

Tomato Production Under Irrigation in Some Selected Districts of Zuru Local Government Area of Kebbi State, Nigeria

Danmaigoro A.^{1*} and Gona A.²

¹Department of Agricultural Economics and Extension, Faculty of Agriculture, Usmanu Danfodiyo University, Sokoto, Nigeria

²Department of Agricultural Economics and Extension, Faculty of Agriculture, Kebbi State University of Science and Technology Aliero

Corresponding Author: Danmaigoro A., E-mail: danmaigoroaliyu@gmail.com

ARTICLE INFORMATION

Received: May 02, 2020
Accepted: June 14, 2020
Volume: 1
Issue: 1

KEYWORDS

Farmers, tomato production, resource use efficiency

ABSTRACT

The study was conducted to examine the economics of tomato production under irrigation in selected district of Zuru Local Government in Kebbi State. Multi stage sampling technique was used to select tomato irrigation farmer. Data collection was done using a structured questionnaire administered to the tomato farmers. Data analyses were done using farm budget model and multiple regression analysis. The result show that the major source of income is from the profit gain from tomato farming which implies that irrigated tomato production is profitable in the area with average net farm income of N 405750 per hectare. Result of the multiple regressions revealed farm size (1%), quantity of seed (5%) and capital (10%) were positive and statistically significant by the means of contributing to farm total output. The R² for linear function for tomato farmers is 0.787 which implies that 78.7% of the tomato farmers are dependent variable are explained by variation in the explanatory variable included in the model. However, result of the MVP/MFC ratio test revealed that both seeds, capital and Agrochemical has MVP/MFC ratio of 0.7042, 0.661 and -1.301 respectively were over-utilized by the tomato farmers. It is therefore recommended that loan and credit facilities should be provided for irrigated tomato farmers in the study area. Finally, extension agents should be provided to disseminate research finding and educate tomato farmers in other to boost profitability of the business.

1. Introduction

Tomato (*Lycopersicon esculentum* mill.) is one of the most important Vegetables worldwide. According to Afolami and Ayinde (2002), vegetable particularly tomato, supply essential micro nutrient in human nutrient that act as preventive agent to several illuminate. Increase tomato production may improve food security and offer employment opportunity to the populace. Tomato production in Nigeria is considered to be important, not only as food crops but even more as major source of income for rural households and also considered as a main source of raw material for the tomato processing industries (Cetin and Varda, 2008).

World tomato production in 2001 was about 105 million tonnes of fresh fruit from an estimated 3.9 million hectare. It is a relatively short duration crop and gives a high yield, it is economically attractive and the area under cultivation is increasing daily (Shankara *et al.*, 2005). The crop grows well in irrigated condition which makes it one of the principal crops cultivated on fadama land. It is produced in large quantities in Zuru Local Government area particularly in fadama (flood plain and low lying areas).

In Zuru local Government, many farmers are engaged in tomato production under different farming methods such as rainfed and irrigation. But most farmers are involved in surface irrigation presumably due to large number of rivers, streams and associated tributaries. Hence, the farmers in the study area are engaged in tomato production under surface irrigation farming in order to serve as a source of livelihood and income to solve their socio-economic and domestic needs especially during the dry season. Tomato farmers don't only need to be more efficient in their production activity, but also to be responsive to market indicators, so that scarce resource to market are utilized efficiency to increase productivity as well as profitability and ensure supply to the urban markets. Therefore, the principal solution to increase tomato production in the study area lies in raising the productivity of the crop by closing the existing yield gaps and providing the crop all through the season.

Olukosi and Ogungbile (2005) stat that the ultimate goal of any commercial farming is to maximize profit, which is achieved at the point where marginal cost (MC) equal to marginal revenue (MR). This means the revenue generated from the sale of the last unit of output equals to the additional costs incurred in its production.

