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A Comparative Study on Cucumber Production in Wet and Dry Season in Rivers State, Nigeria

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Abstract

Nigeria agriculture is dependent on rainfall for water supply and it is marked by two notable seasons, the wet and dry seasons. Cucumber production during wet and dry season is becoming popular among farmers in Rivers State. The study compared wet and dry season cucumber production in Oyigbo Local Government Area, Rivers State, Nigeria. Specifically, socioeconomic characteristics of the farmers were described. Profitability of cucumber production in the wet and dry season was estimated and compared. Effects of socieonomic variables on revenue generated was estimated. 76 farmers were randomly selected from four communities in the study area. Descriptive statistics, enterprise budget model, regression model and z-test were the analytical tools used. The result indicated that majority of the farmers were females with 59.2%. Gross margin in the wet season production was ₦330,124.88 with a net income of ₦147,472.89 while gross margin realized from dry season production was ₦281,901.44 with a net income of ₦255,473.83. The result of multiple regression analysis adopted double log function as the lead equation because, it showed righest (R^2) 64%. Coeffcients such as farm size, labour and fertilizer were positively significant at 5%, 5% and 1% respectively. The a z-statistic value of 2.535 for net income in wet and dry season, implied that the differences in the net income between wet and dry season varied significantly at 1%. It is recommended that farmers should scale up cucumber production during the dry season for higher profit margin.

Keywords: Comparative, cucumber, production, wet, dry season

1. Introduction

Cucumber (*Cucumissativus* L.) is a widely cultivated plant that belongs to the family Cucurbitaceae (Jyoti, Lakshmi and Swetha, 2014). It is a soft succulent plant with high water content and has large leaves that form canopy over the fruit. The vines grow on trellise. The fruit is roughly cylindrical, elongated with tapered ends and may be as long in diameter (Wilcox and Omojola, 2015).

Production of cucumber started from Southern Asia but a large number of varieties have neen developed and cultivated worldwide (Alahira, 2014). China is the largest producer accounting for over 80.15% of global production valued at 70.29 Million Metric tonnes followed by Turkey (1.9 Million Metric tonnes), Russia (1.63 Million Metric tonnes). U.S.A is the ninth producer of cucumber in the world with a production volume of 677.88 thousand metric tonnes (FAO, 2019). In Nigeria, cucumber is majorly grown in the North, particularly Jos, Plateau (Chinatu, Onwuchekwe-Henry and Okoronkwo, 2017). Worthy to note, that little is also grown in Ohaji-Egbema in

Imo State and in some other states of the federation (Ume and Ojiako, 2018). However, according to a research conducted at the Department of Soil Science

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University of Nigeria, Nssuka by Professor Micheal Uguru, cucumber can be grown anywhere giving the right production method and management of the environmental factors (Ume and Achike, 2017). In Rivers State, cucumber is commercially produced in Igwuruta, Tia and Oyigbo Local Government Areas. (Elum, Etowa and Ogonda, 2016).

Cucumber contains about 96% of water, which makes it often be recommended as a natural diuretics for body building (Elum et. al., 2016). In addition, it contains magnesium, potassium, sodium, calcium, vitamins A, B, C, and K, fibre, antioxidants and little amount of calories, fat and protients (Ware, 2019).

The unpredicted dry and rainfall due to climate change has uttered the duration of both dry and wet season in Rivers State. Planting of vegetable in Nigeria is usually done during the rainy season which starts from April to October annually while the dry season planting extends from November through March annually (Okorie, Okolaja and Umaru, 2019). However, with the high amount of rainfall in the Niger Delta during the wet season, the soil moisture content may be more than the quantity required for proper cucumber growth and development of the crop. According to Arshad (2017), too much rainfall might reduce the growth and development process of the plant and negatively affects its yield. Also, during the dry season, rainfall may not be enough or might be totally absent in order to achieve maximum output. Therefore, crop production during the dry seson would require artificial supply of watter through irrigation.

