
DETERMINANTS OF YIELD AND PROFITABILITY OF RAINFED CUCUMBER (*Cucumis sativus L.*) PRODUCTION IN ANAMBRA STATE, NIGERIA.

Isibor, C.A., Nkamigbo, D.C., Adejoh, S.O. & Agbanaje, C. E.

Department of Agricultural Economics and Extension,
Nnamdi Azikiwe University Awka
Email: [*dc.nkamigbo@unizik.edu.ng](mailto:dc.nkamigbo@unizik.edu.ng)

ABSTRACT

The study examined the determinants of yield and profitability of rain fed cucumber production in Anambra State, Nigeria. Specifically it described socioeconomic characteristics, determinants of yield and profitability, socioeconomic characteristics that influences yield and profitability in the study area. Multistage sampling and random techniques were used to select two agricultural zones, 4 LGAs, 8 communities and 160 respondents (farmers) for the study. Primary data were collected by means of structured questionnaire and were analyzed using descriptive statistics such as means, multiple regression and probit analysis. Findings from socioeconomic characteristics shows that much number of young and strong male folks dominated the production because of its duration for maturity and monetary value. The result of probit regression model showed that cost of seed, educational status, farm size and age were the determinants of yield and profitability. The result of multiple regression analyses showed that out of the nine independent variables included in the model, cost of fertilizer, cost of agro-chemicals, cost of seed, farm size and age showed positive and significant effects on rain-fed cucumber yield and revenue at 1% and 5% levels of probability. The overall profitability showed that rain fed cucumber production is profitable venture. Agrochemicals for control of diseases should be subsidized by relevant authorities for easy access to rain fed cucumber farmers and modern day storage facilities should be made available and readily affordable these farmers were recommended.

Keywords: *Yield, Determinants, Rainfed Cucumber*

Agriculture, being one of the oldest and most crucial occupation, plays a vital role in the development of any country. In Nigeria, the agricultural sector remains a significant contributor to the gross domestic product (GDP) and overall economic growth, despite the prominence of the oil

industry (Azifuaku, Ugwumba, Okoli and Okeke, 2020 & Isibor and Nkamigbo, 2023). According to Matsane and Onyekale (2014) and Isibor and Nkamigbo (2023b) the sector plays a crucial role in society, contributing to poverty alleviation, food security and economic growth. In Africa, it serves as the foundation of many economies and a vital source of livelihood for numerous individuals.

Cucumber (*Cucumis Sativus L.*) is a monoecious annual horticultural crop that belongs to the Cucurbitaceae family (Rolnik and Olat, 2020). It is believed to have been cultivated by man for over 3,000 years (Adinde, Uche, Anieke, Odom, Igwe and Akor, 2021). Cucumbers are commonly consumed fresh, served as a dessert after meals, or used in combination with other food items to make juice. Cucumber is grown for its tender fruits which are consumed either raw as salad, cooked as vegetable or as pickling in its immature stage the fresh are good source of vitamin C, vitamin K, vitamin A, vitamin B6 and thiamin. It helps in healing diseases of urinary bladder and kidney, digestive problems like heart burn, acidity, gastritis and ulcer (Adinde, Anieke, Uche, Aniako, Isani and Nwagboso, 2016; and Adinde et al, 2021).

Rainfed cucumber (*Cucumis sativus L.*) production is an important agricultural activity in Southeastern Nigeria, particularly in Anambra State. On its health importance, Onyeozu, Adekola and Deekor (2020) stated that cucumber is good for diabetic patients as it contains low sugar and speeds up digestion. Rainfed cucumber production is a viable agricultural practice in the southern region of Nigeria and one that can help to improve the dietary and economic needs of farming communities. With proper resource management and an efficient marketing strategy, cucumber farmers can benefit from better crop yields and increased income. To achieve increased yield and maximize profit from cucumber production, proper management techniques must be implemented. This includes practices such as crop rotation, soil fertility management, pest and disease control, and weed control (Abdulkadir, Mahmoud, and Kashere, 2020).

