

Economics of pineapple production in Awgu Local Government Area of Enugu State, Nigeria

David Okechukwu Enibe* • Chinecherem Joan Raphael

Chukwuemeka Odumegwu Ojukwu University, Igbariam, Anambra State, Nigeria.

*Corresponding author. E-mail: enibedav@yahoo.com. Tel: +2348137829887.

Accepted 21st June, 2020.

Abstract. The study analyzed the economics of pineapple production in Awgu Local Government Area (LGA) of Enugu State, Nigeria. Data for the study were collected from 50 respondents from Amoli and Ihe communities of the LGA through a simple random sampling technique. The communities were purposively selected because they contain higher concentration of pineapple farmers. Primary data were collected using interview schedule administered to the respondents. Data were realized with descriptive statistics, enterprise budgeting techniques and multiple regression analysis. The study revealed that (36%) of the farmers had farming experience of 1 to 10 years' experience in pineapple production, indicating that new farmers entered the crop's production sector within the last decade. The enterprise proved profitable with farmers' net return on investment value of 1.7. Farm size, cost of input, level of education and household size significantly determined net farm income. It was further revealed that poor access road and high transportation cost were the main constraints of the pineapple producers. The study concluded that profitable production opportunities exist on the crop. The study recommends that extension agencies should encourage more new farmers to exploit pineapple production potentials while encouraging its existing farmers to scale up production through farm size increment, reinvestment of their gains and production knowledge increase.

Keywords: Pineapple, production, profitable, Awgu, Nigeria.

INTRODUCTION

Sustainable Development Goals 2 (SDG 2) was set up in 2015 by the United Nations (UN) for addressing the significance of food security and nutrition with calls on member countries to end hunger, realize food security, improved nutrition and aid sustainable agriculture progress by 2030 (Otekunrin *et al.*, 2019). Doubling the productivity and incomes of small-scale farmers by the aforesaid year is one of the principal targets of the SDG 2 (Otekunrin *et al.*, 2019). Currently, Poverty and unemployment in most African countries have not been reduced (Food and Agricultural Organization (FAO, 2017). In Nigeria, 91.78 million people are reported to be living in extreme poverty and this figure is seen as the

highest among the nations of the world (Otekunrin *et al.*, 2019). Unemployment rate is seen as one of the factors fuelling the hunger conditions (Otekunrin *et al.*, 2019). Agriculture is in Nigeria known as a significant labour employer (FAO, 2017). This indicates that promotion of different agricultural sectors is one of the best ways to reduce unemployment and the global hunger index (GHI). In this consideration, giving attention to increased production of valuable fruits such as pineapple, bananas and citrus is justified. This is because they offer important nutritional, economic and social values, and can contribute in reducing the GHI. Interest of this paper is on pineapple.

Pineapple (*Ananas comosus*) belongs to the plant family *bromeliaceae* and is reported a native of Brazil and Paraguay where wild relatives were first domesticated (Hossain, 2016). It is a very important economic and popular fruit grown in different tropical countries (Portia *et al.*, 2017). Pineapple is rated as the third most valuable fruit in the globe behind bananas and citruses such as grapefruit, limes, lemons, and oranges (Olayinka *et al.*, 2014). Pineapple is a delicious fruit with fine flavour, a good source of dietary fibre and important vitamins such as A, B, B6, C, E and sugar (15%) (Portia *et al.*, 2017; Iwuchukwu *et al.*, 2017; Enibe *et al.*, 2018).