Irrigation processes are however labour and capital intensive and requires high technical know-how for their uses. Also, farmers in the developing countries cannot afford to practice these various irrigation practices because of the cost of the equipment for its operations (Adekunmi, Oyeyinka, Awoyemi and Ayansika, 2017). The level of profitability of cucumber production in River State has not yet been adequately estimated. Also, little or no research has been carried out to ascertain the profit level in the major production seasons in the study area ie wet and dry seasons. It therefore imperative and important that this study was designed with the broad objective of comparing the productivity of cucumber in wet and dry season in Oyigbo Local Government Area. Specifically, the study examined socio-economic characteristics of cucumber farmers in the study area, compared the cumber productivity in the two major seasons, determined the profitability of cucumber production in the study area, determined the effect of the socio-economic variables on the yield of cucumber in the study area and identified the major constraints to cucumber production in the study area.

Hypotheses

Ho_1: The net income in wet season cucumber production is not significantly different from the net income of cucumber production in dry season cucumber production inthe study area.

Ho_2: The output in wet season cucumber production is not significantly different from the output in dry season cucumber production in the study area.

2. Material and Methods

2.1 Study Area

This research was carried out in Oyigbo Local Government Area of Rivers State, Nigeria. The Local Government is among the twenty-three (23) Local Governments in Rivers State. It was created on the 3rd of May, 1991.Oyigbo Local GovernmentArea is bounded by Port Harcourt City Local Government Area on the southeast, Tai/Eleme Local Government Area West, Ikwerre and Emohua Local Government Area at the North. Oyigbo is situated on the west side of Rivers State (Edward and Amugo, 2018). Oyigbo Local GovernmentArea comprises of the following communities Afam, Komkom, Obeama, Izuoma, Umuagbai, Ndoki, Mmrinwanyi, and Egberu. Oyigbo Local government covers a total of 1,232 square kilometers with urban and semi-urban areas. Oyigbo local Government Area have a tropical climate of intensively high rainfall during the rainy season and cool at night due to their closeness to some rivers, streams, vegetation cover and their adjourning creeks, which were mainly as a result of deforestation to make more lands available in the area. Despite being a peri-urban area, most of the towns and villages in Oyigbo are still engaged in farming and fishing as their occupation, making use of some expanse of agricultural land in the area.

The total projected population of Oyigbo Local Government is 176,100 along with ten (10) political wards (National Population Commission, 2016). Major food crops grown in Oyigbo Local Government Area include; maize, okra, yam, cucumber, cocoyam, pepper, fluted pumpkin, oranges, banana, cowpea, melon, etc. cash crops like oil palm trees, rubber, kola nut tree, pear trees and cashew tree are also grown in the area. These crops are produced in both subsistent and commercial quantity.

2.2 Population of the Study

This research was carried out in Oyigbo Local Government Area of Rivers State, Nigeria and the population of the study comprises of all the registered cucumber farmers in Oyigbo local government area that are known for cucumber production in commercial scale.

2.3 Sample Size and Sampling Techniques

The sample size was made up of 76 respondents in cucumber production. The study area was chosen because of the high activity of cucumber production in the area and it is believed that this will make a fairly true representation of the study area. A multi-stage sampling technique was used to sample the respondents used for the study. In the first stage, four (4) communities (Mmirinwanyi, Komkom, Izuoma, and Obeama) were purposively selected because they were known to produce cucumber in large quantity. In the second stage, 19 farmers known to produce cucumber in wet and dry season were randomly selected from each of the communities already selected giving a total of 76 cucumber farmers in the study area.

2.4 Instrument for Data Collection

Well-structured questionnaire containing relevant questions such as quantity of cucumber produced per unit price, cost of labour, transportation and amount realized from sales will be asked. Interview and also personal observation were also used to obtain relevant information from the respondents.

2.5 Sources of Data Collection

Primary data was collected using well-structured questionnaire, personal observation and interview to collect relevant information from farmers while secondary data were collected from journals, textbooks, internet and publications.

2.6 Methods and Techniques of Data Analysis

Objective i, iii, and v were analyzed using descriptive statistics such as mean, frequencies, and percentages while objective ii and iv were achieved using the enterprise budget analysis model and regression analysis model respectively.