Moreover, despite the production potential due to favourable weather conditions and availability of irrigation source and highly improved disease resistant varieties of tomato and the dire demand at both local and national market levels and given the fact that tomato can be grown in dry season using irrigation in order to augment for its availability all through the year, the question why the crop is scarce and expensive at certain period of the year remains a thing of concern by both researcher and the Government at policy level (World bank 2001). This might be due to lack of necessary technical and managerial production skills and perishable nature of the crops among other reasons.

According to Gona, et al., (2009), the efficiency of resource-use is the ability to derive maximum output per unit of resource which is the key to effectively addressing the challenges of achieving food security and alleviating widespread incidence of poverty by improving upon the livelihood of the entrepreneurs. It is against this backdrop that this study hopes to examine the resource use, as indicated by the efficiency of resource utilization in tomato production in Zuru Local Government Area.

The general objective of this research is to examine the economics of tomato production under irrigation farming in Zuru local Government area of Kebbi State. The specific objectives of the study are to:

- i. determine the profitability of tomato production under irrigation farming and
- ii. determine resource use efficiency of tomato production under irrigation.

This study aim was to find out whether the resource employed by tomato farmers are efficiently utilized or not (i.e. either over utilized or underutilized). This will give the farmers a direction on how to either increase or decrease the resources so as to enable the farmers make adjustment in order for them to operate at optimal level. The findings on profitability on tomato production will help both existing and prospective investor to see the need to invest more so as to boost tomato production and make it readily available at all season.

2. Methodology

The study was conducted in Zuru Local Government located at the extreme south-eastern part of Kebbi State in North-western part of Nigeria. It lies between latitude 11° 25' to 11° 56' N and longitude 5° 5' to 5° 57' E, the area experience annual rainfall in April to October of 1025mm and dry season lasting November to March, temperature of 30°C and cover an area of approximately 653 square kilometres (km²) (Girma, 2004).

2.1 Sampling Procedure and Data Collection

A multi-stage random sampling technique was used to select the respondents. The first stage involves a purposive selection of four (4) community out of the six (6) community that constitute Zuru Local Government namely; Dabai, Manga, Rafin Zuru, Rikoto, Senchi and Ushe. Second stage involves random selection of three (3) villages from each community where tomato is produced and the third stage involves random selection of ten (10) tomato farmers were selected from the villages thus making a total of one hundred and twenty (120) tomato farmers that was used for the study.

Primary data that was used for the study were collected by means of a structured questionnaire administered to tomato farmers engaged in tomato production under irrigation in the study area. Secondary information was obtained from relevant literature sourced from journals, internet, text books, etc.

The analytical tool that were used in analyzing the data were descriptive statistics, farm budgeting and multiple regression analysis.

Model Specification

The farm budgeting model that was used is mathematically expressed as:

$$NFI = GFI - \{TFC + TVC\} \dots \dots \dots (1)$$

Where:

NFI = Net farm income or profit is the difference between gross farm income and the total cost of production. (₦)

GFI = Gross farm income which represents the sum of the total value of crop harvested on the sample farms during the study. (₦)

TVC = Total variable costs incurred by the respondents during the production period. These include cost of inputs such as labour, fertilizer, chemicals, seeds etc. (₦)

TFC = Total fixed costs incurred by the respondents. These include leasing value of land, depreciation on farm implements such as hoe, cutlass, interest on loan etc. (₦)

Regression model that was used to examine input-output relationship

The implicit form of the model is presented as follows;

$$Y = f (X_1, X_2, X_3, X_4, X_5, U) \dots \dots \dots (2)$$

Where:

Y= yield of tomato (kg)

X₁ = farm size (ha)

X₂ = quantity of seeds used (kg)

X₃ = quantity of fertilizer (kg)

X₄ = labour (man-days)

X₅ = capital (₦)

X₆ = chemicals (litres)

The resource use efficiency was calculated as follows;

$$r = MVP/MFC \dots \dots \dots (3)$$

Where:

MVP = value added to tomato output due to the use of an additional unit of input,

MFC = cost of unit of a particular resource

Decision rule

If r > 1 = resource is under utilization

If r < 1 = resource is over utilization

If r = 1 = resource is efficiently utilized

3. Results and Discussion

3.1 Cost and Return (Profitability)

In any production process cost are incurred in producing output and return are earned from the sale of such output.