Hussain (2016) reported that more than 2.1 million acres are used for pineapple production in over 82 countries which include Thailand, Brazil, Costa Rica, India, Nigeria, Kenya, Indonesia, Mexico, Hawaii, Philippines, Austraria, South Africa, Puerto Rico, Cuba and Formosa. Among the pineapple producing countries of the world, Nigeria ranks 7th and 1st in Africa with 1.4 million metric tonnes at 7,778T/ha (Akhilomen *et al.*, 2015). Currently, 1,664, 510 metric tonnes are in Nigeria produced in an area of 199891 at the yield of 83271 Hectogram (hg)/hectare (ha) (FAOSTAT, 2019). Nigeria's current pineapple output is only 5.96% of the world production (27,924,287 tonnes) and her 83271hg/ha appears to be of low yield or productivity in compares with those of West Africa, Africa and the world that are respectively 117053, 134556 and 251260 hg/ha (FAOSTAT, 2019). This is worrisome to the crop's researchers in Nigeria, suggesting the need to deepen its research and reveal the ways to scale up its production. One may wonder why.

Encouragement of increased pineapple production is desirable because of five major reasons, values uses. First, it provides good raw materials in confectionary industries for production of various products which include household additives, fruit drinks, sweet and even wine (Enibe *et al.*, 2018). Second, it is a leading commercial fruit in international market (Iwuchukwu *et al.*, 2017) and has the capacity to generate foreign exchange (Enibe *et al.*, 2018). This is because Hossain (2016) reported that 90% of fresh pineapple in the world is demanded in 12 important countries namely: USA, England, Japan, Canada, Germany, France, Belgium, Italy, Spain, Korea, Netherlands and Singapore. Third, its potential business opportunities have not been fully exploited in Nigeria (Enibe *et al.*, 2018). Fourth, pineapple consumption benefits human health because it facilitates protein digestion, combats loss of memory and sadness and in addition offers cerebral toner values (Iwuchukwu *et al.*, 2017). In addition, Hossain (2016) revealed that it is used to: arouse appetite, expulse internal worms, prevent ulcers and enhance fat excretion. Finally, it offers ornamental values because it symbolizes expensive living and lovely welcome of visitors to homes (Olayinka, 2013, Enibe *et al.*, 2018).

Nigeria has the potential to increase her pineapple

output through three major ways. First, entry of new small and large scale farmers or entrepreneurs who will help to cultivate the crop on its available land in various states, town and village communities which Akhilomen *et al.* (2015) reported to be 180, 000 hectares. In evidence, Enibe *et al.* (2018) in Anambra state pineapple market study concluded that investment opportunities exists on not just the crop's market, but also on its production and processing. Second, is farmers' adoption of pineapple production technologies. Technologies referred are the application of scientific knowledge for the crop's production which includes standard spacing, fertilizer application and choice of cultivars because they have different attributes. It is revealed that making high quality seeds available to farmers is needed for achieving reasonable agricultural productivity increase in Nigeria (FAO, 2017). Such desirable pineapple high quality cultivars include Smooth cayenne, Queen, Spanish, Abacaxi, Maipure and red Spanish. Third, pineapple production and efficiency research helps to suggest how best to allocate resources for increased agricultural output. Regarding this, Akhilomen *et al.* (2015) noted that the important role of efficiency in increasing agricultural output has been generally accepted among researchers and policy makers. They further revealed that pineapple farmers in Edo State of Nigeria have the capacity to increase technical efficiency by 30% to reach their maximum level.

Several studies in the past have been conducted on pineapple. For example, Enibe *et al.* (2018) analysed pineapple marketing in Anambra State and found it profitable and recommended its exploitation by potential traders and entrepreneurs. Iwuchukwu *et al.* (2013) studied the training needs of pineapple farmers in Enugu State of Nigeria. Iwuchukwu *et al.* (2017) studied the problems and prospects of pineapple production in Enugu State. However, research gaps still exist on the crop that warrants investigation. Olayinka (2013) studied profitability and constraints of pineapple production in Osun state and found its NROI to be low (8 kobo for every one naira) suggesting that the low NROI may discourage farmers from scaling up cultivation of the crop. This indicates that there is a need to understand farmers' NROI in different study areas. Aforementioned studies appear not to have provided information on the effects of socio-economic characteristics of respondents on net farm income (NFI). In consideration of the above, this study answered the following research questions: Who are the pineapple farmers in the study area? Is pineapple production profitable in the study area? Do the socio-economic characteristics of pineapple farmers have effects on their net farm income? What are the current constraints of pineapple farmers in the study area? The specific objectives of the study are to: Examine the socioeconomic characteristics of the pineapple farmers in the study area; determine the costs and returns of pineapple production in the study area; determine the

Table 1. Regression variables and their descriptions.

