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ECONOMIC ANALYSIS OF IRISH POTATO PRODUCTION IN SARDAUNA LOCAL GOVERNMENT AREA OF TARABA STATE, NIGERIA.

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ABSTRACT

The study analysed the profitability of Irish potato production in Sardauna Local Government Area of Taraba State, Nigeria. Primary data were collected from 118 Irish potato farmers using purposive and random sampling techniques. The data were analysed using descriptive and inferential statistics. The result of the study revealed that majority (60.1%) of the respondents were in their prime age, 72.1% of the respondents were male and 49.2% were married. Most (94.1%) of the respondents had one form of education or the other while 85.6% of the respondents were small holder farmers. The result on the costs and returns revealed that Irish potato farming in the study area is profitable with a profit of ₦18, 131.57 per hectare. The return on Naira invested was ₦ 0.18k. This Implies that for every ₦1 invested, ₦ 0.18k was realised as profit. The result on the input output relationship reveals that seeds, fertilizer and educational level of the respondents were the main variables that have direct relationship with the output of Irish potato production in the study area. The major constraints affecting Irish potato production in the study area were identified as; lack of storage facilities, Problems of pest and diseases, high cost of labour, among others. The study recommend that modern storage techniques and facilities should be made available to the farmers at subsidize rate and there is need for extension agents and other agricultural specialists to visit the study area and proffer solution to the problem of pest and diseases while Irish potato farmers in the study area are encourage to form cooperative societies to enable them access credit facilities without hitch.

Key words: Profitability, regression model, Irish potato, Taraba State

INTRODUCTION

Agricultural production contributes significantly to economic development in Nigeria. The importance of agriculture in the economy of Nigeria is profound. Despite the growth in the oil industries it continues to be the principal economic activity of most people in Nigeria (Abdullah *et al*., 2006). Nigeria is a country endowed with a large expanse of arable land with enormous potential and favourable climate for the production of tuber crops and other food crops that can serve as raw materials to our agro-industries (Sallau *et al.*, 2010).

Among crops Irish potato (*Solanum Tuberosum L.)* ranks fourth in the world in terms of economic importance after wheat, rice and maize (Tolno *et al.*, 2016). Irish potato also known as "earth apple" is the main root and tuber crop that is grown almost in all parts of the tropical and subtropical area and in warmer areas of the temperate regions (Akintomide *et al.*, 2012). The crop is also known as round potato to distinguish it from sweet potato, and the word "Irish" came because a large proportion of Irish people depended on it for food (Demo *et al*., 2005). World production reached a record of 320 million tons in 2007 and production in the developing countries has almost doubled since 1991, with a corresponding increase in consumption. The tuber is an important source of food, employment and income in developing countries (Food and Agricultural Organization, 2008). The Irish potato has great potential in both national and regional markets, due to growing demand for chips and snacks/crisps (Anderson, 2008). This growth in demand can be traced to many factors, including increasing economic activities, urbanisation, tourism, and changing lifestyles, all of which are shifting consumer food preferences towards easy to cook and processed foods (FAOSTAT, 2008).

Irish potato is an important staple food as well as raw materials for industries. In order to meet the demand for industrial and human consumption, the yield per hectare needs to be improved. Such imminent improvement could be achieved through efficient management and monitoring of agro-climatic parameters, among other (Zemba *et al.*, 2013).

Irish potatoes is one of the most important food crop in Nigeria that plays a major role in national food security (Anozie *et al.,* 2008). In terms of food contribution, Irish potato is the most efficient tuber crop consumed by the majority of the population. It contains higher crude protein than any other root and tuber crop because of the low calories and high vitamin C content, (Akintomide *et al.,* 2012). However in spite of the popularity and diverse importance of Irish potato, studies have shown declining in production, in a study by Abdullah *et al*., (2006) revealed that Irish potatoes are produced on a small scale basis on an average plot size of less than 0.5ha. Anderson (2008) also reported that about 70% of the nation population are engaged in agriculture but more than 70% of these farm are at subsistence level. Aside that, Irish potato production in Nigeria is still faced with some constraints mitigating against its production which include inadequate supply of good quality seeds, poor storage facilities, disease, poor pest management, high cost of production inputs, poor market outlet, activities of middlemen among others (Ugonna *et al.,* 2013). The nexus of Nigeria's agricultural development problems has been declining agricultural productivity as reflected in the contribution of agriculture to GDP from 56 per cent in 1964 to 39 per cent in 1997 and in the declining share of export earnings from about 71 percent in 1964 to less than 5 per cent in the 1990s, (Aduba *et al*., 2013).

The National Policies on agricultural food production in Nigeria has made several efforts to increase food production in order to meet the food security objectives to self-sufficiency in staple food production especially rice, maize, tuber crops among others in Nigeria (Ayoola, 2007). Also, despite the effort of the Irish Potato Programme in Kuru to improve the production of potato in Nigeria, the decreasing level of production suggest that there are constraints facing small scale potato farmers in Nigeria (Ayodele, 2000). It therefore becomes very necessary to analyse the economics of Irish production in Sardauna Local Government Area of Taraba state, Nigeria. The specific objectives were to:

i. describe the socio-economic characteristic of the respondents in the study area;
ii. determine the costs and returns associated with Irish potato production in the study area;
iii. examine the input and output relationship in Irish potato production; and
iv. identify the major constraint of Irish potato production in the study area.

