Journal of Agriculture, Environmental Resource and Management
ISSN2245-1800(paper) ISSN 2245-2943(online)
4(1)385-394; Dec.2019

www.saerem.com

Economics of off- Season Cucumber Production in Uzo-Uwani Local Government Area of Enugu State

Okorie, O. J., Okoloaja, S. N. and Umaru, I. I.

Department of Agricultural Economics, University of Nigeria, Nsukka

Correspondence address: oguejiofor.okorie@unn.edu.ng,

ABSTRACT

The study analyzed the economics of offseason cucumber (Cucumis sativus) production in Uzo-uwani L.G.A of Enugu State. Primary data were collected using structured questionnaires administered to 70 (seventy) cucumber farmers generated using a multi-stage sampling technique. Data were analyzed using descriptive and inferential statistics such as; Frequency, percentages, multiple regression analysis and 4- point Likert scale. The results showed that majority (54.3%) of the farmers were females, had age of 40 years, 5 years farming experience, farm size of 0.3 ha with majority (88.6%) having a minimum of primary education. Average yield was 5 tons per season and a profit of ₦60,815.11 per season which shows that at this level of production (70% use small irrigation pump), revenue outweighs costs. The profit function analysis revealed that the combined effects of the variable items in profit function explained about 81.5% of the variation in the profit variable. Output price was positive and significant on profit at 1%. The Cost of land, seed, and labour were significant at 1%and had a negative effect on profit. Major constraints to the off-season production of cucumber in the study area include; lack of access to credit, high cost of inputs, pests, and diseases. The study recommends that youths be encouraged to invest in the enterprise; Government provide improved seed varieties and other incentives like irrigation equipment; Extension agents be encouraged to disseminate research outcomes to the farmers' and stakeholders should help farmers increase their capital base through grants and credits

***Keywords**: Cucumber production, Economic analysis, Offseason, Uzo-uwani*

INTRODUCTION

The world's population tends to increase by the second at a geometric progression; it is projected to skyrocket to 8.2 billion by the year 2025 and is likely to approach 9.3 billion in 2050 (United Nation Department of Economic and Social Affairs, UNDESA, 2000). Feeding such rapidly projected population is a major problem. Out of the population size, the majority is expected to come from developing countries of Asia and Africa especially the sub-Saharan region (United Nation Conference on Trade and Development, UNCTAD, 2015). Countries in these regions are environmentally dependent and with poor technology in agricultural production (Akter, 2011; Bowman & Zilberman, 2013). Most rural poor are far from consuming a balanced diet, they scramble for the major nutrients like protein, carbohydrates, fat, and oil at the expense of micronutrients. Balanced diet cannot be complete without the food classes present in the right proportion (United States Department for Agriculture, USDA, 2013).

Comparatively, Nigeria is a major producer of carbohydrate-rich foodstuff (yam, cassava, etc.) that has a longer shelf life than vegetables in which Nigeria accounts for 1.26% of the total world output of 17,397 tons per annum(FAO, 2007). However, this vegetable output comes from rainfed production. Vegetables are nourishing foods because they contain little of all the essential nutrients that man needs. Vegetable can supply micronutrients but is particular with vitamins and minerals salts like iron, calcium, phosphorus and essential oil that increases resistance to diseases in human(Enete & Okon, 2010). Fruit vegetables such as cucumbers (*Cucumis sativus*) are a valuable source of conventional antioxidant nutrients including vitamin C, beta-carotene, and manganese. It equally contain about 95% water and are for this reason often recommended as natural diuretics and helpful for bodybuilding (Elum,., Etowa, & Ogonda, 2016).

However, vegetable production is seasonal in Nigeria. The seasonality has resulted in food insecurity, which is a challenge to sustainable food production (Ibekwe & Adesope, 2010). The characteristics of the off-season period include low income for farmers accompanied by hunger and malnutrition. These sometimes lead to the death of small children since food prices are also high. The scarcity of vegetables in off-season (dry season) and non-availability of their accompanying nutrients during the period is a major problem for the poor rural population. The deficiencies in diets are responsible for the 'hidden hunger' syndrome in developing countries (United Nations Conference on Trade and Development, UNCTAD, 2015). For the fact that developing countries are climatic dependent, that is, their agricultural production is rain-fed dependent; Nigeria faces serious challenges to achieve sustainable vegetable production beyond the rainy season.