MATERIALS AND METHODS

The research was carried out in Anambra State. The State is bounded by Delta State to the West, Imo State to the South, Enugu State to the East and Kogi State to the North. It has an estimated population of 6,358,311 million people (Wikipedia.org/wiki Anambra State Population, 2022)

which stretches over about 60 kilometers between surrounding communities. Anambra State lies on the longitude 6220°N and 7021°E and latitude of 5038°N and 6930°E (Wikipedia.org/wiki Anambra State, 2022). Anambra State population is estimated to be growing at an average of 2.84% annually. The population density of Anambra State currently is rated at 992.1p/Km (Wikipedia.org/wiki Anambra State, 2022). Anambra State comprised of 21 Local Government Area, and four (4) Agricultural zones (AZs) – Aguata, Anambra, Awka and Onitsha. The State is embedded by five (5) major rivers and their tributaries. These are River Niger, Anambra River, Ezu River, Idemmili River and Ulasi River. However, there are smaller streams like Oyi, Nkisi and Obizi. The State experiences dry season from late October to early May and has at least 6 dry months in the year and rainy season occurs from April to November. The annual rainfall ranges from 1400 mm in the Northern part to 2500 mm in the Southern part of the State with temperature of 25°C - 35°C. Anambra State is occupied by the Igbo ethnic group who by nature are farmers, fishermen, craftsmen and traders and also it is known for production and marketing of several raw materials and agro-products in different parts of the State. Some of the crops produced and marketed in the State include rice, yam, oil palm, cassava, cocoyam, maize, cucumber, mango, vegetables and different varieties of fruit trees, among others and livestock such as fish, goat, sheep, poultry and cattle. Anambra State has several daily markets both in rural and urban areas where agricultural products are sold.

Population and Sampling Technique of the Study

The population of the study consisted of 30,056 (Twenty thousand and fifty-six) registered cucumber farmers in Anambra State (Agricultural Development Programme (ADP) 2022) which is the sample frame. Anambra State comprises of four zones: Awka, Anambra, Aguata and Onitsha zones. A Multi-stage and random sampling procedure were used to select respondents for the study.

Stage I: Two agricultural zones were purposive selected from the four agricultural zones of the State. This is as a result of their intense participation and popularity in rain fed cucumber production among others in the State, namely Aguata and Anambra zones.

Stage II: Two Local government were randomly selected from each of the selected two agricultural zones making it a total of four LGAs. Aguata zone (Orumba North and Orumba South) and Anambra zone (Ayamelum and Anambra East LGAs).

Stage III: Two communities were purposive selected from each of the four LGAs (based on their popularity in rain fed cucumber production) making it a total of eight communities for the study.

These communities include Omogho and Ajali in Orumba North LGA, Ezira and Ogboji in Orumba South LGA, Omor and Omasi in Ayamelum LGA and Aguleri Otu and Nando in Anambra East LGA totaling eight (4) LGAs and 8 communities.

Stage IV: Thirty (20) rain fed cucumber farmers (respondents) were randomly selected each from the already selected LGAs making a total of one hundred sixty (160) respondents for the study which is the sample size.

Table 1 Sample of the Zones, LGA, Communities, Coordinates and Respondents.

Agricultural Zones	LGAs	Communities	GPS Coordinates	Respondents
Aguata	Orumba North	Omogho	6°023N , 7.144E	20 farmers
		Ajali	6.2971°N, 7.1339°E	20 farmers
	Orumba South	Ezira	5.9965°N, 7.2194°E	20 farmers
		Ogboji	6°01'02N, 7°15'107E	20 farmers
Anambra	Ayamelum	Omor	6.5056°N, 6.9753°E	20 farmers
		Omasi	6.6354°N, 7.0283°E	20 farmers
	Anambra East	Aguleri Otu	6.3333N, 6.8833E	20 farmers
		Nando	6.3114°N, 6.9075°E	20 farmers
Total = 2	4	8		160

Source: Field Survey, 2023.

Method of Data Analysis

The objectives of the study were achieved by means of the following statistical tools. Descriptive statistics such as tables, mean, probit analysis and multiple regression.

Socioeconomic characteristics

X₁ = age in years.

X₂ = gender (GEN) (male =0, female =1)

X₃ = marital status (MRS) (single = 0, married=1and widow/divorce)

X₄ = educational status

X₅ = source of finance (SOF)

X₆ = household size (HHS)

X₇ = farm size (FS)

X₈ = monthly income

X₉ = other business activities (OBT)