MATERIALS AND METHODS

Study Area:

The study was conducted in Sardauna Local Government Area of Taraba State. Located between latitude 6º 43' and 7º 15' to the north and longitude 11º 15' and 12 º 30' east of the Greenwich meridian. Sitting at an elevation of 1,348 meters above sea level, it is among the high elevated towns in Nigeria. It has a total land area of about 3,885km^2 and the area has an estimated population of 224,437 and the present projected population of 2018 is 301,842.9 (NPC, 2006). The area has mountainous vegetation characterized with short grasses and forest scattered all over the place. Temperate crops such as tea, coffee, pea, banana, plantain, Irish potatoes, pepper, pineapple as well as vegetables (*Kumbi*) are grown on the plateau (Musa *et al.,* 2012). The climate of the study area is marked by dry and wet season. The wet season starts in March and ends in October. It has an average annual rainfall of between 1,866mm to 3000mm. The dry season starts in November and ends in February with a temperature variation between 15ºc to 20ºc. (Tukur *et al.,* 2005). The local government is bounded by Gashaka Local Government in the north-eastern part, Kurmi Local Government to the west and Cameroon republic to the east and south. Majority of inhabitants of the local government area are engage in farming as an occupation. Most of the tribal spread within the area includes Fulani, Mambilla, kaka, Panso, Kambu among others. The basic amenities available are hospital, rural electricity, schools among others. (Taraba State Diary, 2010).

Sampling techniques and Sample size

Irish potato farmers constituted the study population. Purposive and simple random sampling technique were used to selects the respondents for the study. Purposively

sampling was used to select five wards out of the 10 wards in the study area based on their prominence in Irish potato production. A total of 118 Irish potato farmers were selected in proportionate to the size of the wards using simple random sampling technique.

Source of Data and Method of Data Analysis

Data for the study were obtained from primary source which were collected through the use of structured questionnaires administered to the respondents in the study area. Data collected were analysed using descriptive statistic such as means, frequency and percentages to address the research objective such as: the socio-economic characteristics of the respondents and identify the major constraints associated with Irish production in the study area while Gross Margin analysis was used to ascertain the profitability of Irish production. The gross margin analysis was used to estimate the cost and returns of Irish potato production thereby determine the profitability of Irish farmers in the study area. Gross Margin is the difference between the total revenue per hectare of land and the total variable costs per hectare of land. Olukosi and Erhabor (2005) maintained that gross margin is a good approximation of net farm income, since small-scale farmers usually have negligible fixed cost. Revenue was computed on the basis of the average value of Irish potato yield per bag. The variable cost was calculated using the average market value of the purchased inputs, with detailed of seed, fertilizer, hired labour, agrochemicals, empty sacks and transportation cost. Inferential statistics including multiple regression analysis was also used to examine the input-output relationship in Irish production in the study area.

The gross margin analysis formula as given by (Olukosi and Erhabor, 2005) is as follows:

GM = GF1 - TVC

NFI = GM – TFC

Where

GM = Gross margin (₦/ha)

GFI = Gross farm income (₦/ha)

TVC = Total variable cost (₦/ha)

TFC = Total fixed Cost (₦/ha)

NFI = Net farm income (₦/ha)

The Regression models is expressed as follows

$Y = b_o + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + U$

Y = Output of Irish potato (kg)

X_1 = Irish potato seed (kg)

X_2 = Fertilizer (kg)

X_3 = Herbicides (litres)

X_4 = Labour (man days)

X_5 = Farm size (hectares)

X_6 = Educational level

X_7 = Age (years)

$B_o – b_6$ = Parameters to be estimated

RESULTS AND DISCUSSION

Socio- Economic Characteristics of the Farmers

The results of the Socio-economic characteristics of the respondents are presented in Table 1. It shows that 77% of the respondents were within their active age bracket of 20-49. This means the respondents were still very active to engage in agricultural production that will contribute toward household food security. Majority (72.1%) of the respondents were male, while 49% were married. About 71% had attained various level of education. 63.6% of the respondents had farm size of 1-5 hectares. This implies that most of the Irish farmers' studied were small scale farmers.

Table 1. Socio-Economic Characteristics of the Respondents.

Characteristics	Frequency n=118	Percentage (%)
Age (yrs.):		
20-29	28	23.7
30-39	43	36.4
40-49	20	16.9
50-59	18	15.3
≥ 60	9`	7.7
Gender:		
Male	85	72.1
Female	33	27.9
Marital Status:		
Single	34	28.8
Married	59	49.2
Divorced	16	13.5
Widow	10	8.5
Educational Level:		
No formal Education	47	39.8
Primary Education	25	21.2
Secondary Education	35	29.7
Tertiary Education	11	9.3
Farm Size:		
1-5	75	63.6
6-10 `	43	36.4

Source: Field survey, 2018.