More so, sources of water are limited to areas with perennial water bodies or irrigated areas for rice production. Those alone cannot supply water for adequate off-season demand for vegetables. . Generally, rural farmers are poor with majority having income-per-capita of less than one dollar per day. Due to overdependence on rainy season for production, many families face market glut during harvest due to the fact that supplies exceed demand and there is post-harvest losses due to poor preservation methods. Again, there is also field losses due to pests and diseases that are prevalent in humid areas of the region (Ume, 2013).

Again, for lack of capital, growing vegetables would have suited small farm families with limited resources during the off-season (Roberts, 2003).

Off-season production simply refers to production beyond rainy season. In Nigeria, we have two different seasons; the rainy season and the dry season. Planting of vegetable dominates during the rainy season, and this usually extends from April to October each year, while off-season planting spans from November through March each year (Ibekwe & Adesope 2007). Therefore, off-season production induces different irrigation options on the farm households. These include the use of watering cans, wash bores, water pumps. Irrigation henceforth is limited to areas with high water levels of perennial streams or with boreholes. However, irrigable land is restricted to areas of water resource and the technology in the local area is not enough to cover larger areas.

If many farmers within the water source areas may be interested in the off-season farming, it could normally lead to the fragmentation of the available irrigable land. In addition, agricultural production in the rural areas do not most of the time have access to formal credit facilities that will help them acquire better technologies that will enable them access lands farther the water bodies. They rather resort to money lenders which could raise the cost of production due to high interest rate. As a result, there is seasonal migration of labour to off-farm activities which in turn reduces labour supply to vegetable production. This is more for the users who depend on wells and other natural sources of irrigation water such as rivers, streams, and ponds. Some of the wells usually dried-up within the dry season leaving the farmer with the alternative of digging shallow wells. The wells in turn dry up within a short period. This led to reduced yields and returns (Tsoho & Salau, 2012).

Akinyele (1998) is of the view that a number of problems exist in the irrigation sub-sector, which may include and not limited to high costs of irrigation equipment, lack of water downstream, no provision of irrigation services and changing of hydraulic regime of flood plains. These precipitate to low achievement of target yield or output which in turn gives poor financial returns to the farmers engaged in off-season production of vegetables at large. As a result, Nigeria rural poor generally grow off-season vegetable at subsistence level with higher youth labour during off-season periods (Emokoro, Ekwunwe, &Osifo, 2007). Another common constraints militating against vegetable farming is the lack of storage facilities (Tsohu and Salau, 2012). There is currently no efficient method for the storage and preservation method of vegetable and this brings about colossal waste during the rainy season, owing to its high level of perishability thus leading to scarcity during the dry season (Ume, 2013). However, during the dry season, there is usually the scarcity of this product, thereby leading to a high price due to short supply. It is therefore important for small-scale farmers to cultivate their land all year round since seasonality of agricultural product affects employment and income as well as output (Arene & Okpukpara, 2006).

FAO (2007) puts vegetable and fruits production in Nigeria at 1.26% of the world output of 17,397tonnes. Nigeria has more potential to increase output but the level of participation in off-season production is low resulting in poor output level and worsening food insecurity in Nigeria. While much work has been done on vegetable production in off-season, little has been done on water cucumber off-season production in Uzo-Uwani L.G.A of Enugu state. Moreover, the

choice of irrigation technology is a function of economic returns, good socio-economic and environmental factors that this work will examine. Again, there is little work on the productivity of the input factors in terms of input contribution to physical production process. In addition, factor and output prices were factored in to estimate the profitability, that is, the economic incentive to most activities. The strength of the constraints to water cucumber production in the area was lacking in previous studies with respect to water cucumber production. The broad objective of the study is therefore to analyze the economics of off-season water cucumber production in Uzo-uwani Local Government Area of Enugu State. The specific objectives include; identification and description of the Socio-economic characteristics of cucumber producers in the area; estimation of the profitability in off-season cucumber production and identify constraints facing off-season production of cucumber in the area.

