 percent had less than 5 years experience, 50 percent had between 6-10 years, 16.7 percent had 17-21 years while 8.3 percent had more than 21 years of experience. This is capable of impacting positively on pumpkin production in the study area. With regards to household size, 33.3 percent had a household size of less than 5 people, 58.3 percent had between 5 and 10 while 8.3 percent had a household size greater than 10. The implication of this large household size showed available labor for pumpkin production in the study area. [25] reported a large household size in the study area. In terms of source of financing pumpkin production, 50 percent financed their farming operations through personal savings, 38.3 percent borrowed from friends and relatives while 11.7 percent financed theirs through other sources. None of the farmers were able to access finance from formal sources. The age range of farmers in the study area was from 19 to 63 years with majority being within the age bracket of 41-50 years ( 43.3%), followed by above 50 years (28.3) while 21.7% and 6.7% were within 31-40 and 0-30 years age brackets. The dominance of 41-50 years showed that farmers were still young. This is capable of impacting positively on pumpkin production. [25] reported a dominant age group of 31-40 years in the study area. This is contrary to other regions in Nigeria especially South West where majority of farmers are above 60 years. Educationally, about 83.3 percent of respondents were literate. 50 percent attended primary school, 28.3 percent attended secondary school, 5 percent had tertiary education while 16.76% did not have any formal education at all. The implication of this high rate of literacy implies that farming information from extension agents and other sources can be better assimilated, processed and put to practice. Beside educated farmers are early adopters of farming both farming and agricultural marketing innovations. With respect to labor source for pumpkin production, 66.7 percent of farmers in the study area made use of family labor while 25 percent and 8.3 percent made use of hired and borrowed labor respectively. The high use of family labor justifies the huge household size in the study area.

### 2.2 Average Costs and Returns in Pumpkin Production in the Study Area

Table 2 present the average costs and returns of pumpkin production in the study area. Total revenue of ₦ 367,150.6 was realized per hectare of pumpkin. The total cost of ₦ 138, 737.60 was incurred. Of this, variable cost constituted about 83.03 percent (₦115, 197,6) of total cost of pumpkin production. Further analysis of the variable cost component showed that labor accounted for 88 percent, manure 3.4%, pesticide 8.6 percent and planting material 1.3 percent of total variable cost of production. A gross margin and Net Income of ₦ 251,953 and ₦228, 413 were realized per hectare. This indicated that pumpkin production is profitable in the study area. Comparing the net return with the national minimum wage of 18,000 revealed that pumpkin production is a profitable venture in the study area, hence can constitute a good source of employment for our young school leavers and the teeming population.

### 2.3 Profit Function Analysis

Table 3 presents the result of the profit function which was employed to determine the factor that influenced the profitability of pumpkin production in the study area. From the table, 89.63 percent of the variability in profit is explained by the combined effect of the variable price items in the

function. Result revealed that the price parameter for labour, land value and pesticide had negative significant effects on the profit level while the price variable for output price had a positive significant effect on the profit level of farmers

## 2.4 Determinants of Fluted Pumpkin Production

Table 4 presents the regression result for the factors affecting flutted pumpkin output in the study area. Of the four functional forms that were estimated, (linear, semilog, double log and exponential), the linear model was chosen as the lead equation because of the high $R^2$ value and the significant number of explanatory variables.

The coefficient for farming experience was positive and significant at 5 percent level. Experienced farmers are perceived to better understand and processed new farming information from extension agents and other sources and hence, improves upon their efficiency and output. They are also known to be early adopters of new farming techniques. [25,6,30] reported a significant differences between farming experience and water leaf, amaranth spp and cassava output in the study area respectively.

Household size impacted positively on pumpkin production in the study area at 5 percent level. Since pumpkin production is labor intensive, large household sizes would imply available labor for pumpkin production. This is the case in the study area where the vegetative pattern and land tenure system does not favour mechanization. Other studies such as [31,6,25] reported similar findings.

