

## PROFITABILITY OF PEPPER PRODUCTION IN DERIVED SAVANNAH ZONE OF OGUN STATE, NIGERIA

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### Abstract

*This study examined the profitability of pepper production in Ogun State, Nigeria. The study was based on primary data collected from 120 pepper farmers using a multistage sampling technique. Data collected were analysed using descriptive statistics and budgetary analysis. The results revealed that 85.0% of the sampled farmers were males with a mean age of 43 years and mean pepper farming experience of about 12 years. Majority (84%) of the respondents were married, 67% were natives, 48% had household size of 6 to 10 members and with mean household size of 8 persons. Majority (77%) of the respondents cultivated between 0.10ha and 1.54ha of land with a mean farm size of 1.23ha. This study also revealed that about 58% of the pepper farmers financed their production from personal savings. The major constraints to pepper production among the sampled farmers were inadequate viable and disease-resistant seeds (84%), inadequate transportation (91%) and inadequate access to finance/credit (91%). The budgetary analysis per hectare revealed that the sampled pepper farmers incurred ₦228,293.06 (US\$1,521.95) and ₦9,765.49 (US\$65.10) on variable and fixed cost items respectively and earned a revenue of ₦622,847.56 (US\$4,152.32) as well as a profit of ₦251,496.09 (US\$1,676.64) per ha/season. Pepper production had a return on investment of 2.62. Thus, pepper production was found to be a profitable enterprise considering the profit realised by the farmers in the study area. The study recommended that policies should be implemented by government to provide financial assistance to farmers in order to access adequate farm resources and expand the existing scale of production. Good and accessible roads should be constructed to facilitate movement of farm inputs and pepper produce.*

**Key words:** Pepper, Production, Profit, Constraints, Derived Savannah.

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### Introduction

Pepper is an important agricultural crop not only because of its economic importance but also due to the nutritional and medicinal value of its fruits as well as being an excellent source of natural colours and antioxidant compounds (Howard *et al.*, 2000). It is the world's second important vegetable, ranking after tomatoes and it is the most produced type of spice flavouring and colouring for food while providing essential vitamins and minerals. The nutritional value of pepper merits special attention. It is a rich source of vitamins A and E. Both hot and sweet peppers contain more vitamin C to prevent flu colds than any other vegetable crop (Bosland and Votava, 2000). In many households, pepper provides the only needed flavour to enhance intake of otherwise bland diets. Rubatzky and

Yomaguchi (1997) pointed out, in addition to the uses of pepper as food, that pepper is used for cosmetic production, condiment and medicine as well as ornamentals in gardens.

Gruben and Tahir (2004) pointed out that Food and Agriculture Organization (FAO) statistics estimated world production of *Capsicum* peppers in 2001 at 21.3 million tonnes from a harvested area of 1.6 million ha (i.e. an average yield of 13.4 t/ha).

Comparatively, yield in the developing countries is about 10 – 30% of that in developed countries (Erinle, 1989; Grubben and Tahir, 2004). However, Nigeria is known to be one of the major producers of pepper in the world accounting for about 50% of the African production and the major area of production is Northern Nigeria (Business day, 2007; Erinle, 1989). High potential pepper producing areas of Nigeria such as Kaduna, Kano, Jigawa, Katsina, Sokoto, Plateau and Bauchi States (most of which also lie within the derived savannah zone) produce enough pepper to meet the needs of the people in the deficit areas (e.g. Southwest i.e. Ogun, Oyo, Ondo, Osun, Ekiti and Lagos States). Although, pepper is widely cultivated throughout Nigeria, yields obtained by peasant farmers are often very low (Adigun, 2001).

Pepper production in Ogun State is not unconnected with the climatic condition and day length while the moisture content of the soil and the prevailing temperature has important effects on the growth and yield of the crop. In general, the maximum growth and production of pepper occur between a temperature range of 18°C and 30°C (Grubben and Tahir, 2004), in a loam or silt loam soil with good water-holding capacity (but also on many soil types as long as the soil is well drained) and the soil pH between 5.5 and 6.8 (Berke *et al.*, 2005).