Socioeconomic characteristics of rain-fed cucumber production

Socioeconomic characteristics of rain fed cucumber farmers is presented in Table 2. From the results, it was discovered that a trend of younger generation who are between the age of 30-39 (37.30%) who drive joy in testing new things for a living are into cucumber production.. This a generation that are vibrant and energetic to tackle the stress and hustle of adapting to agronomical practices for optimum and optimal production. This agrees with Nkamigbo, Ugwumba and Okeke (2019) who noted that young, energetic are in watermelon marketing in the study area. This agrees with Nmada and Marcus (2020) who reported mean age of ginger farmers in their study area. The result analysis shows that rain fed production in the study area is gender base in that much number of young and strong male folks (85.62%) are into the production because of its duration for maturity and monetary value. This is a prove that young ones especially male folks are interested in agriculture if properly positioned. This is in tandem with the report of Adeoye and Balogun (2016) and Ekpunobi, Nwigwe & Nkamigbo (2020) who stated that male dominated cucumber production and yellow cassava production in their study areas. This is contrary with the report of Wilcox (2015) and Elum et al. (2016) who stated that cucumber production is dominated by female in their study area. The enterprise recorded much number of single (61.25%) than married and widowed. The educational status revealed that it is an enterprise for enlightened crop of farmers in that it encompasses younger generation who have gotten one form of education or the other with high percentage of young graduate who are finding it difficult to secure white collar job and also those that have flair for the crop and its financial pay. This is in agreement with Elum et al. (2016) who reported that education is a vital as it could enable quick capacity building in cucumber production that farmers' education can enhance their farming activities, level of awareness and level of receptivity of improved technologies.

Household analysis showed that 1-4 people living and eating from the same pot is 121%. This is in agreement with Mukaila, Obetta and Ogbu (2022) who reported that a large household size increases the probability of getting physical assistance from family members which enhances the proliferation of the venture. The result of source of finance for the enterprise proved that friends and relative and isusu is the main source of

finance for take-off of the enterprise. The result shows that average farm size greater than 1 hectare recorded 66.87%. The implication is that cucumber production is gradually gaining ground in the study with much farmers venturing into it. The result of monthly income shows that young farmers are gradually tilting in agricultural production. The result of other business activity shows that rain fed cucumber farmers do have other business activity they belong 1 order to maximize profit.

Table 3: Socioeconomic characteristics of rain fed cucumber farmers

VARIABLES	FREQUENCY	PERCENTAGES
Age		
20-29	35	21.87
30-39	60	37.50
40-49	33	20.62
50-59	17	10.63
60 and above,	15	9.37
Total	160	100
Gender		
Female	23	14.37
Male	137	85.62
Total	160	100
Marital Status		
Single	98	61.25
Married	46	28.75
Widow/Divorced	16	10
Total	160	100
Educational Status		
0-6	11	6.87
7-12	50	31.25
13-18	99	61.87
Total	160	100
Source of Finance		
Personal savings	33	20.61
Friends and relatives	70	43.62
Cooperatives/Isusu/banks	57	35.62
Total	160	100
Household Size		
1-4	121	75.62
5-8	32	20.0
9 and above	7	4.37
Total	160	100
Farm size		
≤1 ha	53	33.12
≥ 1 ha	107	66.87
Total	160	100
Monthly income		
50,000-100,000	71	44.37
Above 100,000	89	55.62

Total	160	100
Other biz Activities		
Yes	121	75.62
No	39	24.37
Total	160	100
Farming Experience		
1-5 years	77	48.12
6-10 years	50	31.25
11 years and above	33	20.62
Total	160	100

Source, field survey, 2023.

Determinants of yield and profitability of rain fed cucumber production

Probit regression model result to estimate the determinants of yield and profitability of rain fed cucumber production is predicted as $Use^* = 5.357 + 0.252COS + 0.161COF + 0.117COA - 0.372 COLD + 0.0234COL - 2.546EDU + 0.211FS - 0.284AGE - 0.3160FEXP$ and presented in Table 4.2. From the result of the analysis, nine variables were inputted into the analysis and only cost of seed, educational status, farm size and age were significant at 1% level of probability while the remaining five- cost of fertilizer, cost of agro chemical, cost of leasing land, cost of labour and farming experience were not significant. The coefficient of cost of seed was positive and significant at 1% level of significant. This implies that increase in the quality and quantity of seed will increase the yield and profitability by 2.0%. The coefficient of educational status was negative and significant at 1% level of probability. This implies that the educated farmers are more energetic, vibrant and articulate to make use of their educational background in production and adapt to modern research that will improve yield and profitability in production than those who do have much educational background. The coefficient of farm size was positive and significant at 1% level of significant. This implies that farmers with large farm size tends to have better yield and profit than those with less farm size. This is in agreement with Okeke, Nkamigbo and Chukwuji (2013) who state that farmers with large farm size do have better yield than those with less. The coefficient of age was negative and significant at 1% level of profitability. This is contrary to a prior expectation. This implies that older farmers tends to lose in terms of yield and profit compared to younger farmers who are vibrant and are ready to adapt to stress and innovation to boom and boost production and profit.

