

## ECONOMIC ANALYSIS OF DRY SEASON VEGETABLE FARMING IN BENUE STATE, NIGERIA

Teran, A.D Abah, D., and Ovor, B  
Department of Agricultural Economics  
Federal University of Agriculture, Makurdi  
P.M.B 2373, Makurdi, Nigeria

Corresponding Author Email: aondonenge.teran@uam.edu.ng; Tel: 08034772958

---

### ABSTRACT

*This study analyzed the economics of dry season vegetable farming in Makurdi Local Government Area of Benue State, Nigeria. Simple random sampling technique was used to select ninety-nine respondents. Primary data were collected using a well-structured questionnaire. Descriptive statistics, Gross margin analysis and linear regression were used as statistical tools for analysis. Findings revealed that the mean age of the farmers was about 39 years, 74.7% were males, 68.7% were married, and 90.9% had formal education. The mean household size was 6 persons, an average annual income of ₦10114.4. Mean farm size was 1.07 hectare, and mean farming experience was about 15 years. Research revealed that dry season vegetable is profitable in the study area. The cost of seed, cost of labour, farm size and household size significantly influence dry season vegetable production in the study area. The result of the factors affecting dry season vegetable production revealed that certain factors such as lack of access to credit facilities, shortage of labour, and traditional land tenure system were the major challenges facing dry season vegetable production in the study area. It was therefore recommended that government and non-governmental organization should provide inputs resources such as credit facilities, fertilizers to improve the production of vegetables, and farmers should form cooperative so as to access credit inputs.*

**Keywords:** Vegetable, OLS, Riverside, Profitability, Marketing, Cost.

### INTRODUCTION

Agriculture is important in the economy of Nigeria with crops of cocoa, oil palm, maize, rubber, yam, vegetables and cassava produced for food and foreign exchange earnings, and providing employment for over 66% of the population (International Fund for Agricultural Development [IFAD], 2014). Agriculture remains a significant sector despite the discovery and exploration of crude oil which contributes about 40% of the country's GDP (IFAD, 2014). Even though agriculture is a leading earner of foreign exchange (Adesoji and Farinde, 2006).

Vegetable production is a growing aspect of agriculture in recent times. The awareness to consume vegetables for good health is increasing. According to (Food and Agricultural Organization (FAO), 2009), vegetables play a significant role in supplying the essential minerals, vitamins and fiber not present in large quantities in starchy staple foods. According to (Agropedia, 2009) farmers adopt the production of vegetables due to the changing food habits of people and the increasing awareness of individuals towards balanced diet and concept of nutritional security.

Vegetables are essential to human health. For instance, tomato fruits contain lycopene, a valuable anti-cancer and anti-cardiovascular chemical. Carrots contain carotene (precursor of the essential vitamin A), and many fresh vegetables contain vitamin C. Vegetables are valuable in maintaining the alkaline reserve of the body (Rumeza *et al.*, 2006). According to (Food and Agricultural Organization (FAO), 2009) vegetables are a good source of income for farmers and offers opportunities for the disables to earn a living. Vegetables have great export potentials and are good sources of foreign exchange earnings (Agropedia, 2009).

The importance of vegetables as major and efficient sources of micronutrients in African diet cannot be over stressed. Vegetables are nourishing foods because they contain a little of all the substances man needs: protein, mineral salts, sugars, vitamins, aromatics, colouring agencies, iron and essential oils that increase man's resistance to disease. In this class of food, man finds the wide range of nutritive elements he needs. Vegetables are therefore complementary foods of the first order, and are much more important for man's health than products of animal origin (Adepoju and Adejare, 2013).

Growing vegetable is particularly suited for small scale farmers and their families, and because of their limited resources they can meet the cultivation requirement of irrigation by the use of watering can (Robert, 2003). Baffour *et al.* (2015) defined vegetable as the edible portion of an herbaceous annual or perennial crop which could either be served raw (green/fresh) or after a little cooking. Dry season vegetable production also called vegetable forcing in the production of vegetable outside the normal growing season using certain infrastructures such as green houses, irrigation, watering can, etc.