**Table 1. Demographic characteristics of pumpkin farmers**

| Variable | Number | Frequency |
|---|---|---|
| **Gender** | | |
| Male | 23 | 38.3 |
| female | 37 | 61.7 |
| **Farming experience** | | |
| Less than 5 years | 15 | 25 |
| 3-10 years | 30 | 50 |
| 11-16 years | 10 | 16.7 |
| 17 and above | 5 | 8 |
| **Household size** | | |
| Less than 5 | 20 | 33.3 |
| 5-10 | 35 | 58.3 |
| Greater than 10 | 5 | 8.3 |
| **Sources of Finance** | | |
| Personal savings | 30 | 50 |
| Friends and Relatives | 23 | 38.3 |
| Other sources | 7 | 11.7 |
| **Age** | | |
| 0-30 | 4 | 6.7 |
| 31-40 | 13 | 21.7 |
| 41-50 | 26 | 43.8 |
| Above 50 | 17 | 28.3 |
| **Eductional level** | | |
| No formal eduction | 10 | 16.7 |
| Primary School | 30 | 50 |
| Secondary school | 17 | 28.3 |
| Post secondary | 3 | 5 |
| **Labour Source** | | |
| Family labor | 40 | 66.7 |
| Hired labor | 15 | 25 |
| Borrowed labor | 5 | 8.3 |

*Source: computed from field survey data, 2013*

**Table 2. Income and expenditure by pumpkim farmers per hectare**

| Items | Units | Value |
|---|---|---|
| **Revenue items** | | |
| Value of output | Kg | 367,150.60 |
| **Total Revenue** | Naira | 367,150.60 |
| **Cost items** | | |
| **Variable cost** | | |
| Labor | Naira | 101,376 |
| Cost of manure | Kg | 3,926.00 |
| Pesticide | litres | 9,895.60 |
| Planting Material | Kg | 1,500.00 |
| **Total Variable cost** | | 115,197.60 |
| **Fixed cost** | | |
| Land | Hectare | 10,120.00 |
| Depreciation | | 13,420.00 |
| **Total Fixed Cost** | | 23,540.00 |
| **Total Cost (TVC+ TFC)** | | 138,737.60 |
| **Gross Margin ( TR- TVC)** | | 251,953.00 |
| **Net Income ( GM-TFC)** | | 228,413.00 |

*Source: Computed from field survey data, 2013. Note: ₦160 is equivalent to 1 US $*

**Table 3. Profit function analysis for fluted pumpkin**

| Parameter | Coefficient | Standard error | t-value | P-value |
|---|---|---|---|---|
| Intercept | 3146.61 | 2245.01 | 1.4016 | 0.2122 |
| Labor cost | -3.8511 | 0.4461 | -8.6328 | <0.0001 |
| Manure cost | -2.3150 | 1.8631 | -1.2426 | 0.2190 |
| Output price | 8.2816 | 0.9172 | 9.0292 | <0.0001 |
| Capital | -0.5218 | 0.5046 | -1.0340 | 0.2730 |
| Land value | -0.9336 | 0.0719 | -12.9339 | <0.0001 |
| Pest control | -3.2152 | 0.1151 | -27.9339 | <0.0001 |
| Planting Material | -0.3834 | 0.3152 | -1.2164 | 0.2199 |

*Source: Field Survey, 2013*

**Table 4. Result of the multiple regression analysis/production function analysis**

| Coefficient/Variable | Linear (L) | Semi-log | Double-log | Exponential |
|---|---|---|---|---|
| Intercept | 3864.210(21240.99) | 9.8125***(0.3019) | 7.3901(4.7529) | 50009.19(28762.78) |
| Educational level | 718.765(457.621) | 0.0305***(0.0082) | 0.0561(0.0439) | 13873.88(26549.69) |
| Farming Experience | 3141.232**(1152.372) | 0.0046(0.0134) | 0.0716(0.0722) | 294.575(165.028) |
| Household size | 804.625**(271.836) | 0.0324(0.0259) | 0.1932***(0.0181) | 3258.30**(1346.451) |
| Farmers Age | -1676.70** (684.546) | -0.0034(0.00732) | 0.0754(0.2176) | 1965.17(2718.73) |
| Land size | 0.8843***(0.2285) | 2.1561***(0.5714) | 2341.55(2151.41) | 1478.75(857.13) |
| Labor | 14.0021(8.0652) | 0.0015(0.008) | 0.2328(0.6982) | 1389.75(868.13) |
| Capital | 2.9672***(0.8970) | 1.9521*(1.1410) | 0.0975(0.1312) | 2134.87(1791.28) |
| Organic manure | 9.8741*(5.1082) | 0.0026*(0.0014) | 0.6580(0.3781) | 5643.40***(1810.81) |
| Planting material | 0.0321(0.6520) | 0.0211(0.0782) | -0.0974*(0.0562) | -3162.73(3026.14) |
| Harvest. Frequency | -2871.40(5011.10) | -0.0035(0.0063) | 0.1153(0.0862) | -373.401(989.212) |
| $R^2$ | 0.8345 | 0.7174 | 0.8091 | 0.6924 |
| Adj. $R^2$ | 0.8074 | 0.6887 | 0.7774 | 0.6607 |
| Observations | 60 | 60 | 60 | 60 |

*Source: field Survey, 2013. N/B, figures in brackets are standard errors. *** Significant at 1%,**significant at 5%, and *significant at 10%. (L) is the lead equation*

The age coefficient had a positive significant impact on output at 5 percent level of probability. This implied that output of pumpkin reduces with increase in farmer's age. This finding is surprising given that aged farmers were supposed to be more experienced than start- up farmers. [31] reported similar findings on their study on dry season vegetable at Imo State.