Average Costs and Returns per Hectare of Irish Potato Production

The results obtained in Table 2 reveals that the total cost of producing Irish potato per hectare was ₦ 102, 066.43 while total revenue per hectare was ₦ 120, 198. Gross margin attained was ₦ 25, 225.17. This implies that Irish production in the area was profitable. The return on Naira invested was ₦ 0.18K. Indicating that for every ₦1.00K expended in Irish potato production, ₦ 0.18K was realized as profit.

Table 2: Average costs and returns per hectare of Irish potato production

Costs Returns	Amount (₦)
Variables costs	
Seeds	5,267.00
Fertilizers	13,390.16
Herbicides	796.6
Labour	64,934.7
Transportation	6,934.27
Fixed Costs	
Depreciation on fixed costs	2,093.6
Rent on land	5,000
Total fixed costs (TFC)	7,093.6
Total cost = (TVC+TFC)	10,2066.43
Revenue	
Quantity harvested (kgs)	770.5 kgs/ha
Price/kg	₦ 156/kg
Gross income (Qty x price)	₦ 120,198
Gross margin (GI – TVC)	₦ 25,225.17
Net farm income (GM-TFC)	₦ 18,131.57
Return on Naira invested $\frac{NFI}{TC}$	₦ 0.18k

Source: Survey data, 2018

Result of Multiple Regression Analysis

Irish potato output was regressed with the independent variables (age, educational level, fertilizer, herbicide, farm size, seed and labour). Four functional model were used. (Linear, Cobb-Douglass, double-log and exponential model). The linear model had the best fit based on the adjusted coefficient of multiple

determinations (R^2) T-Statistic and the signs of the regression coefficient.

The result showed that R^2 was 0.60 implying that 60% of the variation in output was explained by the model. Only three of the six explanatory variables were found to be significant at 1% level. These are: seed ($p<0.01$), fertilizer ($p<0.01$), and education ($p<0.01$). This means that seeds, fertilizer and the educational level of Irish potato farmers have direct relationship with the output of Irish potato in the study area.

The coefficient of seed is positive and statistically significant at 1% level implying that an increase in seeds will bring about increase in output. Fertilizer coefficient was found to be positive and significant at 1% level implying that an increase in fertilizer will bring about increase in farmers output. Similarly, the coefficient of the farmers educational level was also positive and significant at 1% implying that an increase in the farmer's educational level will lead to increase in farmers output.

Table .3.: Result of the multiple regression analysis

Variable	Regression coefficients	Standard error	t-value	Probability level
Constant	360.490	199.239	1.809	0.073
Seed (X_1)	2.680	0.706	3.797	0.000**
Fertilizer (X_2)	2.199	0.527	4.177	0.000**
Herbicides (X_3)	20.959	34.936	0.600	0.550
Labour (X_4)	0.006	0.004	1.352	0.179
Farm size (X_5)	1.978	8.557	0.231	0.818
Education (X_6)	29.956	7.684	3.899	0.000**
Age (X_7)	5.884	3.827	1.538	0.127
R^2	0.603			
Adjusted R^2	0.577			
T-value	23.628			
Standard error of estimate	352.397			
Durbin-watson	1.887			

Source: Field Survey, 2018
**Significant at 1%

Constraints to Irish Potato Production

The distribution of the respondents based on constraints faced by Irish potato farmers in the study area is presented in Table 4. The result reveals that the most severe problem affecting Irish potato production were lack of storage facility (27.06%), problem of pest and disease (25.08%) and high cost of labour (24.01%) these were ranked 1st, 2nd and 3rd respectively according to severity. Inadequate fund was ranked 4th. The finding revealed that all the respondents were faced with one problem or the other.

Table 4: Distribution of Respondents based on major constraints to Irish potato production

Constraints	Frequency	Percentage (%)	Ranking
Inadequate funds	92	23.06	4
High cost of labour	96	24.06	3
Lack of storage facilities	108	27.07	1
Problem of pest and diseases	103	25.81	2
Total	399**	100.00	

Source: field survey, 2018
**Multiple response

CONCLUSION

Based on the major findings of this study it was concluded that, Irish potato production in the study area is a profitable enterprise. And majority of the Irish potato farmers in the study area were small holder farmers. Seeds, fertilizer and educational level of Irish potato farmers are the major determinants of the output of the crop in the study area. The production of Irish potato in the study area was affected by inadequate storage facilities, pest and diseases, high cost of labour among others.

RECOMMENDATIONS

The following recommendations are therefore preferred:

i. Irish potato farmers in the study area are encouraged to form a farm cooperative society in order to access funds from government and financial institutions to boost Irish potato production in the study area.

ii. Modern storage facilities should be provided by government and other stakeholders in the study area at affordable price to minimize the farm losses experienced due to lack of storage facilities.

iii. There is need for extension agents and other agricultural specialist to visit most of this Irish Potato farmers to be able to identify the most common pest and diseases that do affect the farmers' production in the study area in order to proffer solution to the problem.

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