Though many studies have been carried on dry season vegetable for instance Tsoho and Salau (2012) carried out research work on the economic analysis and constraints to dry season vegetable production under fadama in Sudan savannah ecological zone of Sokoto State Nigeria and Onoh *et al* (2016) on Dry season vegetable production by Okigwe Agricultural zone of Imo State, Nigeria, however no research have been carried out to assess the economic benefit of dry season vegetable in Benue State. Hence this research focus the economic analysis of dry season vegetable farming in Makurdi Local Government Area of Benue State.

The broad objective of this study is economic analysis of dry season vegetable farming in Benue State. The specific objectives are to: describe the socio-economic characteristics of the respondents; analyze the cost and returns of farmers engaging in dry season vegetable farming; and assess the factors that influence the farming of dry season vegetables.

## METHODOLOGY

The study was carried out in Makurdi Local Government Area. Makurdi is a local government area in Benue State, with administrative headquarters in Makurdi town which also serves as Benue State's capital. Makurdi local government area falls under Benue North-West Senatorial District alongside Buruku, Guma, Gboko, Gwer East, Gwer West and Tarka local government areas. Makurdi Local Government Area also forms a Federal constituency alongside Guma Local Government Area. Makurdi local government area has an area of 820 km<sup>2</sup>. It shares boundaries with Guma Local Government Area to the North-East, Gwer East Local Government Area to the South, Gwer West local government area to the West and Doma Local Government Area of Nasarawa State to the North-West. The widely disputed result of the 2006 national population census put the population of Makurdi Local Government Area at 300,377, with 154,138 males and 146,239 females. It comprises eleven (11) council wards. The climate is tropical with dry and cold windy harmattan weather from November to March and rainy/wet season from April to October. The average temperature range is between 32°C and 35° C with an annual rainfall of 1500mm-1800mm. Relative humidity varies with the period of the year.

The population of this study consists of dry season vegetable farmers in Makurdi Local Government Area of Benue State. Purposive sampling technique was used in the collection of data from the respondents using a structured questionnaire. Firstly, five (5) River sides were purposefully selected from the study area based on dry season farming activities in the areas, secondly, 10% of the sample frame from each river sides was taken based on their population size to give sample sizes from each river side, summing up to a total of 100 respondents.

Table 1: Sample Size Selection Plan

Riversides	Sample Frame	Sample Size (10%)
1	300	30
2	170	17
3	140	14
4	226	23
5	164	16
	<b>1000</b>	<b>100</b>

Source: Field survey 2023

## Model Specification

### Gross Margin Analysis for Cost and Returns

$$GM = TR - TVC$$

Where,

GM is gross margin (Naira/hectare)

TR is total revenue (Naira/hectare)

TVC is total variable cost (Naira/hectare)

### **Linear Regression for factors influencing dry season vegetable farming**

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \epsilon$$

Where,

Y is gross income (₦)

X<sub>1</sub> is farm size (hectares)

X<sub>2</sub> is cost of fertilizer (₦)

X<sub>3</sub> is cost of labour (₦)

X<sub>4</sub> is seed (₦)

X<sub>5</sub> is Household size (number)

## **RESULTS AND DISCUSSION**

### **Socio-Economic Characteristic of Respondents**

The socio-economic characteristics of the respondent are presented Table 2. The result revealed that mean age of farmers to be 39.55%. This implies that in Makurdi Local Government, dry season vegetable farming is done by active and energetic people in their middle ages of production. This conformed to the finding of Abang *et al* (2009); Tijani and Bakari (2013) and Ochi *et al* (2015) who reported that food crops farmers are predominantly in their active years and therefore might have all necessary energy and strength to be efficiently productive. It further goes to show that given the requisite materials for the production of dry season vegetable, could perform optimally since their energy level is adequate. The result on the gender distribution of the respondents shows that more males are involved in dry season vegetable farming. This inequality in gender participation may be a as result of cultural belief that favors male fork in the ownership of land, also it may be the nature of most farm activities that are tedious, strenuous and labour intensive as such can only be done by men effectively. This result agreed with the result of Tsoho and Salau (2012) who report that males dominated vegetable farming in Sokoto state.