2.7 *Model Specification*

Enterprise Budget Analysis Model

Enterprise Budget analysis model was in this study to determine the profitability of the cucumber farmers in wet and dry season in the study area. The Enterprise Budget analysis model is expressed as:

NP = (TR-TC)

TC = TFC + TVC

Where

NP =Net income or Net Returns in Naira (₦)

TR = Total Revenue of cucumber in Naira(₦)

Gross Margin in Naira(₦) = TR-TVC

TFC = TFC in Naira(₦)

TVC = Total Variable Cost of cucumber production Naira(₦)

TFC = Σ(DB+DH+DHG+DM+DB+DK+DWC+DL)

Where

DB = Depreciation value of basket used in Naira(₦)

DH = Depreciation value of hoe used in Naira(₦)

DHG = Depreciation value of hand gloves in Naira(₦)

DM = Depreciation value of Matchet used in Naira(₦)

DB = Depreciation value of basin used in Naira(₦)

DK = Depreciation value of knife used in Naira(₦)

DWC = Depreciation value watering can used in Naira(₦)

DL = Depreciation value of Land in Naira(₦)

TVC = Σ(CS + CF + CP + CL + CW + CT + CR)

Where

CS = Cost of seeds in Naira(₦)

CF = Cost of fertilizer in Naira(₦)

CP = Cost of pesticide used in Naira(₦)

CL = Cost of labour in Naira(₦)

CW = Cost of weeding in Naira(₦)

CT = Cost of transport in Naira(₦)

CR = Cost of rent in Naira(₦)

Revenue Model

TR = Q x P

Where

TR = Total Revenue of cucumber produced by the farmers in wet and dry season in Naira

Q = Total Output of cucumber in kg

P = Price per kg of cucumber in Naira(₦)

2.8 Multiple Regression Model

Regression model was used for the analysis of the data that will collected from the field to determine the effect of the socioeconomic variables on cucumber yield in the study area. The implicit form of the regression model is expressed as

$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8,)$

Where

Y= Output level of cucumber produced in wet and dry season in kg

X_1 = Age in years

X_2 = Education number of years spent schooling

X_3 = Farm size in hectare

X_4 = Seed in kg

X_5 = Labour in mandays

X_6 = Fertilizer in kg
X_7 = Pesticide in litres
X_8 = Transport in hours

Explicit Form

The four functional forms of the multiple linear regression models are used. They are specified as

Linear: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + e$

Semi-Log: $Y=\beta_0+\beta_1 InX_1+\beta_2 InX_2+\beta_3 InX_3+\beta_4 InX_4+\beta_5 InX_5+\beta_6 InX_6+\beta_7 InX_7+\beta_8 InX_8+e$

with econometric criteria of adjusted R-square, F-calculated and number of significant variable in each of the estimated equation.

2.9 Hypotheses

Hypothesis 1 and 2 were tested using the following model using Z-test

Z-test compares means of two populations. Z test assumes normal distribution under null hypothesis. It is performed on a large number of data or on a population data. The score determined by Z test is called "Z score". Z score can be approximated when population standard deviation of a large data is given.

The Z test statistic according to Daniel, 1999 was stated as follows:

$$Z = \frac{(\bar{\chi}_1 - \bar{\chi}_2) - (\mu_1 - \mu_2)}{\sqrt{\delta^2 1 / n_1 + \delta^2 2 / n_1}}$$

Where

$\bar{\chi}_1$ = sample mean of cucumber produced in wet season
$\bar{\chi}_2$ = sample mean of cucumber produced in dry season
μ_1 = population mean of cucumber produced in wet season
μ_2 = population mean of cucumber produced in dry season
δ^2_1 = population standard deviation of cucumber produced in wet season
δ^2_2 = population standard deviation of cucumber produced in dry season
n1 = number of observation of cucumber produced in wet season
n2 = number of observation of cucumber produced in dry season

Hypothesis

Double Log: $\text{Log } Y = \log\beta_0 + \beta_1\log X_1 + \beta_2\log X_2 + \beta_3\log X_3 + \beta_4\log X_4 + \beta_5\log X_5 + \beta_6\log X_6 + \beta_7\log X_7 + \beta_8\log X_8 + e$

Exponential: $InY = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + e$

Where

β_0 = Intercept
β_1- β_8 = Regression coefficient
e = Error term

The four expressed equations above were used and the lead equation was chosen on the basis of comparing

H_0: $\mu_1 = \mu_2$
H_A: $\mu_1 \neq \mu_2$

Decision Rule: If Z-calculated i.e. Z estimated is greater than (>) the critical value which is 1.9600 for a two tailed test, then the null hypothesis will be rejected, but if otherwise accept the null hypothesis. The rule is applicable for a two tailed test.