METHODOLOGY

The Study Area

The area of study was conducted in Uzo-Uwani Local government area of Enugu state. Uwani Local Government Area comprises 15 communities, namely, Adani, Igga, Ogurugu, Ojor, Asaba, Nimbo, Ugbene, Nruobo, Nkpologu, Uvuru, Umulokpa, Adaba, NkumeAkpugo and Ukpata. Uzo-Uwani Local Government Area is endowed with fertile soils. It has an average rainfall of about 1700mm, usually spread over a period of seven months from April to October. The average temperature is about 27^{0}C, with variations throughout the year.Uzo-Uwani Local Government Area lies within Longitudes 6^0.45^1 and 7^0 East, Latitudes 7^{0}12’ and 3^0 6^1 North (Uzo-uwani Local Government bulletin, 1990). The inhabitants are predominantly farmers. This is probably because of the natural endowment of large expanse of fertile land.
Land is owned mostly on communal basis in the study area, only a few individuals own land. The soil favours the production of cassava, yam, rice, oil palm, citrus, banana, plantain, cucumber etc. Livestock raised in the study area include; cattle, fowls, pigs, goats, ducks and sheep.

Sampling Procedure

In order to have a good spread of respondents for the study, purposive random sampling technique was adopted because not all communities grow off-season vegetable due to lack of major water source. The sampling population for the study was dry-season vegetable farmers in the area. A preliminary study of the area was carried out which aimed at determining the potential Cucumber growing communities in the area. Seven communities were randomly selected from the list of the notable cucumber growing communities, and from each community, ten (10) Cucumber farmers were randomly selected. This gives a sample size of 70.

Method of data collection

Primary data were used in the study. Well-structured questionnaire were administered to the sampled dry-season Cucumber farmers. Data were collected on the socio-economic characteristics of the farmers such as age, sex, occupation, size, educational status, marital status, income level and farmers view on dry season vegetable production. Also, some information on output and input prices, plot size, extension services, sources of funds, irrigation method, labour utilization and type

of chemicals, fertilizers, manure etc. were also gathered.

Data Analysis

Descriptive and Inferential Statistics were used in analyzing the data. Objectives i was realized using multiple regression; objective ii was realized using gross margin analysis; objective iii was realized using Likert scale rating techniques where four response option of strongly agree, agree, disagree and strongly disagree scaled 4 to 1 respectively were used.

Model Specification

Profit function Analysis

Profit function was employed to estimate the profitability of the individual farmer upon input use in off-season cucumber production enterprise. The profit function model is specified as follows:

$\Pi = b_0 + b_1 P_y + b_2 P_1 + b_3 P_2 + b_4 P_3 + b_5 P_4 + b_6 P_5 + b_7 P_6 + b_8 P_7 + e_1$

where

Π^* = Amount of Profit (₦), (ie. TR-TC)

bi = coefficients of inputs with respect to profit (elasticities)

P_y= Price of output (₦)/kg

P_1= cost of seeds (₦),

P_2= cost of manure (₦),

P_3 = cost of fertilizer (₦),

P_4= cost of labour (₦),

P_5= cost of pesticide (₦),

P_6= opportunity cost of land (₦), and

P_7= Capital, which is depreciated value of fixed assets (matchet, watering cans, hoses and motorized irrigation equipment (₦))

e_1= error term

Likert Scale

. Likert four-point type scale was used to identify the constraints to off-season cucumber production and is specified as follow; the option "SA= strongly agree'' was given the highest value 4, "A= agree'' was given a value of 3, "D= disagree'' was given a value of 2 and "SD= strongly disagree'' was given a value of 1. The following scaling procedure was adopted: Strongly agree (SA), Agree (A), Disagree (D) and Strongly disagree (SD). The values of the four responses were added as follows,

$$\frac{4+3+2+1}{4} = 2.5$$

The sum of the points was divided by 4 to obtain a mean score of 2.5, which was regarded as the mean response level or benchmark to either accept or reject. Based on this, scores below 2.5 (MS<2.5) were taken as a weak factor and was not be considered (rejected) while those with mean score of above (MS>2.5) were taken as strong factors and considered (accepted).

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

The analysis of socio-economic characteristics of the respondents was done with respect to age, gender, household size, level of education, farming experience, nature of farming, farm size, source of farm labour, method of land acquisition and source of planting materials.

