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RESEARCH ARTICLE

ANALYSIS OF PROFITABILITY AND CUCUMBER PRODUCTIVITY AMONG SMALLHOLDER FARMERS

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ABSTRACT

In the tropics, cucumber is a popular vegetable to grow; and as such it becomes imperative to evaluate the levels of farm productivity, given that agricultural productivity has a linear relationship with overall farm profitability. Therefore, this study analyzed profitability and cucumber productivity among smallholders in Jos-South, Plateau State, Nigeria. For this study, 115 respondents were selected using a multistage sampling method. Collected data were analyzed using descriptive statistics, farm budgeting and total factor productivity techniques. The estimated gross and net farm incomes were respectively ₦204,000 and ₦95,200 per hectare; indicating a venture that has the potential to improve economic prospects and is relatively profitable. Additionally, the benefit-cost ratio and profit margin were estimated to be 0.88 and 46.7%, respectively. In addition, the majority of cucumber farmers (51.3%), whose TFP indices were below the optimal scale, were producing sub-optimally; due to an inefficient mix of inputs and the high cost of factors of production. Further, the following were barriers to cucumber production in the area under study: inadequate capital (93.9%); inadequate input supply (78.2%); labour cost (75.7%); limited access to microcredit (70.6%); lack of improved technology (67.8%); limited extension contact (53.9%); fragmented farm holdings (50.4%); and pest and disease outbreaks (43.5%). Therefore, this study recommends improved access to agricultural credit and farm capital; improved cooperative activities, input supply and subsidies, policy modifications, development and adoption of agricultural production technology, improved extension service delivery and farmer sensitization.

KEYWORDS

Crop production, *Cucumis sativus*, productivity index, profitability, smallholders

1. INTRODUCTION

Agriculture remains one of Nigeria's most important economic sectors despite oil revenues. Agriculture accounts for more than 40% of Nigeria's GDP, employs approximately 70% of the population, and produces approximately 80% of the country's food requirements (Adenuga et al., 2013). Vegetables are one of the most important agricultural crops because of their nutritive and economic potential. It is estimated that several plant species are utilized as vegetables all over the world; however, only a small percentage are of significant commercial value (FAO, 2016). Vegetables play a crucial role in human nutrition; they have chemical compounds and vitamins that are necessary for human health. According to and the World Health Organization (WHO) ranks low vegetable consumption sixth among its twenty risk factors for human mortality worldwide, just behind more well-known killers like smoking and high cholesterol (FAO, 2016). It is to this end that a base quantity of 400g per head each day is suggested for the utilization of vegetables by the WHO. Nonetheless, as per the vegetable utilization per head each day in Nigeria is very low; 179g as contrasted with the suggested rate (FAO, 2010). Vegetables not only provide a source of nutrition but also provide employment opportunities in agrarian communities; providing smallholder farmers with a marginal farm income in addition to higher hectare productivity in comparison to staple crops (FAO, 2016). Cucumber (*Cucumis sativus*) clearly stands out as the most important vegetable grown in Nigeria, both in terms of production scale and consumption level (Ndanitsa et al., 2009). According to Adenuga *et al*., (2013), cucumber is a widely cultivated vegetable. It is an important vegetable in the tropics and has been cultivated for over 3,000 years (Goni et al., 2013). It is a soft luscious plant with a lot of water and broad leaves that cover the fruit and form a canopy. Stakes or trellises support the vines. The fruit is roughly cylindrical, elongated, and tapered at the ends. In their unripe, mature state, it is typically consumed raw in salads or pickled, and in tropical regions, it is also used in stews (Onuwa *et al*., 2021). According to Onuwa *et al*. (2021), the crop is Asia's fourth most important vegetable after the tomato, cabbage, and onion; and is Western Europe's second-most important vegetable crop after tomatoes (Wilcox et al., 2015). China is the largest producer of cucumbers in the world, producing 48,000 million kilograms, or 73% of all production worldwide. Russia is the second-largest producer, with 1,742 million kg (2.68 percent), followed by Turkey, with 1,600 million kg (2.46 percent). According to the Food and Agriculture Organization (FAO, 2016), the global production of cucumber in 2015 exceeded 65,000 million kilograms.

Cucumber is a vegetable that can be used for a lot of purposes including medicinal, nutritional, food beverage and cosmetics; however, its utility is yet to be fully exploited (Ndanitsa et al., 2009; Van-Leeuwen, 2001). Sufficient water application is important for horticultural crops because soil water shortages adversely affect farm yield (Wu-Yi, 2014; Van-Leeuwen, 2001). Cucumber production has suffered yield losses as a result of water stress; product yield was higher by and large under satisfactory water supply and application (Akpan, 2009). However, cucumber fruit yields decreased when excessive water was applied (Ndanitsa, 2009).