The result further revealed that majority (68%) of the respondent were married. This implies that more married people were involved in dry season vegetable in the Makurdi Local Government. This is expected because married people have the responsibility of feeding and catering for the welfare of the households and can equally serve as source of farm labour. This findings of this study is in conformity with the work of Kadiri *et al* (2014) who reported that most farmers are married because family could be source of cheap labour for them. The result further revealed that majority of the respondents had farming experience. Farming experience could lead to higher efficient use of resources and hence lead to higher productivity. Education plays a significant role in skill acquisitions and enhances one's ability to understand and apply technological innovations as well as ability to plan and take risks. The mean educational level in years of the dry season vegetable farmer in the study area is 8.87 years. The implication is that farmers with more years of formal education tend to be more efficient in dry season vegetable production.

This agrees with the findings of Raufu (2014) who reported that majority of respondents were privileged to attain secondary school. Furthermore, the study revealed that majority (75.8%) of dry season vegetable farmers in Makurdi Local Government Area had farming as their major occupation while 24.2% had other occupation that could augment their livelihood. This implies that majority of the farmers are into full time farming which will enhanced high productivity. The mean annual non-farm income was found to be ₦10111.0k. The result revealed that majority of the farmers had annual non-farm income of less than ₦50000; higher annual non-farm income will enhance farmer's access to production inputs and increase in standard of living. The mean household size of dry season vegetable farmers was found to be 6.24. This implies that majority of the respondents have average household size which could provide high family labour to the production system. The mean farm size was found to be 1.07 hectares. The implication of the finding on farm size is that most of the farmers had small farm holdings. The relevance of farm size in this study stems from the fact that the larger the farm size business in terms of hectares or labour requirements, the earlier the farmers tends to adopt new practices applicable to his farm enterprises (Imoh and Essien, 2005). Relatively small farm size could constitute a major constraints to technology adoption (Sani *et al*, 2014).

#### **Cost and Return in dry season vegetable production per Hectare**

The findings in table 3 shows cost and return dry season vegetable farming. The analysis of costs and returns shows that the mean value of cost of seeds, cost fertilizer, cost of herbicide, and cost of labour respectively stood at ₦ 1718.2, ₦4369.2, ₦3415.3, ₦4003.0. Mean of total variable cost stood at ₦13531.0, Mean of total revenue stood at ₦173050.0 while mean of gross margin stood at ₦1605000.0. This implies that if more fertilizer is use there will be increase in the returns of dry season vegetable. Since total revenue is high than the total variable cost, dry season vegetable is profitable in the study area. This result is agreement with Mustapha *et al* (2016) and Tsoho and Salau (2012) findings who reported that dry season vegetable is profitable.

#### **Factors influencing dry season vegetable in the study area**

The result of factors influencing dry season vegetable farming in the study area is shown in table 4. The coefficient of determination ( $R^2$ ) is 0.695; indicating that 69.5% of the factors influencing dry season vegetable is explained by cost of seed, cost of herbicide, cost of fertilizer, cost of labour, farm size and household size. The result shows that F statistic (34.499) is positive and significant at 5% level indicating the goodness of fit for the model and overall significance of variables used in the model. The result show that coefficient cost of seed was positive and significant at 5% level of significance, which implies that for every 5% increase in the cost of seed, it will increase variable cost by (0.27), which will in turn increase the cost of production and reduce economic analysis.

The coefficient Cost of labour was positive and significant at 1% level of significance, this implies that for every 1% increase in the cost of labour, it will increase variable cost by (0.846), this will reduce returns in dry season vegetable. Also coefficient of farm size was found to be positive and significant at 1% level of significance, this implies that for every 1% increase in farm size will increase output and production by (7226.429). The coefficient of household size was positive and significant at 1% level of significance, this implies that for every 1% increase in household size will increase availability of farm labour, which will increase farm income. However the coefficient of cost of fertilizer and cost of herbicide were not significant and therefore do not significantly influence dry season vegetable farming in the Study Area. The result is in line with Morgan *et al* (2021) findings who reported that farm size and household size were found to be positively significant at 1% level in their study.

### **Constraints Faced by Farmers**

The result on table 5 shows results of constrained faced by dry season vegetable farmers, it 23.5% of the respondents are faced with poor marketing problem. This implies that majority of the respondents sell their produce with ease without much drudgery, this may be due to present of numerous markets in the study area and the fact that nearly all household required one or two vegetables for it daily meal. This result disagree with Daramola *et al* (2016) findings who reported that marketing is a major of dry season vegetable farmers in Ondo state. The results shows that 41.4% are faced with lack of storage facilities problem. The results showing majority of respondent with non-problem of storage facilities may be due to the fact that the product are easily sold. This is in agreement with Adebo and Ajiboye (2015).