The respondents sampled, showed varying age distribution ranging from about 18 years to above 50 years (Table 1). About

15.7% of the respondents fell within the age bracket of 21-29 years, 34.3% fell within the age bracket of 30-39 years, and 40-49 tears respectively. Age bracket of51-60 years accounted for 14.3%. The result shows that a greater percentage of the people were within the economic age range of 21-50. This finding is in line with the findings of Azeez & Madukwe (2010).

Table 1: Description of some socioeconomic characteristics of respondents

Age (Years)	Frequency	Percentage
18 – 20	1	1.4
21 – 29	11	15.7
30 -39	24	34.3
40 -49	24	34.3
50 and above	10	14.3
Average level of education	6.68 years	
Gender		
Male	32	45.7
Female	38	54.3
Level of Education		
No formal education	8	11.4
Primary Education	11	15.7
Secondary Education	29	41.4
Undergraduate	4	5.7
Graduate	18	25.7
Farm Size (Ha)		
0,01 – 0.2	11	15.7
0.21 – 0.6	27	38.6
0.61 – 1.0	20	28.6
Above 1.0	12	17.1
Average farm size	0.59 ha	
Years of farm experience		
1 -5	44	62.9
6 – 10	22	31.4
Above 10	04	5.7
Average years of farm experience	5 years	

Source: Field survey, 2018

The frequency distribution of respondents according to gender as presented in (Table 1). indicated that 45.7% of the respondents were males, while 54.3% were females. This implies that off-season cucumber farming is not gender exclusive but mostly carried out by the female folks in the study area. This is in line with the findings of Azeez & Madukwe, (2010), that more females are into off-season vegetable production than their male counterparts who are probably engaged with other activities and that women are more active in agriculture than the men.

Their level of education showed that 11.4% of the sampled respondents had No

formal education. 15.7% of the respondents had primary education, 41.4% of the respondents had secondary education, 5.7% were undergraduates and 25.7% were graduates. These results further implied that majority (88.6%) of the respondents were literates. This could augur well for extension services. It makes it easier to disseminate research findings for increased productivity to off-season cucumber farmers in the study area. (Ohen, Umeze & Cobham, 2014) had similar results.

For farm size,15.7% of the sampled population had a farm size of 0.01-0.2 ha, 38.6% had a farm size of 0.2-0.6 ha, 28.6% had a farm size of 0.61-1.00 ha and 17.1% had a farm size of above 1ha. The average farm size of respondents was 0.59 ha.This implies that offseason cucumber production was dominated by small-scale farmers. This agrees with the findings of Ibekwe and Adesope (2010).

A greater percentage of the sampled respondents had a farming experience of below 6 years while 31.4% fall within 6-10 years and only a few are above 10 years. The average year of farm experience is 5 years. This means that majority of the respondents have not been long in the business of off-season cucumber production. This may be attributed to the fact that majority of the farmers in the area depend mainly on rain-fed agriculture. Equally, the crop may be new in the area and because of the commercial potentials, young people are into it.

Identified irrigation practice included; traditional or bucket system, small pumps irrigation that were predominantly owned by individuals and canal irrigation system that were mostly owned by government. The canal irrigation system was often given out by the government to large and medium scale rice farmers at a subsidized rate to enhance the productivity of rice. Farmers who cultivated rice alongside cucumber and other crops were those who used the canal irrigation system in the area. Small pumps were more in use for irrigation in the study area. This is because of the presence of the river "Obina" in the study area where the farmers source water for irrigation. The traditional or bucket system irrigation were mostly used by very small-scale farmers who practice garden farming. Water pump irrigation dominated the farm practice showing that labour is drastically reduced against the tradition of labour-intensive production hence reduction in drudgery which is good for youths.

Table 2: Profit elasticities of inputs in the production of off-season cucumber production

Table 2: Results of the multiple regression analysis showing estimates of profit elasticities

Parameter	Coefficients	t	Sig.
(Constant)	-47745.943	-.187	.852
Output price	.005	3.083	.004***
Seeds	-.170	-2.047	.045**
Manure	-.067	-.972	.335
Labour cost	-.771	-7.451	.000***
Pesticide cost	-.006	-.064	.949
Land value	-.059	-.710	.048**
Asset depreciation	-.018	-.278	.782
R^2=0.815			

Source: Field survey, 2018.