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Fruit parameters (length, diameter, number, weight etc.) are affected by the schedule of irrigation application (Adenuga et al., 2013; WWAP, 2012). Irrigation scheduling is very important technique for water conservation; by ascertaining crop water requirements. Cucumber is sensitive to water stress due to its shallow fibrous root system (Akpan, 2009). As agriculture is the world's largest consumer of freshwater, there is a growing need to improve water use efficiency in irrigated agriculture. A proportion of 70-80% of the water diverted in arid and semi-arid areas is used for agricultural purposes (WWAP, 2012). Moreover, the proportion of people living in water-stressed areas worldwide is projected to increase to 67% by 2050 (Wu-Yi, 2014). Nigeria's rural population is predominantly involved in agricultural food production however, it is reported that Nigeria has a food demand exceeding its local production, indicating a food demand-supply deficit; attributable to several factors including high cost of agricultural production, climatic change, lack of improved inputs, financial constraints, lack of technical support, fragmented farm holdings, insecurity and conflicts in agrarian communities, farmers literacy level, etc. (Ufiobor, 2017; Ndanitsa et al., 2009). The importance of this study is basically to contribute to the dearth of information on farm productivity and profitability, particularly for cucumber production in Nigeria. It therefore becomes imperative to evaluate the current level of productivity of farm units given that agricultural productivity has a linear relationship with overall farm efficiency (Goni et al., 2013). This study will be of benefit to cucumber farmers, consumers, traders, policy makers and public sector agencies, ministries of agriculture, students of agriculture and research scientists, as well as other stakeholders in the commodity value chain. As a result, this study investigates smallholder cucumber farmer's productivity; particularly, it estimated the profitability of cucumber production; ascertained the level of cucumber productivity; and identified the constraints of cucumber production in the area under study.

2. METHODOLOGY

2.1 Study Area

The study was conducted in Jos-South local government area (LGA) of Plateau State, Nigeria; It has a land area of 510 km^2 and a population of 306,716 (NPC, 2007), and its coordinates are 9^{0}46'N and 8^{0}48'E. The L.G.A. is divided into four districts (Kuru, Vwang, Du, and Gyel), each with unimodal rainfall pattern of 900 to 1250 millimeters per year and an average daily temperature of 180 to 220 degrees Celsius: Cucumber, tomato, acha (*fonio*), millet, maize, guinea corn, and potatoes, are the most commonly grown crops; as well as goat, pig, poultry and cattle were the livestock reared. Farming, civil service, mining, and trading are the most common occupations in Jos South LGA (Onuwa and Folorunsho, 2022; NBS, 2012).

2.2 Sampling Procedure

Multistage methods were utilized to choose respondents for the study. In the initial phase two (2) districts were purposively chosen out of the four (4) in the area under study; because of the abundance of small-scale cucumber farmers in the area. The purposeful selection of eight communities out of fifteen (15) from the selected districts was done in the second phase; and was attributable to the widespread use of sole based cucumber production systems in the area. The last phase included the involved the systematic random selection of smallholder cucumber farmers; using the assembled list from the community enumerators in the chosen areas, at steady proportionality of 0.2 (20%); which is the constant ratio or fraction of a variable quantity to another to which it is proportional; from a sample frame of 601 smallholders, 115 respondents were chosen for the study; and validated using the raosoft sample size calculator with a confidence level of 95% and a margin of error of 10% adapted from (Onuwa et al., 2022a). In Table 1, the distribution is shown.

Table 1: Distribution based on Sample Frame and Size

S/N	Selected District	Selected community	Sample frame	Sample size (0.2)
1	Du	Kwang	89	17
		Shen	108	21
		Zok	63	12
		Bek	49	9
		Fwapna	64	12
2	Kuru	Zachol	79	15
		Dazek	65	13
		Kushe	84	16
	Total		601	115

2.3 Method of Data Collection

Well-structured questionnaires designed in line with the objectives of the study were used for data collection.

2.4 Analytical Techniques

Collected primary data was evaluated using descriptive statistics, agricultural budgeting models and total factor productivity (TFP) techniques. Farm budgeting technique (cost and profit analysis) was used to determine the cost and profitability of catfish production in the area. The technique of TFP is used to estimate agricultural productivity by comparing the agricultural input index with the output index. Therefore, a combination of statistical and budgetary techniques was used in the analysis of the collected data as adapted from (Onuwa et al., 2022b).