The problems militating against cucumber production were identified using a 4-point Likert Scale. The respondents were asked to indicate on a 4-point Likert Scale, if they agree that the various problems militate against cucumber production. Their response categories were strongly agreed (SA) =1; agreed (A) =2; disagreed (D) =3 and strongly disagreed (SD) =4. These values were added to obtain a value of 10 which was divided by 4 to get a mean score (M) of 2.5. A mean value was obtained on each of the items. Any mean score (M) $\geq$ 2.5 was regarded as a strongly agreed problem affecting cucumber production while any mean score (M) < 2.5 was not regarded as a strongly agreed problem.

3. Results and Discussion

Table1: Socieconomic characteristics of cucumber farmers in the study area

Variables	Frequency	Percent

Gender		
Male	31	40.8
Females	45	59.2
Age in years		
20-29	13	17.0
30-39	33	43.3
40-49	25	32.9
50 & above	5	6.5
Mean	37	
Marital Status		
Single	24	31.6
Married	52	68.4
Household size in number of persons		
1 -3	8	10.6
4-6	39	51.3
7- 9	25	32.9
10-12	4	5.2
Mean	6	
Educationa level		
No Formal Education	1	1.3
Primary	3	3.9
Secondary	60	78.9
Tertiay	12	15.9
Marital Status		
Single	24	31.6
Married	52	68.4
Farm size (hactre)		
Below 1	47	61.7
1- 1.99	21	27.9
2.00-2.99	5	6.5
3.00-3.99	2	2.6
4 & above	1	1.3
Mean farm size	1.02 ha	
Experience in farming in years		
1-10	47	61.7
11-20	23	30.4
21-30	6	7.9
Mean	10	
Type of Occupation		
Farming	58	76.63
Civil service	3	3.9
Trading	15	19.8
Production Season		
Both wet and dry season	76	100
Total	**76**	**100**

The result in Table 1 presents the socio-economic characteristics of the farmers which indicated that majority (59.2%) of the respondents were females and 40.8% were males. This implies that women constituted a larger proportion of farmers involved in cucumber production in the study area. This is in agreement with Elum et. al., (2016) and Wilcox et. al., (2015) who reported that women were more involved in agriculture. Majority 43% of the farmers were within the age group of 30-39 years and only 6.5% of them were 50years and above. Mean age of the

farmers was 37 years. This implies that the farmers were energetic and within the productive age.

The result on the marital status of the respondents indicated that majority (64.8%) were married while 31.8% were single. In Nigeria, as observed in many African countries, marriage is seen as a stage of responsibility whereby farmers are expected to have a means of livelihood to carter for their families. Marital status is also used as a condition for accessing important production assests like land. Therefore, the high percentage of married folks could be an added advantage on accessing resources needed for farming especially land in the area.

The finding on household size of the respondents showed that majority 51.3% had household size of 4-6 persons, 32.9% had household size of 7-9 persons per family with 6 persons as the mean household size. This result agrees with Wilcox et. al., 2015 who noted that large household size could imply more hands in the farm and cheap farm labour supply that could be utilized for cultivation of large land area and greater output.