The coefficient for land size was significant at the one percent, implying that increasing land size would increase output of pumpkin. Increasing land size means that the available labour in the study area could be efficiently utilized by farmers. The positive relationship between land size and output can be attributed to economy of scale. This finding is consistent with [32]. Other studies such as [25] reported an inverse relationship in the study area.

The capital coefficient was positive and significant at the one percent level. This suggests the importance of capital in pumpkin production in the study area. This result compares favorably with [25].

Also, the coefficient of organic manure had a positive significant impact on output at 10 percent level. The use of organic manure to improve the soil fertility would invariably enhanced output of fluted pumpkin in the study area. [25,26] reported similar findings in the study area.

## 3. CONCLUSION

The study examined the determinants of pumpkin production and profitability in Akwa Ibom State, Nigeria. The summary statistics revealed that pumpkin production was dominated by literate farmers (83.3%), majority which were female (61.7%) with average household size of 7 persons. The major sources of finance, dominant age group and labour sources were personal savings, 41-50 years and family labor (66.7%) respectively. The price parameter for labor, land value, pesticide and output impacted significantly on pumpkin profitability. Farmers had a Gross Margin and Net income of ₦ 251,953 and N228, 413, respectively, implying that pumpkin production is profitable. Farming experience, household size, age, land size, capital and organic manure were the major determinants of pumpkin output in the study area.

## 4. RECOMMENDATIONS

Based on the findings of this study, it is recommended as follows:

(i) People should be encouraged to go into pumpkin production. This can be achieved through series of awareness campaigns, provision of basic production inputs like planting material, pesticides, manure etc. If possible, government should acquire large expanse of lands and lease them out to vegetable farmers at reduced rates and less stringent conditions. This would go a long way to reduce the land rental value and ensure access to land.

(ii) To ensure capital availability, soft, interest free loan should be given to pumpkin farmers. This would enable them acquire land, procure production inputs and increase their scope of production.

(iii) Awareness campaigns on the use of organic manure should be intensified. All hands should be on desk to support the on-going campaign on organic farming, as it is a right step in the right direction towards boosting agricultural outputs.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Food and Agricultural Organization. The state of food insecurity in the world. 2010. Accessed 18 October 2013. Available: http://www.fao.orgh/docrep/013i1683e/i1683e.pdf.
2. United Nations High Commissioner for Refugees; 2012. Global Trends 2011: 2012:41 Accessed 16 September 2013. Available: http://www.Unher.org/4fd6f87f9.html.
3. Okon UE , Aselm A, Bassey NE. Technical efficiency and its determinants in garden egg (*Solanum spp*) b Production in Uyo metropolis, Akwa Ibom State. Field Action Science Report [online]. Special issue 1; 2010. Accessed 16 October 2013 Available: http://facrsreport.revues.org/458.
4. Owombo PT, Adiyoloja DK, Koledoye GF, Ijigbade JO, Adeagbo MA. Gross Margin analysis of Amaranth Vegetable Production in Ondo State, Nigeria. A