2.5 Farm Budget (Profitability) Analysis

The agricultural budget model applied for this study is cost and profit analysis. Metrics such as total revenue, total cost; net income of the farm, profit percentage and profit-to-cost ratio were analyzed. The farm budgeting models used are presented in Equations (1), (2), (3) and (4), res

N.F.I=T.R-TC …….. (1)

Where: N.F.I= net farm income; T.R=Total revenue (₦); and TC=total cost (₦)

$TR = P_Y.Y_I$ …….. (2)

Where: P_Y = output unit price (₦); and Y_I = output quantity (kg)

pectively as adapted from (Onuwa et al., 2022b):

Total Cost (TC) =TVC+TFC …….. (3)

Where: TC = Total cost (₦); TVC=total variable cost (₦); and TFC=total fixed cost (₦)

TVC = PX. XI …….. (4)

Where: PX = variable input unit price (kg/liter) [Seed (₦), fertilizer (₦), labour cost (₦), and agrochemicals (₦)]; and XI = Input quantity (kg/liter)

TFC = Total fixed cost (₦) (agricultural equipment's and irrigation facilities)

Where: GM = Gross Margin (₦/ha); GFI = Gross Farm Income (₦/ha); and TVC = Total Variable Cost (₦/ha).

To further substantiate the profitability of this enterprise, profitability ratios such as: percentage (%) profit margin and benefit-cost ratio (BCR), fixed and operating ratios were estimated and specified in Equations (5) and (6), respectively as adapted from Onuwa *et al.* (2022b).

Percentage Profit margin (%PM) = Net farm income/Total revenue x 100% …….. (5)

Benefit-cost ratio (BCR) = Net farm income/Total cost …….. (6)

2.6 Total Factor Productivity

By comparing an index of agricultural outputs to an index of agricultural inputs, total factor productivity (TFP) can be used to calculate agricultural productivity (Onuwa *et al.*, 2022b). This can be processed following Onuwa *et al.* (2022b). This can be computed following Onuwa *et al.* (2022b) as the implicitly specified ratio of the total variable cost (TVC) to the output in equation (7):

$$\frac{TFP}{TVC}=\frac{Y}{TVC}=\frac{Y}{\sum PiXi} \text{ ……..} \quad (7)$$

Where: Y = quantity of output; TFP = Total Factor Productivity; TVC = total variable cost; P*i* = unit price of the ith variable input; and X*i* = quantity of ith variable input. This method does not take into account the role of total fixed cost (TFC) because it does not affect the conditions for resource-use efficiency or profit maximization; and presented in equation (8), as adapted from Onuwa *et al.* 2022b):

$$TFP=\frac{Y}{AVC} \text{ ……..} \quad (8)$$

The TFP index can be interpreted as follows:

(< 0.1) = Sub-optimal; (1.0 – 1.09) = Optimal; and (≥ 1.10) Super-optimal.

3. Results and Discussion

3.1 Farm Budget Analysis

According to Table 2, cucumber production yielded a net and gross farm income of ₦95,200 and ₦204,000 per hectare, respectively. This indicates that cucumber production was a relatively profitable endeavor with potential for improved economic outcomes. The total variable and fixed costs were ₦60,300 (55.4%) and ₦48,500 (44.6%) per hectare, respectively (Figure 1); indicating that production costs consumed a significant portion of the farm's gross income. The production of cucumbers was estimated to cost ₦108,800 per hectare overall. Farm tools/Irrigation facilities (25.3%) and farm improvement (19.3%) constituted the most significant production cost components. The benefit-cost ratio was 0.88, indicating that 0.88 naira can be earned for every one naira invested in cucumber production. The profitability index of cucumber production in the study area can be seen in these ratios. This conforms to (Onuwa et al., 2022c; Wilcox et al., 2015; Goni et al., 2013; and Owombo et al., 2012) who, in their respective studies on agricultural profitability, reported outcomes that were comparable.