The result also revealed that nearly all the respondent (99%) are faced with the problems of lack of access to credit. This may be as a result of incentive of government and agricultural organizations to agricultural productions. Access to credit is expected to increase production and returns to farm enterprise. The result agreed with Daramola *et al* (2016) finding of financial problem to dry season vegetable farmers. The result revealed that 63.6% of respondents were faced with the constraints of shortage of labour. The findings implies that labour to dry season vegetable in the study area is readily available probably due to small farm holdings and availability of family labour. This agree with Tsoho and Salau (2012), who reported similar issue.

Furthermore, the result revealed that traditional land tenure system was a problem faced by majority of the farmers (59.6%). Land tenure problem may be due to land ownership and unavailability of land for irrigation in the country. The findings also revealed that only 6.1% of the respondent were faced with scarcity of water for irrigation problem. This may be due to the presence of the river Benue in the study area that ensure water availability.

**Table 2: Socio-economic characteristic of respondent**

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Mean</b>
<b>Sex</b>			
Female	25	25.3	
Male	74	74.7	
Total	99		
<b>Age</b>			
21-40	55	55.6	39.55
41-60	42	42.4	
61-80	2	2.0	
Total	99		
<b>Marital Status</b>			
Single	15	15.2	
Married	68	68.7	
Divorced	7	7.7	
Widowed	4	4.0	
Widower	5	5.1	
Total	99		
<b>Farming Experience</b>			
1-10	45	45.9	15.00
11-20	22	22.4	
21-30	22	22.4	
31-40	10	10.2	
Total	99		
<b>Education</b>			
No formal education	9	9.1	8.87
Primary	33	33.1	
Secondary school	44	44.9	
Tertiary	13	13.1	
Total	99		
<b>Major occupation</b>			
Other wise	24	24.2	
Farming	75	75.8	
Total	99		
<b>Non-farm income</b>			
1-50000	83	83.8	10114.0
50000-100000	4	4.0	
100001-150000	1	11.1	
150001-1000000	11	1.1	
<b>House hold size</b>			
1-5	50	50.5	6.24
6-10	35	35.4	
11-15	10	10.1	
16-20	2	2.0	
21-25	2	2.0	
Total	99		
<b>Farm Size</b>			
0.1-0.5	21	21.4	1.07
0.6-1.0	52	52.5	
1.1-1.5	15	15.2	
1.6-2.0	10	10.2	
2.1-5.0	1	1.0	
Total	99		

Source: Field survey 2022



**Table 3: Cost and Returns in dry season vegetable production**

Variables	Min	Max	Mean	Std deviation
Cost of seed	00	5000.00	1718.2	1073.46128
Cost of fertilizer	00	40000.00	4369.2	4312.60736
Cost of herbicide	00	13000.00	3415.3	2739.79275
Cost of labour	00	24000	4003.0	3337.15798
Total variable cost	900.00	47800.00	13531.0	7004.66991
Total Revenue	16800	125000.0	17305.0	127143.0
Gross margin	10000.00	123000.0	3774.0	126144.0

Source: Field survey 2022

**Table 4: Factor influencing dry season vegetable production**

Variables	Coefficient	Std.error	tstatistic	Sig.
Constant	24494.085	3576.094	6.849	0.000
Cost of seed	0.270	0.064	1.108	0.021**
Cost of herbicide	0.083	121	-0.688	0.493
Cost of fertilizer	-0.249	158	-1.577	118
Cost of labour	0.846	0.065	13.113	0.000***
Farm size	7226.429	988.384	7.311	0.000***
Household size	-422.335	1603.866	0.340	0.001***
R <sup>2</sup>	0.695			
F-statistic	34.499			

Source: Field survey 2021, \*\* Significant at 5% level, \*\*\* Significant at 1% level

**Table 5: Constraints faced by farmers**

Constraints	Frequency*	Percentage
Poor marketing channel	24	23.5
Lack of storage facilities	41	41.4
Lack of access to credit facilities	98	99.0
shortage of labour	63	63.6
Traditional land tenure system	59	59.6
Scarcity of water irrigation	93	93.9