The findings on the farmers educational attainment indicated that majority 78.9% had secondary education. It is believed that educated farmers would be able to understand and make rational decisions relating to the use of improved methods of planting in cucumenr production. This is supported by the view of Wilcox et al. 2015 who stated that educated farmers were able to understand the steps involved in cucumber production. They also noted farmers were receptive to improved technologoies used in vegetable production. In a related study carried out by (Idrisa et.al.,2008;Babatunde et. al., (2007), it was observed that low education made it for farmers to adopt improved technologies introduced by extension officers. However, Nwaru et. al., (2006) observed that farmers relied on their farming experience for improved productivity rather than their educational attainment. This result agrees with Busari, Idris-Adeniyi, and Oyekale (2012) who noted that the years of farming experience and middle age bracket of 41-60 years played important roles in influencing farmers' production. Futhermore, the study showed that majority (61.7%) had farm experience in farming of 1-10 years, 30.4% had an experience of 11-20 years, only 7.9% had an experience of 21-30 years. The average farming experience was 10 years. This implied that the farmers had considerable knowledge in farming and it is expected that their wealth of experience would have improved their farm productivity. This is supported by Uwagboe, Ndagi, Agbongiahuoyi, Adebiyi and Aigbekaen (2010) and Enete, Nweke and Tollens (2002) studies which showed that age and experience are important positive factors in farm work. Experience of the farmers could help farmers to manage farm resources and minimize cost of production (Egbodion and Erie, 2011). Furthermore, it was noted in Nwaru, Onyenweaku and Nwosu(2006), report that the older a farmer became, the more his efficiency dropped.

The result also showed that farmer who cultivated farm holding of less than 1 hectare of land was 61.7% and only 2.6% had farm size within the range of 3.00-3. 99 hectares while 1.3% had 4 hectares and above. The findings also revealed that 76.3% of the respondents in the study area had farming as their main job, 3.9% were civil servants and 19.8% were traders. This shows that few of these farmers supplemented their income from other jobs like trading and civil service. Finally, it was observed that all the respondents in the study area cultivated cucumber in both wet and dry seasons with percentages of 100% respectively. This implies that the farmers are utilizing both seasons to make additional income.

Table 2. Result of regression analysis

Variables	Linear	Semi-log	Double-log	Exponential

Constant	499.4(0.23)	-8948.7(-1.48)	2.67***(6.44)	7.628***(20.6)
Age	-16.9(-0.44)	-8948.7(-0.57)	-0.15(-0.61)	-0.002(-0.37)
Educational level	446.4(0.99)	-1969.9(0.73)	0.23(1.19)	0.109(1.39)
Farm size	333.8(0.84)	2026.2**(2.02)	0.16**(2.30)	0.049(0.72)
Experience	-54.9(-1.11)	2108.1(-0.61)	-0.04(-0.45)	-0.004(-0.42)
Household size	77.9(0.68)	-852.7(0.61)	0.02(0.24)	0.008(0.39)
Labour Mandays	117.1***(3.88)	865.9**(2.44)	0.33**(2.71)	0.019***(3.67)
Fertilizer	3.36***(3.29)	4357.8***(3.78)	0.32***(3.94)	0.001***(3.15)
Pesticide	128.6(1.42)	4433.8(1.40)	0.02(0.26)	0.002(0.17)
R^2	0.64	0.65	0.64	0.55
F-ratio	14.9	15.8	15.1	10.4
Akaike Criterion	1999.3	2000.7	34.9	52.7

Source: Field data, 2021; $R^2 = 0.65$, Adjusted $R^2 = 0.64$, F-ratio = 15.1, AIC= 34.9 for double-log regression model. Values in parenthesis are the computed t-values. ** Significant at 5%, *** Significant at 1%.

The result in Table 2 was estimated with four functional models which evaluated for their performance using the standard economic criteria such as the R^2, F-ratio, z-ratio,, AIC value, and a number of significant variables. Among the four models, double log multiple regression model was chosen as the lead equation and was used for further discussion because it gave a "better fit" with the lowest AIC value and a higher number of significant variables.

The coefficient of multiple determination (R^2) estimate of the double log model indicated that 64% of the variation in cucumber production among the farmers was explained by the explanatory variables included in the model. The remaining 34% could be due to other factors not specified in the model. It was observed that three variables namely; farm size, labour and fertilizer were positively significant at 5%, 5% and 1% respectively. Among the four models, double log multiple regression model was chosen as the lead equation and was used for further discussion because it gave a "better fit" with the lowest AIC value and a higher number of significant variables.