Table 2: Costs and Return Analysis of Cucumber Production per Hectare

Variables	Quantity	Amount (N/ha)	%
A. Output			
i. Cucumber output	1,700kg/ha		
ii. Unit price per kg	120/kg		
B. Gross farm income		204, 000	
C. Variable cost items:			
iii. Seed	350g/ha	14,000	12.9
iv. Inorganic Fertilizer	50kg	18,000	16.5
v. Organic fertilizer	150kg	6,000	5.5
vi. Labour cost	65 man-days	17, 500	16.1
vii. Agro-chemicals	4lt	4,800	4.4
D. Total Variable Cost (TVC)		60, 300	55.4
E. Fixed cost items:			
viii. Farm improvement (live fence/well)		21,000	19.3
ix. Farm tools/Irrigation facilities		27,500	25.3
F. Total Fixed Cost (TFC)		48,500	44.6
G. Total Cost (T.C) (D+F)		108, 800	100
H. Net Farm Income (NFI) (B - G)		95,200	
J. Benefit-Cost ratio (H/G)		0.88	

Source: Field Survey (2020

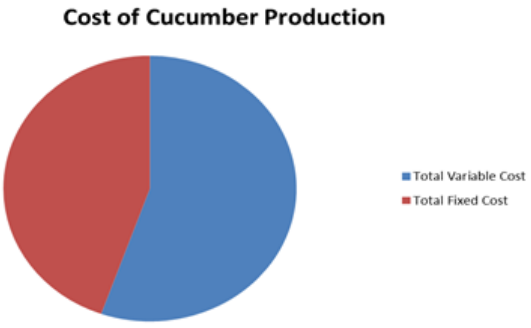

Figure 1: Proportion of Total Variable and Fixed Costs

3.2 Total Factor Productivity Analysis

According to the summary statistics of the total factor productivity result in Table 3 and Figure 2; the majority of cucumber farmers, 51.3%, were producing less than optimally because their TFP indices were below the optimal scale, indicating that the production process did not allocate the right mix of inputs; According to their TFP indices, 27.8% were found to be optimally productive, and 20.9% were found to be super-optimally productive because their TFP indices were higher than the optimal scale. The low output in the various cucumber farms in the study area could be attributed to a suboptimal input mix and high production input costs. This corroborates with whose studies on agricultural productivity profiles yielded comparable findings (Onuwa et al., 2022b; Onuwa et al., 2021; Cechura et al., 2014; Fakayode et al., 2008).

Table 3: Distribution Based on Total Factor Productivity of Cucumber Farmers

Productivity index	Frequency	%
Sub-optima (<1.00)	59	51.3
Optima (1.00-1.09)	32	27.8
Super-optima (>1.10)	24	20.9

Source: Field survey (2020)

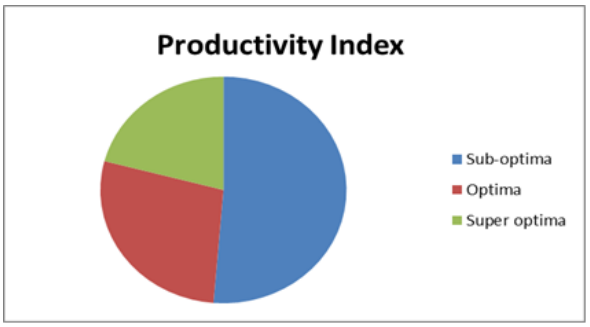

Figure 2: Index of Total Factor Productivity

3.3 Constraints of Cucumber Production

Table 4 and Figure 3 show the identified constraints that have significantly affected cucumber production in the study area, these factors include inadequate capital (93.9%); farmers find it difficult to access agricultural capital and agricultural credit. Insufficient input supply (fertilizers, improved varieties, agrochemicals, etc.) (78.2%); this is due to poor and restricted access to agricultural inputs in the study area. Cost of Labor (75.7%); due to the driving factors (e.g. drudgery, labor intensity, etc.) of agricultural production, which led to the migration of agricultural labor to other sub-sectors. Limited access to microcredit (70.6%); this is because there are no formal financial institutions in the study area, leading to the financial exclusion of rural farmers. Lack of improved technology (67.8%); attributable to the high cost of technology adoption (e.g. irrigation facilities, knapsack sprayers, etc.) and inefficient resource utilization among smallholders. Poor contact with extension (53.9%); due to farmers' limited access to local extension services. Fragmented farm holdings (50.4%); due to tenure policies in the area resulting to subsistence-level agricultural production. Outbreaks of disease and pests (43.5%); due to the widespread use of poor management techniques by farmers. This supports with the discoveries of who reported comparable results regarding the production of arable crops (Onuwa *et al*., 2022c; Ufiobor, (Onuwa et al., 2022c; Ufiobor, 2017; Goni et al., 2013; Goni et al., 2013).