Name of variable	Description
Net farm income	This was obtained by deducting total fixed cost (TFC) from the gross margin.
Farmer's age	This was measured in years and the a priori expectation is that it will exert positive effect on profit.
Educational level	This was measured as the number of years the farmer spent in school. The a priori expectation is for education to have a positive influence on net farm income.
Marital status	This examined the farmers' marital life for understanding their married, single, divorced or widowed situation. The a priori expectation is for marital status to have insignificant effect on net farm income.
Household size	This is the total number of people living together in a house and feeding from the same pot. It could have a negative or positive influence on net farm income. The a priori expectation is for household size to have insignificant effect on net farm income.
Farming experience	This measures how many years the farmer has been in pineapple production. The a priori expectation is for farming experience to have significant effect on net farm income.
Farm size	This measured the size (plots and hectares) of the pineapple farm owned by each of the farmers The a priori expectation is for far size to have significant effect on net farm income.

Source: Field Survey (2018)

socioeconomic characteristics of the farmers that are affecting farmers' net farm income; and identify the problems of the pineapple farmers in the study area.

MATERIALS AND METHODS

The study area is Awgu local government area (LGA), Enugu state of Nigeria. The State is one of the Southeast Nigerian States. The study LGA lies in Enugu West Agricultural zone of Enugu state. According to Okoli *et al.* (2014) the population is 198,134 persons with population density of 2260 persons per km. Awgu L.G.A. is bounded on the north by Udi and Nkanu west LGAs, on the west by oji river LGA and on the south by Abia State (Isochi LGA). It comprises of 20 autonomous communities which are named: Agbogugu, Isu-awa, Ituku, Ihe, Ogbaku, Owelli, Ogugu, Agbudu, Amoli, Agwu, Mmaku, Ugbo, Ezere, Agwunta, Ngbidi, Nkwe, Ugwueme, Obeagu, Nenwenta and Mgbowo. About 80% of the population of those communities are peasant farmers.

Data for the study were collected from primary and secondary sources. The secondary data were obtained from sources which include Journals and Food and Agricultural Organization (FAO) articles. The primary data were collected from two autonomous town communities (Amoli and Ihe). The communities were purposively selected because they appear to be more popular in pineapple production. From each of the communities, 25 farmers were randomly selected and interviewed using interview schedule. This gave a total of 50 respondents from the two communities.

Data collected were realized using descriptive statistics (DS), net farm income analysis (NFIA) and multiple regression analysis (MRA). Assessed for the analysis were socioeconomic variables of the respondents, production costs and returns and the problems of the farmers. Also assessed for the costs and returns of the enterprise were NFI, total revenue (TR: total output \times unit price of product), total variable cost (TVC: variable inputs \times unit prices of variable inputs), total fixed cost (TFC: annual depreciation values of fixed cost items) and total cost (TC: TVC + TFC). The socioeconomic variables collected were age, educational level, marital status, household size, farming experience, farm size, and input costs.

Measurements of variables

The independent variables for the equation of the relationship between farmer characteristics and net farm income (NFI, dependent variable) are specified in Table 1. The socio economic variables were measured as presented in Table 1.

Data analysis

Objective I was achieved using net farm income (NFI) analysis, objective III was realized using descriptive statistics such as percentage, frequency distribution and mean score while objective II was achieved using multiple regression analysis. The multiple regression

analysis was used to determine the relationship between profit and socio-economic factors and is specified as follows:

$PFT = F (FAS, COI, LOE, MAS, AGE, FAE, HHS; e)$
where

PFT = profit (naira)

FAS = farm size (ha)

COI = cost of inputs (naira)

LOE = level of education

MAS = marital status

AGE = age of the farmer (years)

FAE = farming experience (number of years)

HHS = household size (number of people in a household)

e = error term.