Consumption of pepper accounts for about 20% of the average vegetable consumption per person per day in Nigeria (Erinle, 1989; Alegbejo, 2002). It is used extensively in food flavouring in the daily diet of over 120 million Nigerians irrespective of their socio-economic status. It is used in the preparation of soup and stew, which are among the major essential complements of staple foods based on cereals and root crops and also forms remedies for toothache and sore throat (Leung and Foster, 1996; Bosland, 1994).

Therefore, the aim of the study is to evaluate the profitability of pepper production among farmers in the study area. It is expected to bridge the knowledge gap on the production of pepper in the derived savannah zone of the State which is an emerging zone of pepper production in the country.

### **Objectives**

The broad objective of the study is to evaluate the profitability of pepper production in derived savannah zone of Ogun State, Nigeria.

The specific objectives are to:

- i. describe the socio-economic characteristics of pepper farmers in the study area;
- ii. assess pepper planting methods;
- iii. estimate profitability of pepper production in the study area;
- iv. identify constraints to pepper production in the study area;

### **Methodology**

#### **Description of the Study Area**

The study area is Ogun State and it is located in the Southwest geo-political zone of Nigeria. It was carved out of the defunct Western State on February 3, 1976 by the then Federal Military Government of Late General Murtala Ramat Muhammed. It is located within the tropics, bounded in the west by Benin Republic, in the east by Ondo State, in the south by Lagos state and the Atlantic Ocean, and in the north by Oyo and Osun states. It is situated between Latitude 6.2°N and 7.8°N and Longitude 3.0°E and 5.0°E. It has a total land area of 16,409.26 square kilometres. It has an estimated population of 3, 728,098 (National Population Census, 2006).

The climate follows tropical pattern, with the raining season starting about March and ending in November, followed by dry season. The greater proportion of the state lies in the tropical rain forest zone with a sizable feature of guinea savannah in the far northern area of the state. The average monthly temperature ranges from 23°C in July to 32°C in February. The vegetation in the northern part of the state is mainly derived savannah vegetation, while the Central part falls in the rain forest belt. The southern part of the State has mangrove swamp. This climate favours the cultivation of pepper.

The people are predominantly farmers, most of who engage in cultivation of arable crops such as cassava, yam, maize, rice, okra vegetables and pepper, while some engage in livestock production such as piggery, poultry and fish farming. Others are involved in quarry business, artisan works, handicraft such as tie and dye and pottery as well as trading.

### **Methods of Data Collection**

Primary data were used for the study. These were obtained through administration of questionnaire to pepper farmers in the study area. The questionnaire contained pertinent questions that border on production pattern and inputs as well as some socio-economic characteristics of the producers.

### **Sample size and Sampling Technique**

One hundred and twenty (120) pepper farmers in the study area were selected using multistage sampling technique. The first stage involved purposive selection of two Local Government Areas (i.e. Odeda, and Yewa North) given their prominence in pepper cultivation due to the climatic conditions of these areas; this is based on the information provided by the Ogun State Agricultural Development Programme (OGADEP). The second stage was the random selection of 12 villages in each of the two selected Local Government Areas using the list of villages available at OGADEP. The third stage involved random selection of 5 pepper farmers in each of the 24 villages, thus giving a sample size of 120.

### **Analytical Tools/Techniques**

The following analytical tools were employed in the analysis.

- (i) **Descriptive statistics:** the uses of frequency distributions and percentages, as well as mean distributions were adopted to describe the socio-economic characteristics of pepper farmers, describe pepper planting pattern and constraints to pepper production in the study area.
- (ii) **Budgetary Analysis:** Analysis of costs and returns was used to estimate the costs and returns while gross and net margins as well as rate of return to investment were used to measure profitability of pepper production in the study area.

Costs are expenses incurred in the operations of a production unit. Variable cost items included seeds, labour, fertilizer and cost of pesticides. The fixed cost items included sprayers, hoes, cutlasses, baskets and land. The depreciated values of the fixed cost items were also estimated. However, revenue is the price per unit output multiply by quantity of output. The gross margin of an enterprise gives the profit that is likely to be obtained from the production process.