Table 4: Constraints Associated with Cucumber Production

Variables	Frequency*	%
Inadequate capital	108	93.9
Inadequate input supply	90	78.2
High labour cost	87	75.7
Limited access to microcredit	85	73.9
Lack of improved technology	78	67.8
Poor extension contact	62	53.9
Fragmented farm holdings	58	50.4
Pest and disease outbreaks	50	43.5

Source: Field survey (2020); * = Multiple responses

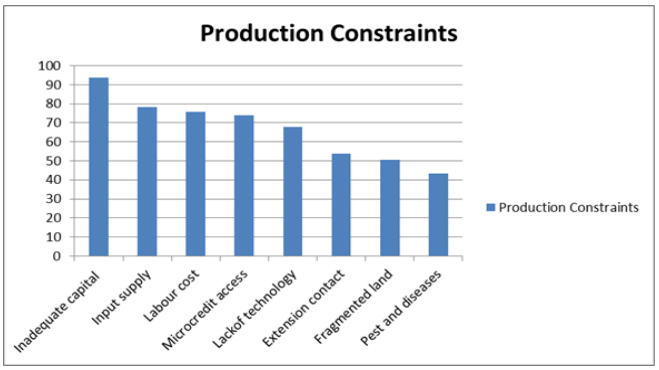

Figure 3: Constraints of Cucumber production

4. Conclusion and Recommendations

This study focused on smallholders' profitability and cucumber productivity in Jos-South, Plateau State, Nigeria. The results showed that cucumber farming was moderately profitable, with possibilities for improved economic prospects. Additionally, the majority of cucumber farmers' TFP indices were below the optimal range, indicating suboptimal productivity; owing to sub-proficient information, poor innovation reception and significant expense on production inputs. All of the constraints that the farmers identified had a significant economic impact on cucumber farming in the area under study; thus exertion ought to be made to limit these factors affecting cucumber production; and as such improve agricultural productivity and efficiency. The following recommendations for policy actions to enhance farm output and derivable incomes are proposed:

i. Develop policies to improve access to agricultural capital and access to agricultural credit for smallholders.

ii. Public-Private sector partnerships that ensures adequate provision and distribution of production inputs/technologies at subsidized rates.

iii. Improved farm cooperative activities that facilitate access to inputs such as fertilizers, herbicides, seeds, etc., as well as efficient produce marketing.

iv. Adoption of modern practices and technology that automates production; minimizes labour costs and optimizes productivity.

v. Agricultural extension activities in the study area need to be strengthened to provide improved agricultural techniques to farmers, i.e. effective technology transfer.

vi. Modifications to tenure policies to reduce farmland fragmentation.

vii. Increased sensitization on modern management practices that mitigates farm risks (pest/disease outbreaks) and improves productivity.

References

Adenuga, A.H., Lawal, A.M., Rotimi, O.A., 2013. Economics and technical efficiency of dry season tomato production in selected areas iof Kwara state, Nigeria. Agris-online Papers in Economics and Informatics, 5: Pp. 11-19.

Agricultural Services and Training Centre (ASTC) Activities, Turkish Journal of Agriculture-Food Science and Technology (TURJAF), 10(8): Pp. 1369-1376. DOI: https://doi.org/10.24925/turjaf.v10i8.1369-1376.4905

Akpan, N.I., 2009. Adopting Sustainable Agricultural Techniques for Food Security and Natural Resource Management. In: Mohammed I. Kyiogwom, U.B., Hassan, W.A., Ala, A.L., Singh, A and Dogondaji, S.D. (eds). Sustaining Agricultural Growth to Meet National Economic Development Goal. Proceedings of the 23rd Annual Conference of the Farm Management Association of Nigeria 14th – 17th December, 2009. Sokoto State Nigeria Pp. 24-33.

Cechura, L., Heinrich, H., Zdenka, M., Michal, M., 2014. Productivity and Efficiency

Cucumber in Jos-East, Plateau State, Nigeria. International Journal of Agriculture and Rural Development (IJARD). 24 (2): Pp. 5740-5750. Available at http://ijard.com/journalarticles/Vol%2024(2)%202021/1._Technical_Efficiency_Of_Cucumber_Production.Pdf

Differences between Czech and Slovak Milk Producers. Review of Agricultural and Applied Economics, 13 (2), Pp. 17-21.