The data was applied to four functional forms of linear, exponential, semi-log, and double log. The explicit forms of the four functional forms of the semi log are given as follows:

$PFT = \beta_0 + \beta_1 FAS + \beta_2 COI + \beta_3 LOE + \beta_4 MAS + \beta_5 AGE + \beta_6 FAE + \beta_7 HHS + e_i$

Linear: $Y = \beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7 + e_i$

Exponential: $\log Y = \beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7 + e_i$

Double-log: $\log Y = \beta_0 + \beta_1 \log X_1 + \dots + \beta_7 \log X_7 + e_i$

The method of net farm income (NFI) analysis employed in determining enterprise profitability is given as follows:

$NFI = TR - TC$

Where

NFI = net farm income

TR = total revenue (total output x unit price of product)

TC = total cost (TVC+TFC)

TVC = total variable cost (variable inputs x unit prices of variable inputs)

TFC = total fixed cost (annual depreciation values of fixed cost items)

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The socio-economic characteristics of the pineapple farmers described were age, educational level, marital status, household size, farming experience, and farm size.

Table 2 shows that majority of the respondents were in the age ranges of 41 to 50 years (42%) and 31 to 40 (26%). The result indicates that most of the respondents were in their active age and can improve their production capacities if given the necessary conditions. This finding agrees with Esiobu and Onubuogu (2014) who reported

that majority of the farmers were within the age range of 41-50 years and are still in their active age and could withstand the stress and strain involved in pineapple production. The result, however, disagrees with Olayinka *et al.* (2014) who in the study of competitiveness of pineapple production in Osun State of Nigeria found smaller proportion (6.7%) of their respondents in the age range of 21 to 40 years. A possible reason is because a significant proportion of the respondents (36%) who are new and most likely to be younger farmers seemed to have entered into pineapple cultivation in this study area as indicated by their farming experience of (1 to 10 years) of as shown in Table 1.

Table 2 showed that the majority of the respondents had primary (36%) and secondary (34%) education. The result indicates that the respondents were educationally positioned to adopt pineapple farming technologies if offered by extension agents or other development workers. The result agrees with Okoli *et al.* (2014) who reported that majority (40%) of the farmers had formal education.

Table 2 shows that majority (76%) of the farmers were married and with large household size of 6 to 10 persons. The result reveals that greater proportion of the respondents support large farm families with their farm income. This result is in line with Iwuchukwu *et al.* (2017) who found that majority (73.8%) of the pineapple farmers were married and with majority of the respondents (60%) managing large household size 6 to 10 persons.

Table 2 shows that majority of the respondents had farming experience of 11 to 20 years (38%). The result indicates that the respondents had good farming experience and can bear the risks involved in adoption of agricultural technologies or in the management of agricultural loans which may be offered to them for scaling up pineapple production. The result favourably compares with Iwuchukwu *et al.* (2017) who in the study of problems and prospects of pineapple production in Enugu state found that majority of the respondents had farming experience of 11-20 years (24%).

Table 2 shows that majority (42%) had farm size between 0.1-1.0 hectares, 12% had between 1.1 and 2.0, another 12% had between 2.1 and 3.0 hectares, 6% had between 3.1 and 4.0 hectares and the least 4% had between 4.1 and 5.0 hectares. The result implied that majority of the farmers were small scale farmers. Because majority of the farmers were new in the production of the crop, it suggests that they need training and encouragement to increase their production capacities. This is the why Iwuchukwu *et al.* (2013) in their study of Training Needs of Pineapple Farmers in Enugu State of Nigeria encouraged building capacities of pineapple farmers in various ways which *inter alia* include training for off-season production and farm size increase. This result is consistent with Olayinka *et al.* (2014) who found that pineapple farmers were mainly small scale farmers.