Source: Field survey 2021



## **CONCLUSION AND RECOMMENDATIONS**

This study concludes that vegetable farmers in Makurdi Local Government Area are in their active age, married and have formal education and with large household sizes. It further concludes that most of the farmers have average farm size and are highly experienced in dry season vegetable farming. Also, dry season vegetable production is found to be profitable venture in the study area. The cost of seed, cost of labour, farm size and household size significantly influence dry season vegetable production in the study area. Furthermore, certain factors such as lack of access to credit facilities, shortage of labour, and traditional land tenure system were the major challenges found to affect dry season vegetable farmers in the study area. It was therefore recommended that government agencies and non-governmental organizations should provide farm inputs such as credit facilities, pulping machines and make available lands needed by farmers so as to help them enlarge their farm size and production ability hence increase the scale of dry season vegetable production in the study area. Farmers and other individuals should come together to form cooperatives that will enable them access credit assistance from banks and other financial institutions that will help in efficient production.

## **REFERENCES**

- Adebo, G. M., & Ajiboye, A. (2014). Comparative Analysis of Poverty Level among Rural and Urban Farmers in Ekiti and Ondo States. *Journal of Developing Countries Studies*. The International Institute for Science, Technology and Education (IISTE), 4(20), 23-27.
- Adepoju, A. O. & Adejare, K. A.,(2013). "Food Insecurity Status of Rural Households During the Post Planting Season in Nigeria," 2013 Fourth International Conference, September 22-25, 2013, Hammamet, Tunisia 160140, African Association of Agricultural Economists (AAAE).
- Daramola Ogunjimi (2016) on Challenges and Information need assessment of dry season vegetable farmers in Akure Metropolis, Ondo State, Nigeria
- Fadama Development Project. National Fadama Development Office of Projects Coordinating Unit. Federal Ministry of Agriculture and Rural Development, Nigeria.
- FAO (2009) How to Feed the World in 2050. Food and Agriculture Organization. [www.fao.org/3/a-ak542e/ak542e13.pdf](http://www.fao.org/3/a-ak542e/ak542e13.pdf)
- Imoh, A.N., and M.U. Essien. 2005. Adoption of improved cassava varieties among small scale farmers in Ikot-Ekpene Zone of Akwa Ibom State in Nigeria, in M.A. Orheruata, S.O. Nwokoro, M.T. Ajayi, A.T. Adekunle and G.N. Asumugha (eds), *Agricultural Rebirth for Improved Production in Nigeria*. Proceedings of the 30th Annual Conference of the Agricultural Society of Nigeria held at the University of Benin, Benin- City, Edo State, Nigeria, October 9-13, 2005, pp: 8-10.

- Kadiri F.A., Eze C.C., Orebiyi J.S. and Onyeagocha S.U.O. (2014). Resource-use and allocative efficiency of paddy rice production in Niger Delta Region of Nigeria. *Glob. J. Agric. Res.*, 2 (4), 11-18
- Morgan, N.C, Wasini, D.A and Ogbolo, N.A (2021). Profitability analysis of vegetable production in Yenagoa Local Government Area, Bayelsa State. *Nigeria. Open Access Research Journal of Biology and Pharmacy*, 2021, 02(02), 001–006
- Mustapha S.B., Udiandeye U.C., Sanusi A.M. and Bakari A.M. (2012). Analysis of adoption of improved rice production technologies in Jeer Local Government Area of Borno State, Nigeria. *Int. J. Dev. Sustain.*, 1 (3), 1112-1120
- Onoh Omogede (2016) on Dry season vegetable production by Okigwe Agricultural zone of Imo State, Nigeria.
- Robert JH (2003). Sustainable vegetable production for small farmers on problem soils in the Highland. Oxford university Press
- Rumeza H, Zafar I, Mudassar I, Shaheenab H and Masooma R (2006), “Use of Vegetables as Nutritional Food: Role in Human Health”, *Journal of Agricultural and Biological Science*, Vol. 1, No. 1, pp. 18-22.
- Tsoho and Salau (2012) on economic analysis and constraints to dry season vegetable production under fadama in Sudan savannah ecological zone of Sokoto State Nigeria.