Table 3: Determinants of yield and profitability of rain fed cucumber production

Parameter	Coefficient	Std.Error	Wald	Odds ratio	95% Confidence interval Lower	Upper
(Intercept)	5.357	1.670	2.46			
Cost of seed	0.252	0.195	0.004***	2.300	1.001	1.271
Cost of fertilizer	0.161	0.276	0.893	0.666	0.020	0.170
Agro chemical	0.117	0.172	0.000	0.542	0.897	0.342
Cost of leasing land	-0.372	0.231	0.137	0.118	0.073	0.342
Cost of labour	0.0234	0.308	0.952	0.678	0.298	0.192
Educational status	-2.546	0.335	0.076***	0.345	0.253	0.128
Farm size	0.211	0.150	0.351***	0.964	0.342	0.307
Farming experience	-0.3160	0.189	0.988	0.999	0.2170	1.897
Age	-0.284	0.225	0.234***	0.602	0.200	0.132
LR test			45.10			
Obs.	160					

Sources, field survey, 2023. *, **, *** (significant @ 10%, 5% and 1% respectively)

Socioeconomic characteristics that influences yield and profitability of rain fed cucumber production in Anambra State.

The multiple regression analysis was used to determine influence of the socioeconomic characteristics on yield and profitability of rain fed cucumber production in Anambra State such as represented by cost of seed (COS), cost of fertilizer (COF), cost of agrochemicals (COA), cost of renting/leasing land (COL), cost of hired labour (COL), education (EDU), Family size (FS), Age (AGE) and farming experience (FEXP) on the net revenue of rain fed cucumber production. The data were fitted to four functional forms (linear, exponential, semi-log and double-log) of the regression model and ran using MINITAB statistical package. Among outputs of the four functional forms tried with the data that of the double-log form was best in terms of number of significant variables, value of Statistic, R² and adjusted R². The equation is given as: RFC= 14563-0.000123COS+0.000123COF+0.09022COA-12347COL-0.02446EDU+12050FS-0.01583AGE-0.00031FEXP.

Out of the nine independent variables included in the model, cost of fertilizer, cost of agrochemicals, cost of seed, farm size and age showed positive and significant effects on rainfed cucumber yield and revenue at 1% and 5% levels of probability. The remaining four were not significant. The regression was considered a good fit to explain the relationship between the yield and revenue and socioeconomic factors of rainfed cucumber farmers. The value of R^2 (coefficient of multiple regression of 0.913) revealed that 91% of the total variation of the independent variables was explained by the independent variables. This means that about 9% of the variation in the dependent variable was not explained by the variation in the independent variables, that is a stochastic error. The F statistic value of 69.2% was statistically significant at 1% level of probability. This indicated that the socioeconomic variables together significantly influenced the yield and revenue and that of the regression is was a good fit.

The coefficient of seed had positive and statistically significant effect on the net yield and revenue at 1% probability level. This implies that as farmers' increases the planting materials (seed) yield is bound to increase (*ceteris paribus*). Farmers could therefore procure additional planting materials (seed) for available land space being cultivated. The coefficient of cost of fertilizer had positive and statistically significant effect on the net yield and revenue at 5% probability level. This implies that the higher the application of organic manure as at when due to rain fed cucumber, the better the yield and revenue of cucumber production. The coefficient of agrochemical (pesticides and herbicides) had positive and statistically significant effect on the net yield and revenue at 1% probability level. This implies that the increase in the application of herbicides to control weeds infestation and the application of pesticides to control diseases and pest infestation will increase the unit yield of the product (yield and output). The coefficient of farm size had positive and statistically significant effect on the net yield and revenue at 1% probability level. The positive sign of co-efficient of farm size implies that a direct relationship exists between farm size and yield. This implies that a unit increase in the land will lead to a unit increase in the yield and output. This is in agreement with Okeke, Nkamigbo Chukwuji (2013) and Ekpunobi et al. (2020) who reported that small farm size generates small yield and large farm size generate higher output (yield) to farmers. The coefficient of age was significant but had a negative relationship with the yield and net revenue at 5% probability level. This is centrally to

apriori expectations and implied that the older farmers who might have accumulated more capital and skills over the years tends to lose out of the production to younger ones who are energetic due to age. This is contrary with the report of Adeoye and Balogun (2016) who reported a negative coefficient.