Table 2. Socio-economic characteristics of the respondents.

Variable	Frequency	Percentage (%)
Age		
21 -30	3	6
31 -40	13	26
41 – 50	21	42
51 – 60	9	18
60 -70	4	8
Total	50	100
Education level		
No formal education	13	26
Primary education	18	36
Secondary education	17	34
Tertiary education	2	4
Total	50	100
Marital status		
Single	12	24
Married	25	50
Separated	3	6
Widow/widower	10	20
Total	50	100
Household size		
1 – 5	6	12
6 – 10	38	76
11 – 15	6	12
Total	50	100
Farming experience (years)		
1 – 10	18	36
11 – 20	19	38
21 – 30	10	20
31 – 40	1	2
41 – 50	2	4
Total	50	100
Farm size (hectare)		
0.1 – 1.0	21	42
1.1 – 2.0	12	24
2.1 – 3.0	12	24
3.1 – 4.0	3	6
4.1 – and above	2	4
Total	50	100

Source: Field Survey, 2018

Pineapple production costs and returns

Table 3 shows that pineapple farmers made gross margin of N1,494,750, net farm income of N1,423,600.00, mean net farm income of N28,472 and net return on investment

of 1.7. The positive values of gross margin, net farm income, mean net farm income and net return on investment (NROI) indicated that pineapple production was profitable in the area. The NROI value of 1.7 implied a return of N1.7 for every one naira invested in the

Table 3. Estimated profit of pineapple farmers (n = 50).

Variables	Amount (N)	Percentages
Total revenue (TR)	2,250,000	
Variable cost		
Cost of input	320,000	42.4
Labour cost	150,000	19.9
Transportation cost	200,000	26.5
Harvesting cost	85,250	11.3
Total variable cost (TVC)	755,250	100
Fixed cost		
Machete	18,300	25.7
Wheel barrow	30,500	42.9
Basin /basket	12,350	17.4
Hoe	10,000	14.1
Total fixed cost (TFC)	71,150	
Total cost (TFC+ TVC)	826,400	
Gross margin (TR-TVC)	1,494,750	
Net farm income (GM –TFC)	1,423,600	
Mean Net farm income (NFI/N)	28,472	
Net return on investment (NFI/TC)	1.7	

Source: field survey (2018).

business. Table 4 reveals that 31.5% of the R^2 (Coefficient of multiple determinations) is the unaccounted proportion of the variation in pineapple profit due to random disturbance. This suggests that there are other unexplained variables which warrant further studies for determination of the crop's most likely NROI and deeper understanding of pineapple production situation in the study area.

The study agrees with Iwuchukwu *et al.* (2017) who found that pineapple production requires improvement through the use of different strategies such as funding of its research, use of organic manure which may be costlier than chemical fertilizer and off season production through irrigation system. The result contradicts Olayinka (2013) who found farmers' NROI to be low as stated above. Farmers' NROI in this study is greater than those of the Wholesalers (0.23) and retailers (0.32) which found by Enibe *et al.* (2018) in Anambra State Economics of pineapple marketing study. However, the middlemen may have greater annual profit than the farmers. This is because they especially wholesalers have greater trade volume and quick turn over within months of a business year (Enibe *et al.*, 2018) unlike the farmers of Southeast Nigeria who mostly cultivate within the normal rainy season of the year.

Effects of socio-economic characteristics of respondents on net farm income

The ordinary Least Square (OLS) multiple regression analysis was used to determine the effect of socio-economic factors of the producers on net farm income. Data collected on the concerned variables were fitted with four functional forms of the regression model; linear, exponential, semi-log and double-log. The independent variables were farm size (FAS), cost of inputs (COI), Level of Education (LOE), Marital Status (MAS), Age (AGE), Farming Experience (FAE) and Household Size (HHS). The analysis was done using the MINITAB Statistical Software. The outputs of the regression are presented in Table 4. The double-log regression output was chosen as the lead equation. This was because the values in the predictor estimates indicated that those of the double log regression were the best. This was because it indicated higher values for the two significant predictor variables, R-square, R-square (adjusted), F-statistics and Durbin-Watson statistic than outputs of the other functional forms of the regression model.