Fakayode, B.S., Omotesho, O.A., Tsoho, A.B., Ajayi, P.D., 2008. An Economic Survey of

Food and Agricultural Organization, FAO. 2010. Food Security and Agricultural Development in Sub-Saharan Africa: Building a case for more public support (Policy Brief1). Retrieved from ftp://ftp.fao.org/docrep/fao/009/a0788e/a0788e.pdf

Food and Agriculture Organization, FAO. 2016. Food Production Dataset, the United Nations. Available on http://faostat3.fao.org accessed on May20, 2016.

Goni, M., Umar, A.S.S., Usman, S., 2013. Analysis of Resource-Use Efficiency in Dry Season Vegetable Production in Jere, Borno State, Nigeria. Journal of Biology, Agriculture and Healthcare, 3 (19), Pp. 18-23.

Irrigation Farming Around River Bank in Edu Local Government Area of Kwara State, Nigeria In: Mohammed I., Kyiogwom, U.B., Hassan, W. A., Ala, A.l, Singh, A and Dogondaji S.D. (eds). Sustaining Agricultural Growth to meet national Economic Development Goal. Proceedings of the 23rd Annual conference of the farm.

National Bureau of Statistics, NBS. 2012. Socio-economic Survey on Nigeria. First Quarter Report, NBS, Abuja, Nigeria.

National Planning Commission, NPC. 2007. Official Census Report, National Population Commission, Abuja, Nigeria.

Ndanitsa, M. A., Umar I., Olaleye, R.S., Mohammed, U.S., Sadia. M.S., 2009. Economics of of

Onuwa, G., and Folorunsho, S., 2022. Determinants of Tomato Farmers Participation in

Onuwa, G.C., Binuyo, G., Alamanjo, C.C., Dalla, A., Holi, H and Yitnoe, G., 2022c. Benefit-Cost and Productivity Analysis of *fonio* (*Digitaria spp*) Cultivation. Journal of Agricultural Research, Pesticides and Bio-fertilizers (Aditum Pub. LLC, USA), 3 (5) Pp. 1-4. Available at http://doi.org/01.2022/1.1070.

Onuwa, G.C., Mailumo, S.S., and Oyewole, S.O., 2022b. Empirical Analysis of Catfish Productivity among Smallholders in Ekeremor, Bayelsa State, Nigeria. International Journal Agricultural and Natural Sciences *(IJANS),* 15 (3): Pp. 257-263.

Onuwa, G.C., Mailumo, S.S., Chizea, C.I., Onemayin J.J., Idris, R.S., Abalaka, E.A., Ebong, A.C.,2022a.Technical Efficiency in Cowpea (*Vigna Unguiculata*) Prodction in Kanke, Plateau State, Nigeria. FUDMA Journal of Agriculture and Agricultural Technology, 8 (1): Pp. 372-382. https://doi.org/10.33003/jaat.2022.0801.027

Onuwa, G.C., Okeke-Agulu, K.I., Birma, J., and Alamanjo., 2021. Technical Efficiency of

Owombo, P.T., Adiyeloja, D.K., Koledoye, G.F., Ijigbade, J.O., Adeagbo, M.A., 2012. Gross Margin Analysis of Amaranth Vegetable Production in Ondo State, Nigeria: A Gender Perspective. Journal of Agriculture and Biodiversity Research, 1 (6),Pp. 91-96.

Rural Infrastructures and Agricultural Productivity Profiles in Nigeria. European Journal of Social Sciences, 7(2):Pp.158-171.

Ufiobor K. A., 2017. Nigerian Agriculture and sustainability, problems and solutions: Sustainable coastal management. Retrieved from www.theseus.fi>bitstream>handle

Van-Leeuwen, N.H., 2001. Irrigation reforms in Africa. In proceeding of Regional seminar on private sector participation and irrigation expansion in sub-Sahara Africa Oct. 2001, Accra, Ghana. Edited by Hilmy Sally and C.L.Abernetthy, Pp. 50-58; 22-26

Wilcox, G.I., Offor, U.S., and Omojola, J.T., 2015. Profitability of cucumber (*Cucumis sativa* L) production in Tai Local Government Area of Rivers State, Nigeria. *J.* Adv. Stud. Agric. Biol. Environ. Sci., 2(3), Pp. 1-6

World Water Assessment Program, WWAP. 2012.World water development report. Retrieved from www.eoi.es/blogs/ismd/water-scarcity.

Wu-Yi, L., 2014. Effects of different temperatures and parameters analysis of the storage life of fresh cucumber and Tomatoes using controlled atmosphere technology. American journal of food technology, 9 (2): Pp.117-126. Retrieved from http://scialert.net>fulltextmobile.