Table 1: Average costs and return analysis of tomato farmers in Zuru Local Government.

Item	Average amount (₦)	% of Average
A Revenue	54050	
B Variable cost		
Seeds	287.1	3.05
Fertilizer	3835	40.84
Water rate	1477.9	15.74
Labour	1502.9	16.00
Agrochemical	826.7	8.80
Total Variable Cost (TVC)	7929.6	84.43
C Fixed costs		

Depreciation for hoe	148.4	1.58
Depreciation for cutlass	93.7	0.99
Depreciation hand fork	66.5	0.70
Depreciation for pumping machine	1019.5	10.87
Depreciation for basket	134.5	1.43
Total Fixed Cost (TFC)	1462.6	15.57
D Total Cost	9392.2	100.0
E Net farm income	44657.8	

Source: survey data 2012

Result in Table 1 shows that the average cost of production incurred by the respondents is (₦ 9392.2) per hectare.

The total variable costs (TVC) dominated the production cost with 84.43% of the total production cost while total fixed cost (TFC) explained the remaining 15.57% of the total production cost. This is in agreement with the finding of Baba (1998), Tsoho (2005) and kaka (2007) who also reported that total variable costs (TVC) dominated the total fixed cost in their respective studies.

Result in table 1 shows that average revenue for a typical farmer is ₦ 54050 and profit of ₦ 44657.8 is realized by a typical farmer. This shows that tomato farming under irrigation in the study area is profitable.

3.2 Regression Analysis of Tomato Production

Table 2 shows result of the linear production function obtained for tomato production under irrigation farming. The linear equation model was selected as the lead equation for the analysis of input – output relationship in tomato production. The selection of lead equation was based on the coefficient of determination (R^2), a prior expectation, statistical significant of estimated regression coefficient.

Table 2: Regression Analysis

Variables	Regression coefficient	Standard error	T. value
Yield of tomato (kg)	0.412	0.209	1.676*
Farm size (ha)	1.045	0.018	0.000***
Quantity of seed (kg)	0.865	0.028	0.018**
Quantity of fertilizer (kg)	0.218	0.455	0.402 ^{ns}
Labour (man-days)	0.656	0.372	1.485 ^{ns}
Agrochemicals (liters)	-0.466	0.182	-2.176**
Capital (₦)	0.121	0.059	1.749*
R^2	0.787		
Adj. R^2	0.769		

*** Significant at $P < 0.01$, ** Significant at $P < 0.05$ and * Significant at $P < 0.10$

Source: survey data 2012

The coefficient of R^2 is a measure of the degree at which the variable in the modal explain variation in the output. The R^2 for linear function for tomato farmers is 0.787 which implies that 78.7% of the variations in tomato production under irrigation was caused by the variations in the independent variables in the model.

The regression coefficient of farm size (ha), quantity of seed (kg) and capital (₦) were positive and statistically significant at 1%, 5% and 10% level of significant. This indicating that an increase in each of this variable would lead to the increase in the level of tomato production under irrigation farming and hence they were the determinant of tomato production in the study area. This implies that a change in level of use of any these variable will result in less than proportionate change in output of tomato. On the other hand, the regression coefficient of agro-chemical (liters) was negative but statistically significant at 5% level of significant indicating that a unit decrease in this input would lead to a decrease in the level of tomato production under irrigation farming. According to Justice and Theresa, (2010) conducted a study on Resource-use Efficiency in Tomato Production in the Dangme West District, Ghana find out that, hired labour, pesticide and farm size were observed to affect tomato output significantly and hence are the determinants of tomato production in the study area. Furthermore, Oluwatayo

et al., (2008) conducted a study on Resource Efficiency among tomato farmers in rural area in Ekiti State. The result of regression analysis showed that farm size, labour, pesticide, herbicides and fertilizer usage are positively related with tomato output and these variable are equally significant in determining the output of the farmers.