Out of the seven predictors, four (farm size, cost of input, level of education and household size) were statistically significant while the other three (marital

Table 4. Determinants of profit realized by the pineapple producers.

Predictor	Linear	Exponential	Semi-log	Double-log
Constant	61083 (2.75)	5.7316 (23.67)	-51698 (-0.70)	4.5131 (5.99)
FAS	-41665 (-1.50)	-0.0456 (-1.51)	-16055 (-1.94)*	-0.1819 (-2.04)**
COI	1.971 (1.87)*	0.000024 (1.75)*	20867 (1.57)	0.2573 (1.80)*
LOE	-13605 (-2.09)**	-0.01189 (-1.67)	-4918 (-2.47)**	-0.0484 (-2.26)**
MAS	-85106 (-1.43)	-0.0796 (-1.23)	-11238 (-1.52)	-0.1302 (-1.64)
AGE	-2350 (-0.46)	-0.00305 (-0.54)	-22266 (-0.42)	-0.3109 (-0.55)
FAE	-2519 (-0.48)	-0.0036 (-0.63)	-5858 (-0.28)	-0.0968 (-0.43)
HHS	26983 (1.77)*	0.0303 (1.82)*	57331 (1.88)	0.6528 (2.00)**
R ²	67.0%	65.3%	57.9%	68.5%
R ² (adjusted)	64.8%	62.8%	55.9%	66.6%
F-statistic	4.22	3.03	2.33	5.40
D-W stat.	1.79	1.76	1.96	1.87

Source: Field Survey, 2018. ** = Significant at 5% level. * = Significant at 10% level. D-Wstat = Durbin-Watson Statistic. Figures in parenthesis are t-statistic values.

status, age and farming experience) were not statistically significant. The result showed that increased farm size at lower input cost, higher educational level and higher house-hold size will benefit the farmers. The result reveals that efforts to increase farm profit will be directed towards increasing farm size at relatively lower input costs and higher formal education or adequate extension services.

The co-efficient of multiple determinations (R-Square) of 0.685 implied that 68.5% of variation in the pineapple profit was accounted for the predictor variables. The remaining 31.5% was due to random disturbance suggesting that there are other unexplained variables which warrant further studies as explained here before. The Durbin-Watson statistic value of 1.87 which was close to the benchmark of 2.0 signified the absence of auto correlation among observations of the same variable. The f-statistics value of 5.40 was significant, an indication of overall significance of the regression and goodness of fit of the model.

Constraints to pineapple production in the area

Table 4 shows that the major constraints of the pineapple producers in the study area were; poor access road (mean of 3.9), high transportation cost (3.8), high cost of labour (3.6), laborious nature of pineapple production, bush Animal/Rodent damage to the plant (3.3), lack of market for pineapple produced (3.2), lack of access to loan (3.0), loss in economic value due to pest and disease infection (2.4), Animal disturbances such as cattle, sheep and goat (2.3), high cost of planting material (2.1) and high cost of fertilizer (2.0).

The result indicates that efforts to increase pineapple production should target improvement on road network and increased business fund which may be through accessing bank loans. This is because other constraints in Table 5 can be reduced with increased fund and better road network. The result also agrees with Iwuchukwu *et al.* (2017) who found that poor access road for transportation was one of the constraints of pineapple

Table 5. Constraints to pineapple production in the area.