The coefficient of multiple determination (R^2) estimate of the double log model indicated that 64% of the variation in cucumber production among the farmers was explained by the explanatory variables included in the model. The remaining 34% could be due to other factors not specified in the model. It was observed that three variables namely; farm size, labour and fertilizer were positively significant at 5%, 5% and 1% respectively. The significance of the farm size, labour and fertilizer explained that farm size, labour and fertilizer determined the value of cucumber output in the study area. From the result of the regression analysis, it can be inferred that a unit increase in labour cost will result in 33% increase in output. Likewise, a unit increase in farm size and expenditure on fertilizer would lead to a 16% and a 32% increase in output of cucumber respectively. The F-ratio of 15.065 with the probability values of 0.000 for both wet and dry season cucumber production reveals that identified farmers' socio-economic characteristics such as labour, fertilizer and farm size, jointly and significantly influenced cucumber yield.

Table 3: Profitability of rainy and dry seasons cucumber production

Parameters	Wet season cucumber production (₦)	Dry season cucumber production (₦)
Variable cost		
Rent	39687.50	31600.45
Localseeds	12025.49	11291.67
Improvedseeds	11289.29	10854.84
Pesticide	7528.95	7173.68
Transport	10141.45	9523.68
Fertilizer	56414.47	50743.42
Water	0.00	1,070.00
Landclearing	10052.00	13754.92
Landpreparation	10336.84	14235.63
Planting	6839.44	8844.59
Firstweeding	80600.56	6645.73
Secondweeding	1700.00	500.00
Harvesting	8576.00	6556.00
Total Variable Cost	**182,651.99**	**171,794.61**
Depreciation on Fixed Items	59,268.54	26,427.61
Total cost (TVC+TFC)	241,920.53	198,222.22
Total Revenue	**389,393.42**	**453, 696.05**
Gross Margin(TR-TVC)	**330,124.88**	**281,901.44**
Net Income(TR-TC)	**147,472.89**	**255,473.83**
Return Per Capital Invested (NI/TR)	**0.37**	**0.56**

Source: Researchers Field Data, 2021

The result of gross margin analysis presented on Table 3, showed that Total Variable Cost (TVC) spent during the wet season production by the farmers was ₦182,651.99 and Total Revenue was estimated as **₦330,124.88** with a net income of ₦147,472.89 while that of dry season production was estimated as followings, TVC was ₦171,794.61, Total Revenue was ₦453, 696.05, gross margin was ₦281,901.44 while net income was ₦255,473.83. The result further showed that net income in the dry season was higher than that of net income in the wet season production. However, a test of significant was to determine whether the differences in the income is statistically significant or it occurred by chance. Retrun on invested during the wet season production was 0.37 while that of dry season production was estimated as 0.56. It is interesting to note here that cucumber production in both dry and wet season on the study area was profitability. This result supports the finding of Adesope (2010), who observed that vegetable production is a vaiable venture in the dry season. Also, the study agrees with the finding of Elum et. al, 2016 who found that cucumber production is highly profitable.

The result further shows that net income in the dry season was higher that of net income in the wet season production. However, a test of significant will determine whether the differences in the income is statistically significant or it occurred by chance. Retrun on invested during the wet season production was 0.37 while that of dry season production was estimated as 0.56.

Table 4: Weekly quantity of cucumber produced in the area

Variables	Quantity produced in wet season		Quantity produced in dry season	
Weekly records	Qty in kg	Mean	Qty in kg	Mean
1st week	21,700	285.5	21,600	284.2
2nd week	37,450	492.8	41,750	549.3
3rd week	61,800	813.2	66,250	871.7
4th week	73,450	966.4	76,300	1,003.9
5th week	49,300	648.7	43,750	575.7
6thweek	21,600	332.3	20,650	271.7
7thweek	8,350	155.6	8,200	107.9

8th week	2,450	87	2,850	37.7
Total	276,100	3,632.89	205,050	2,698. 03

Source: Field data, 2021

The results in Table 4 showed the quantity of cucumber produced in both wet and dry season. Quantity of cucumber produced in the wet season was 276,100kg while quantity of cucumber produced in dry seasonwas 205,050kg. It can be deduced from the result as presented that farmers produced more cucumber in the wet season compared to the dry season. The differences in the quantity of cucumber produced in the wet and dry season could be due to inadequate water and labour required to carry out farming operations during dry season compared to rainy season when there is adequate rainfall for proper growth and development of the crop. This result agrees with Ume et. al., (2017), which noted that the most important factor that can contribute to the success of dry season farming is the source of irrigation water and labour.