Resource Use – Efficiency

The economics of resource use efficiency in tomato production was determinate using the ratio of their marginal value product to the marginal factor cost.

Table 3: Resource Use – efficiency of Tomato Production under Irrigation in Zuru Local Government.

Variable	Bi	MVP/MFC
Farm size (ha)	1.045	2.857
Seed (kg)	0.865	0.704
Capital (₦)	0.121	0.661
Agrochemicals (liters)	-0.466	-1.301

Source: survey data 2012

Table 3 shows that MVP and MFC ratio of farm size was have MVP/MFC ratio of 2.8572, implying that farm size was under-utilizing and increasing the level of farm size will increase profit. While seeds, capital and Agrochemical has MVP/MFC ratio of 0.7042, 0.661 and -1.301 respectively were over-utilized. These implying that seeds, capital and Agrochemical were over utilize hence decreasing the quantity of seeds, capital and Agrochemical used will increase output and profit level. This implies that tomato farmers should increase their farm size and reduce quantity of seeds, capital and Agrochemical will thereby still increase their profit.

4. Conclusion and Recommendations

The study also revealed that a positive net farm income indicates that tomato production under irrigation in Zuru Local Government is a profitable venture. This means that tomato production has great potential to increase Agricultural production and household income, if efforts are made to increase the use of inputs that are being under and over utilize. Based on the finding of this study, it is recommended that inputs such as fertilizer labour, Agrochemical and capital should be made available to the farmers by Government. Effective extension services should also be extended for proper and effective resources-utilization. Government and other concerned stakeholders should give priority to provide efficient technical knowledge about good agricultural practice. Agricultural extension workers should be provided to disseminate research finding and educate tomato farmers on ways of increasing their productivity. Government should encourage production of tomato, since it is found as one of the profitable venture, thereby increase the rate of self-employed.

References

- [1] Afolami, C.A, Ayinde I.A (2002). Economics of Tomato Production in Yewa North Local Government Area of Ogun State: Nigeria. *Agro-Science, Journal Tropical Agriculture Food Environment Extension*, 1(1&2): 17-23.
- [2] Baba, K.M and Adedibu, B.A (1998). The Impact of Modern Small Scale Irrigation In Resource and Farm Income in Northern Worno Area of Sokoto State, Nigeria *Journal of Agricultural extension*, 7(2) 18-21
- [3] Cetin B, and A. Vardar (2008). An Economic Analysis of Energy Requirements and Input Costs for Tomato Production in Turkey. *Journal of Agricultural Research*, 4(5), 428–433.
- [4] Gona, A., I. Mohammed and L.Tanko (2009). Resource Use Efficiency of the Food Meal Industry in Sokoto State, Nigeria Proceeding of the 23rd Annual National Conference of farm Management Society of Nigeria, held at Usmanu Danfodiyo University Sokoto on 14th – 17th December pp 57- 62.
- [5] Kaka, Y. (2007). Efficiency of resource use in Hungry rice production in Arewa Local government area, Kebbi State. *An unpublished MSc dissertation submitted to the Department of Agricultural Economics and Extension, Usmanu Danfodio University, Sokoto.*
- [6] Olukosi, J.O., and O.A. Ogungbile (2005). *Introduction to Agricultural Production Economic: Principle and Application*, Agitab publishers, Ltd. Zaria p 112.
- [7] Shankara, Naika.,Joep van Lidt de Jeude., Marja de Goffau., Martin Hilmi., Barbara van Dam.(2005) Cultivation of Tomato Production, Processing and Marketing. Cultivation of Tomato © Agromisa Foundation and CTA, Wageningen Agromisa: 90-8573-039-2 CTA: 92-9081-299-0
- [8] Tsoho, B. (2005) Economic of Irrigation Farming in Nigeria A case study of Tomato Based Farming in Sokoto State, Nigeria. *International Journal of Agricultural Rural Development* 6, 103 – 110.
- [9] World Bank, (2001) Nigeria National Fadama Development Program II: Proposal for Project Development Fund (PDF), Block B Grant.