Table 4: Regression estimates of the determinants of rain fed cucumber production in Anambra State

Variable	Linear	Semi-log	Exponential	Double Log
Constant	14563 (0.86)	4.2224 (12.55)	52259 (2.12)	6.1123 (3.03)
Cost of seed	0.200 (0.315)	0.3450* (12.44)	0.000163 (0.04)	0.000123*** (8.50)
Cost of fertilizer	0.087* (0.96)	646.6 (1.20)	0.01273 (0.38)	0.0868** (1.18)
Cost of agrochemicals (pesticides and herbicides)	3.200*** (4.030)	199.3 (1.80)	217.8*** (0.16)	0.09022*** (4.3481)
Cost of renting /leasing land	18.165 (4.450)	4.1** (0.003)	0.017119 (3.23)	-12347 (-1.34)
Cost of labour	1.897 (0.465)	0.01008 (0.10)	032423 (14.89)	0.03855 (1.46)
Educational Status	0.004 (0.0097)	0.022203 (0.66)	0.0252* (0.34)	-0.02446 (1.10)
Farm size	0.334 (0.004)	0.03606 (1.11)	0.9420* (1.68)	12050*** (15.00)
Age	1.986 (0.831)	0.02054 (0.44)	0.00000052 (18.66)	-0.01583** (1.08)
Farming Experience	2.856 (4.401)	12621*** (1.07)	42320*** (12.71)	-0.00031 (-0.02)
R ²	0.691	0.760	0.804	0.913
R ² Adj	59.8%	68.2%	63.2%	74.5%
F-Stat	52.2%	60.1%	58.5%	69.2%
D-W Stat	1.60	1.65	1.62	1.72

Source: Field survey, 2023.

SUMMARY AND CONCLUSION

The study examined the determinants of yield and profitability of rain fed cucumber production in Anambra State, Nigeria. Findings on socioeconomic characteristics shows that rain fed production in the study area is gender base in that much number of young and strong male folks (85.62%) are into the production because of its duration for maturity and monetary value. From the result of the probit analysis, nine variables were inputted into the analysis and only cost of seed, educational status,

farm size and age were significant at 1% level of probability while the remaining five- cost of fertilizer, cost of agro chemical, cost of leasing land, cost of labour and farming experience were not significant. The result of multiple regression analyses showed that out of the nine independent variables included in the model, cost of fertilizer, cost of agrochemicals, cost of seed, farm size and age showed positive and significant effects on rainfed cucumber yield and revenue at 1% and 5% levels of probability. The remaining four were not significant. The regression was considered a good fit to explain the relationship between the yield and revenue and socioeconomic factors of rainfed cucumber farmers. The value of R^2 (coefficient of multiple regression of 0.913) revealed that 91% of the total variation of the independent variables was explained by the independent variables. Determinants of rain yield and profitability of rain fed cucumber production in Anambra State. Agrochemicals for control of diseases should be subsidized by relevant authorities for easy access to rain fed cucumber farmers and modern day storage facilities should be made available and readily affordable these farmers.

REFERENCES

- Isibor, C.A. & Mkamigbo, D.C. (2023). Income and revenue analysis of garden egg leaf marketing among smallholder farmers in Onitsha and Awka Agricultural zones, Anambra State, *Intl Journal of Science and Technology Research Archive*, 5(2), 10-22.
- Isibor, C.A. & Mkamigbo, D.C. (2023). Income analysis of Turmeric marketing in Onitsha agricultural zone, Anambra State, *Intl Journal of Life Science Research Archive*, 5(2), 12-20.
- Adinde, J.O., Uche, O.J., Anieke, U.J., Odom, I.C., Igwe, J.A. and Akor, C.E.(2021).Profitability of the use of poultry manure for cucumber (*Cucumis sativus L.*) production in Iwollo, Southeastern Nigeria. *Journal of Agricultural Science and Practice*, 6(5),165-173.
- Abdulkadir, S.U., Mahmoud, B.A and Kashere, M.A.(2020). Effects of fertilizer Management on Growth and Yield of Cucumber (*Cucumissativus*). *Proceedings of 38th Annual Conference of Horticultural Society of Nigeria*. Pp 79-82.