gender perspective. Journal of Agriculture and Biodiversity Research. 2010;5(6):91-96.
5. Taiga A, Suleiman MN, Aina DO, Sule WF, Alege GO. Proximate Analysis of some dry season vegetables in Anyigba, Kogi State, Nigeria. African Journal of Biotechnology. 2008;7(100):1588-1590.
6. Nwosu CS, Onyeneke RU, Okoli VBN. Socio-economic determinants of fluted pumpkin leaf (*Telferia occidentalis*) Production in Ezinihitte Mbaise Local Government Area of Imo State, Nigeria. Agricultural Science Research Journal. 2012;2(6):355-361.
7. Dam PD. Dry Season vegetable farming in the floodplains of River Katsina- Ala in Katsina –Ala Town of Benue State, Nigeria. Journal of Environmental Issues and Agriculture in Developing Countries. 2012;4:1.
8. Mlozi MR. Urban agriculture: Vegetable production in mertropolitan Greater Vancouver District in Lanans Sokoine University of Agriculture, Morogove, Tanzania; 2003.
9. Ibekwe UC, Adesope OM. Analysis of dry season vegetable production in Owerri West Local Government Area of Imo State, Nigeria. Reports and Opinion. 2011;2:12.
10. Cleaver KM, Screiber S. Spiral, population, agriculture and environment of Saharan African, World Bank, Washington D.C; 1994.
11. Cruz D. Mission beyond vegetable. Research and Development Digest. 2006;8:4.
12. Yahaya MK. Development and challemges of Bakolori irrigation project in Sokoto State, Nigeria. Nordic Journal of African studies. 2002;11(3):411-430.
13. Schippers RR. African Indigenous vegetables. An overview of the cultivated species, NRI/ ACP, EU, Chatten, UK; 2000.
14. Bakhru HK. Foods that heal. The natural way to good health. Orient Paperbacks, Delhi. 2003;82-90.
15. Kocher. Tropical Crops. A Text of Economic Botany (2nd ed.). London: Macmillan Publishers Ltd; 1986.
16. Sabo E, Dia YZ. Awareness and Effectiveness of vegetable technology information packages by vegetable farmers in Adamawa State, Nigeria. African Journal of Agricultural Reseach. 2009;4(2):065-070.
17. Aliyu HM. Proximate analysis of some leafy vegetables (Roselle, Jute and Bitterleaf). International J. Food Agric. Res. 2006;3(1):11-14.
18. Grubben GJH, Denton AO. Plant resources of tropical Africa. Wageningen: Vegetable Prota foundation; 2004.
19. Asian Vegetable Research Development Centre. Vegetable production training manual. AVRC-The World Vegetable Centre, Shanhua, Taiwan. 1990;447.
20. Adebisi-Adelani O, Olajide-Taiwo FB, Adeoye IB, Olajide- Taiwo LO. Analysis of production constraints facing fadama vegetable farmers in Oyo State, Nigeria. World J. Agric. Sci. 2011;7(2):189-192.
21. Asian Vegetable Research Development Centre. Annual Report. AVRC-The World Vegetable Centre, Shanhua, Taiwan. 1981;88.
22. Aladetoyinbo RO. Designing an operational analysis and field layout procedure for Fadama development. A paper presented at a seminar on Fadama Development in Ondo State, 18th December. 2005;2-3.
23. Nwachukwu IN, Onyenweakwu C. Economic efficiency of Fadama Telferia production in Imo State, Nigeria: A translog profit function approach. Munich Personal RePec Archive. MPRA Paper No.13469; 2007.
24. Emenyonu CA, Odii MA, Ohajianya DO, heri-Ukoha A, Onyemauwa SC, Ben-Chendo, GN, Munonye OU. Effects of waste water use in vegetable crop production in Imo State, Nigeria. Researcher. 2010;2(10):47-56.
25. Enete AA, Okon UE. Economic of vegetable (*Talinum triangulare*) Production in Akwa Ibom State, Nigeria. Field Actions Science Report [online]. 2010;4. Accessed 17 November, 2013. Available: http://facrsreport.revues.org/438.
26. Udoh EJ, Akpan SB. Measuring technical efficiency of Waterleaf (*Talinum triangulare*) production in Akwa Ibom State, Nigeria. American Eurasian Journal of Agriculture and Environment Science. 2007;2(50):518-523.
27. Edet GE, Etim NA. Economic analysis of okra production: A case of Ivo Local Government Area of Ebonyi State. Nigerian. Journal of Agriculture, Food ans Environment. 2010;6(1& 2):99-103.
28. Udoh EJ. Technical inefficiency in vegetable farms of humid region: An

analysis of dry season farming by urban women in South South Zone, Nigeria. J. Agric. Soc. Sci. 2005;1:80-5.
29. National Population Commission (NPC). National Census Data; 2006. Accessed 19 September 2013. Available: htti:// www.population.gov.ng/.
30. Bassey NE, Okon UE. Socio-economic constraints to the adoption of improved cassava production and processing technologies in Mbo Local Government Area of Akwa Ibom State, Nigeria. Nigerian Southeast Journal of Agricultural Economics & Extension. 2008;1(2):9-17.
31. Okorji EC, Okon UE, Nwankwo JO. Socioeconomic determinants of irrigated vegetable production systems in Anambra Agricultural Zone of Anambra State, Nigeria. The Nigerian Agricultural Journal. 2012;43:227-235.
32. Akpan SB, Aya EA, Essien UA, Akpan OD, Bassey NE. Analysis of total factor productivity among small-holder vegetable farmers in Akwa Ibom State, Nigeria. Nigerian Journal of Agriculture, Food and Environment. 2011;7(4):68-74.



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