Table.5:Z-test for net Income of cucumber produced in wet and dry season

	Dry season net income	Wet season net income
Mean	255,473.83	147,472.89
KnownVariance	41207569935	34157470959
Observations	76	76
HypothesizedMeanDifference	0	
Z	2.534	
P(Z<=z)one-tail	0	
zCriticalone-tail	1.64	
P(Z<=z)two-tail	0	
zCriticaltwo-tail	1.96	

Source: Researchers Field Data, 2021.

The result in Table 5 showed the Z-test value of differences in the mean netcome realized from cucumber production in the dry and wet season. The result indicated a Z-statistic value of 2.534, which had a p value of 0.000, which implied that under a two tailed test, the mean difference in the net income of cucumber produced between wet and dry season varied at 1 percent level of statistical significance. Therefore, the null hypothesis that stated *There is no significant difference between the net income of cucumber produced in wet and dry season* was rejected and therefore the alternative hypothesis stated *a significant difference between the net income of cucumber produced in wet and dry season* was accepted.

Table .6: Z-test for Quantity of cucumber produced in wet and dry season in kg

	Dry Season Output (kg)	Wet Season Output (kg)
Mean	2698.03	3632.90
Known Variance	1638096	3179237
Observations	76	76
Hypothesized Mean Difference	0	
Z	-3.71	
P(Z<=z) one-tail	0	
z Critical one-tail	1.64	
P(Z<=z) two-tail	0	
z Critical two-tail	1.96	

Source: Field Data, 2021.

The result in Table 6 showed the Z-test value of differences in the mean total quantity of cucumber produced in dry and wet season. The result indicated a Z-statistic value of -3.713, which had a p value of 0.000, implying that under a two tailed test, the mean difference in the quantity of cucumber produced in the wet and dry season varied at 1 percent level of statistical significance. Therefore, the null hypothesis that stated *there is no significant difference between the quantity of cucumber produced in wet and dry season* was rejected and therefore the alternative hypothesis stated *a significant difference between the quantity of cucumber produced in wet and dry season* was accepted.

Table 7: Constraints to cucumber production in the study area

Constraints	Mean
Difficulty in harvesting	1.6
Indeguate water supply during the dry season	3.2
High production cost	1.7
Poor access to credit facilities	1.4
Lack of extension services	1.2
Pest and disease infestation	1.8
Low productivity	2.1
Poor transport facilities	2.7
Lack of storage facilities	2.8
Short shelf life	2.1
High cost of input	1.7
Problem of theft	2.4
Difficulty in farm land acquisition	2.1
Indequate improved seeds for planting	1.5
High cost of labour	1.8
Low / unstable price of cucumber fruits	1.4
Non reliability of customers	1.9
Low demand of cucumber product	1.9
Insufficient financial support	2.5
High cost of seeds	1.8

Source: Researcher field data, 2021; *=M ≥ 2.5 = Agreed Problem.

Table 7 shows that the mean distribution of identified constraints which militated against cucumber production in the study area. The data revealed that lack of water (M=3.2), poor transport facilities (M=2.7), lack of storage facilities (M=2.8) and lack of financial support (M=2.5) as major constraints which affected cucumber production. The findings implied that water availability, transport facilities, storage facilities and financial support are not enjoyed by the cucumber farmers in the study area.

4. Conclusions

The study concludes that women dominated cucumber production in Oyigbo Local Government Area in both wet and dry season. Cucumber production was profitable in both wet and dry season. There is significant difference in the net income and quantity of cucumber produced in the wet and dry seasons in the study area. Farm size, labour and quantity of fertilizer used showed significant influence on the yield of cucumber in the study area. Women are therefore advised to improve their income earning by increasing quantity of cucumber production during the dry season. Also, unemployed youths in the area, should be encouraged to engage in cucumber production to earn additional income for their family. Finally, support services and soft loan should be given to farmers to expand their scale of production.

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