S/N	Constraints	Mean	Rank
1.	Poor access road for transportation	3.9	1 st
2.	High transportation cost	3.8	2 nd
3.	High labour cost	3.6	3 rd
4.	Laborious nature of pineapple production	3.5	4 th
5.	Bush Animal/Rodent damage to the plant	3.3	5 th
6.	Lack of market for pineapple produced	3.2	6 th
7.	Lack of access to loan	2.9	7 th
8.	Loss in Economic value due to pest and disease infestation	2.4	8 th
9.	Farm animal disturbances such as cattle, sheep and goat	2.3	9 th
10.	High cost of planting materials	2.1	10 th
11.	High cost of fertilizer	2.0	11 th

Source: Field Survey (2018).

producers in the study.

CONCLUSIONS

Pineapple production in Awgu local Government Area, Enugu state, Nigeria is revealed a profitable enterprise as indicated by positive values of the gross margin, net farm income, mean net farm income and net return on investment and has experienced new farmers. The study shows that the two major constraints of pineapple production in the study area were poor access roads and limited farmers' business fund. The result reveals that efforts to increase farm profit will be directed towards increasing farm size at relatively lower input costs and higher formal education or adequate extension services.

RECOMMENDATION

Based on the study's findings, the following recommendations were made:

There is need for Government interventions through the construction of good access roads which will help reduce the cost of transportation and provide better marketing conditions.

Extension agencies, development workers and other Non-Governmental Organizations (NGOs) should encourage the farmers to form cooperative groups to enable them benefit from the government's integrated rural development programmes/extension services and also have easy access to loan.

Government should formulate good policies which will assist farmers to access commercial and rural development bank loans. This will help pineapple producers and other farmers to access loans for increasing their business scale and net farm income.

REFERENCES

- Akhilomen LO, Bivan GM, Rahman SA, Sanni SA (2015).** Economic Efficiency Analysis of Pineapple Production in Edo State, Nigeria: A Stochastic Frontier Production Approach. *Am. J. Exper. Agric.* 5(3):267-280.
- Enibe DO, Eze AO, Ugwuoke BC (2018).** Economics of Pineapple Marketing in Anambra State, Nigeria. *J. Agric. Exten.* 22(2):161-168.
- Food and Agriculture Organization of the United Nation (FAO, 2017).** Nigeria and FAO: Partnering for sustainable development and food security and nutrition. Available at <http://www.fao.org/faostat/en/#data/>.
- FAOSTAT (2019).** Statistical database of Food and Agriculture Organization of the United Nation. Available at URL: https://www.researchgate.net/publication/335137718_How_far_has_Africa_gone_in_achieving_the_Zero_Hunger_Target_Evidence_from_Nigeria.
- Hossain F (2016).** World Pineapple Production: An Overview. *Afr. J. Food Agric. Nutr. Dev.* 16(4):11443-11456.
- Iwuchukwu JC, Udoye CE, Onwubuya EA (2013).** Training Needs of Pineapple Farmers in Enugu State, Nigeria. *J. Agric. Exten.* 17(1):69-99.
- Iwuchukwu JC, Nwobodo CE, Udoye CE (2017).** Problems and Prospects of Pineapple Production in Enugu State, Nigeria. *J. Agric. Ext.* 21(1):167-180.
- Okoli VBN, Okereke CN, Onubogu GC, Esiobu NS (2014).** Analysis of Participating and Non-participating Commercial Agriculture Development Project (CADP) Farmers in Pineapple Production in Awgu LGA, Enugu State, Nigeria. *Global Advance Res. J. Agric. Sci.* 3(8):259-270.
- Olayinka IB (2013).** Profitability and constraints of Pineapple Production in Osun State, Nigeria. *J. Hortic. Res.* 21(2):59-64.
- Otekunrin OA, Otekunrin OA, Momo S, Ayinde IA (2019).** How far has Africa gone in achieving the Zero Hunger Target? Evidence from Nigeria. *Research Gate.* Available at <https://www.researchgate.net/publication/335137718>.
- Portia AW, Olivvier C, Christopher JA, George OE (2017).** Impact of Climate Variability on Pineapple Production in Ghana. *Agric. Food Secur.* 6(26):1-14.