- Adinde, J.O., Anieke, U.J., Uche, O.J., Aniakor, A.C., Isani, L.C. and Nwagboso, A.A. (2016). Assessment of Performance of four Cucumber Cultivars in Iwollo, South-Eastern Nigeria, Nigeria. *Intl Journal of Current Research in Biosciences and Plant Biology*, 3(10), 136-143.
- Abdulkadir, S.U., Mahmoud, B.A and Kashere, M.A.(2020). Effects of fertilizer management on growth and yield of Cucumber (*Cucumis sativus*). Proceedings of 38th annual conference of Horticultural Society of Nigeria. Pp 79-82.
- Adeoye, I.B. & Balogun, O.I. (2016). Profitability and efficiency of cucumber production among smallholder farmers in Oyo State, Nigeria. *Journal of Agricultural Science*, 61(4), 387-398.
- Azifuaku, E.N., Ugwumba, C.O.A., Okoli, T.O. and Okeke, Uche. (2020). Price competitiveness and supply response of rice producers in Nigeria. Implications for Agricultural trade. *Asian Journal of Agricultural Extension, Economics and Sociology*, 38(12), 88-101.
- Elum, Z.A., Etowa, E.B. and Ogonda, A. U. (2016). Economics of cucumber production in Rivers State, Nigeria. *Journal of Tropical Agriculture, Food, Environment and Extension*, 15(2), 48-53.
- Ekpunobi, C.E., Nwigwe, A.C. & Nkamigbo, D.C. (2020). Socioeconomic determinants of yellow cassava production in Anambra State, Nigeria. *International Journal of Applied Science and Research*, 3(2), 90-100.
- Isibor, C.A. & Nkamigbo, D.C. (2023). Income and revenue analysis of garden egg leaf marketing among smallholder farmers in Onitsha and Awka Agricultural zones, Anambra State, *Intl Journal of Science and Technology Research Archive*, 5(2), 10-22.
- Isibor, C.A. & Nkamigbo, D.C. (2023). Income analysis of Turmeric marketing in Onitsha agricultural zone, Anambra State, *Intl Journal of Life Science Research Archive*, 5(2), 12-20.
- Mukaila, R., Obetta, A.E. & Ogbu, M.C. (2022). Profitability of melon processing among women in Enugu State, Nigeria. *JOTAF/Journal of Tekirdag Agricultural Faculty*, 19(3), 620-631.

- Meludu T. Nkiru, Obianefo A. Chukwujekwu, Nzeribe G. Ejiak, Nwabueze Igu & Onugu U. Charles (2022). Effect of Covid-19 Pandemic Lockdown on Agricultural Migrant Workers in Southeast Nigeria: Implication for Food and Nutrition Security. *The Bangladesh Journal of Agricultural Economics*, 43(1), 19-29.
- Nkamigbo, D.C., Ugwumba, C.O.A. & Okeke, Uche. (2019). Market structure, conduct and volume of trade among channels of watermelon marketing in Anambra State. *Intl Journal of Agriculture and Biosciences*, 8(2), 112-116.
- Nmada, J.N. & Marcus, P.L. (2022). Efficiency of ginger production in selected LGAs of Kaduna State, Nigeria. *Intl Journal of Food and Agricultural Economics*, 1(2), 39-52.
- NPC (2006). List of Nigerian population by States. The Nigerian Population Commission, Retrieved online November 11, 2021 from https://en.wikipedia.org/wiki/List_of_Nigerian_states_by_population
- Onyeozu, A.M, Adekola, G. and Deekor, H.L. (2016). Environmental and Health Education Needs of Rural Farmers for Community Development in Rivers and Bayelsa States. *Journal of Technical and Science Education*, 19(1)39-43.
- Okeke, D.C., Nkamigbo, D.C. & Chukwuji, C.O. (2013). Economics of legume based intercropping systems in Anambra State. *Journal of Vocational and Technical Education*, 18(1), 125-131.
- Rolnik, A., & Olas, B. (2020). Vegetables from the Cucurbitaceae family and their products: Positive effect on human health. *Nutrition*, 78, 110788.
- Wilcox, G.I., Ofor, U.S. and Omojola, J.T. (2015). Profitability of cucumber (*Cucumis sativus* L.) production in Tai Local Government Area of Rivers State, Nigeria. *J. Adv. Stud. Agric. Biol. Environ. Sci.*, 2(3), 1-6.