In accessing the factors that affect the profitability of cucumber production in the area, the regression analysis was also used. The table showed that the output price contributed significantly to profit. Also, the combined effects in the of the variable price items in the function explained about 81.5% of the variation in the profit. The result showed that the price parameter for output had significant ($p<1\%$) and positive effect on the level of profit, while the price parameter for land value and seed ($p<5\%$) and labour cost had negative and significant ($p<1\%$) effect on profit indicating that an increase in the cost of land and labour will lead to a decrease in profit. This is in line with apriori expectations and the result indicates that high output price enhance farmers' profit. Arene & Mbata (2008) had similar findings. The results confirmed that input and output prices have a significant influence on the level of profit and also, that cucumber production in the area is profitable in the study area. The mean net profit per season for cucumber farmers as contained in table 3 was ₦60,815.11 with a standard deviation of ₦65,984.50. Improvement in the production process could have immense impact on the additional income of the affected households thereby reducing their choice constraints. The range of distribution of profit shows that there is room for improvement and there is knowledge gap on production methods among farmers. This portends great potentials for empowerment by governments and other stakeholders on farmers.

Table 3: Summary of profit distribution of respondents

Minimum	Maximum	Mean	Standard Dev.
11,530.00	312,850.00	60,815.11	65,984.50

Source: Field Survey, 2018

Constraints to off-season cucumber production

It was observed that Lack of access to credit, poor visit by extension agent, problem of marketing, poor transport facilities, problem of pests and diseases, and high costs of planting material were serious constraints to off-season cucumber in the study area. The results also showed that land scarcity, the problem of low productivity, the problem of theft and low income of farmers were not indicated as a serious setback in the study area. Lack of access to credit from financial institutions was seen as a major factor militating against off-season cucumber production in the study area. This may be attributed to high-interest rate and collateral required in obtaining loan and unwillingness of financial institutions to give loan to farmers because of high risks involved in the production of off-season cucumber production. Poor visit by extension agents was also adjudged a constraint militating against off-season cucumber in the area. This poses a threat to overall agriculture because extension agents are intermediaries between the farmers and the researchers. Poor extension services imply no improved method of farming in the area. High cost of planting materials was also one of the major constraints militating against off-season cucumber production. This could be attributed to lack of credit access, because the farmers may not have been sufficiently empowered financially, to adequately cover the cost of inputs.

Table 3. Constraints to off-season cucumber production

Constraints	Mean	Std. Deviation

Lack of access to credit facilities	2.90	1.024
Land Scarcity	2.34	.899
Poor visit by extension agent	3.23	1.024
Problem of marketing	2.99	.843
Poor transport facilities	2.81	.822
Problem of low productivity	2.27	.900
Problem of theft	1.71	.903
Problem of pests and diseases	3.44	.715
High cost of planting material	3.04	.875
Low income of farmers	2.40	1.069

Source: Field survey, 2018.

Conclusion

To help mitigate the challenges of achieving sustainable vegetable production beyond rainy season, the following were found to influence off-season cucumber; Profit of cucumber was significantly and negatively influenced by cost of labour, farm size , seed and other inputs. Interestingly, young people not more than 40 years who are literate and energetic are in cucumber production. However, lack of access to credit, poor visit by extension agent, problem of marketing, poor transportation facilities, problem of pests and diseases and high cost of planting materials, were found to be major constraints militating against off-season cucumber production in the area.

Recommendations

Based on the results of the study, the following recommendations are made;

a. Off-season cucumber production is profitable in the area and people especially the youths are encouraged to invest in the enterprise

b. Government should provide assistance such as an improved variety of seeds, and other incentives like irrigation equipment. This will go a long way in reducing expenditure and as well boost food security beyond rainy season

c. Extension agents should be encouraged to disseminate research outcomes to the farmers and also good road network and transportation facilities should be provided in the area for easy movement of farm products

d. Finally, measures should be taken by governments and other non-governmental agencies to help farmers increase their capital base through grants, credits and other incentives.

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