Net profit ( $\pi$ ) = Total Revenue (TR) – Total Cost (TC)

Gross Margin (GM) = Total Revenue (TR) – Total Variable Cost (TVC)

Rate of Returns (ROR) = (TR/TC)

Rate of Return to Investment (RORI) = (NM/TC)

## **Results and Discussion**

### **Socio-economic Characteristics of Pepper Farmers, Planting Methods and Farm Related Variables**

The study revealed that 39.2 percent of the sampled pepper farmers were within the age range of 36 to 45 years (Table 1). This age range falls within active economic age group and the mean age of 43 years implies that majority of the sampled pepper farmers were middle aged.

Also, majority (85.0 percent) of the sampled respondents were male while 15.0 percent were female. This implies that pepper production is male dominated in the study area. This may be because majority of the women find attraction in pepper preservation, processing and marketing activities as alternative options which are important operations in the pepper value chain. The study also revealed that majority (84.2 percent) of the respondents were married and this implied that more labour will be employed in pepper production.

The study also identified the distribution of respondents by farming experience and showed that an average farmer had about 12 years experience in pepper farming. This is an indication that the farmers possess a substantial wealth of experience which could improve pepper production in the study area. The study also revealed that a mean farm size of 1.23 hectares was cultivated by the respondents. This shows that pepper farming in the study area was mostly on small-holdings. This may influence the adoption technology, scale of production, output level as well as revenue accruable to pepper farmers.

Furthermore, from the results obtained in the study, 88.3 percent of the farmers practiced crop rotation while 11.7 percent did not. This may be due to annual nature of the crop and the disposition of the pepper farmers to pepper production. According to Table 1, the planting methods practised by the farmers shows that majority (62.5 percent) of the farmers practised sole cropping, 35.0 percent practised intercropping while 2.5 percent practised both. The intercropping system practised by pepper farmers could help them diversify farming activities, a situation which could increase accruable total farm revenue.

As evident from Table 1, 25.8 percent of the sampled farmers engaged in pepper production with the main objective of income generation. The objective of meeting the farm-family needs was indicated by 9.2 percent of the respondents while 65.0 percent indicated income as well as meeting the farm-family needs objectives (Table 1). Thus it can be opined that farmers engage in pepper production in order to meet family needs and to have enough income for their upkeep.

**Table 1: Distribution of Pepper Farmers by Personal and Farm Characteristics**

<i>Variables</i>	<i>Frequency</i>	<i>Percent</i>	<i>Mean</i>
<i>Age (years)</i>			
26 – 35	34	28.3	
36 – 45	47	39.2	
46 – 55	21	17.5	
56 – 65	12	10.0	
66 – 71	6	5.0	
<b>Total</b>	<b>120</b>	<b>100.0</b>	<b>43.04</b>
<i>Gender</i>			
Male	18	15.0	
Female	102	85.0	
<b>Total</b>	<b>120</b>	<b>100.0</b>	
<i>Marital Status</i>			
Married	101	84.2	
Single	11	9.2	
Widowed	4	3.3	
Divorced	4	3.3	
<b>Total</b>	<b>120</b>	<b>100.0</b>	
<i>Pepper Farming Experience (Years)</i>			
1-10	80	66.7	
11-20	32	26.7	
21-30	1	0.8	
31-40	4	3.3	
> 40	3	2.5	
<b>Total</b>	<b>120</b>	<b>100.0</b>	<b>11.63</b>
<i>Farm Size (Hectares)</i>			
0.1 - 1.54	92	76.7	
1.55 - 2.54	19	15.8	
2.55 - 3.54	3	2.5	
3.55 - 4.54	3	2.5	
4.55 - 5.54	2	1.7	
>5.55	1	0.8	
<b>Total</b>	<b>120</b>	<b>100.0</b>	<b>1.23</b>
<i>Plot Rotation</i>			
Yes	106	88.3	
No	14	11.7	
<b>Total</b>	<b>120</b>	<b>100.0</b>	
<i>Planting Methods</i>			
Sole cropping	75	62.5	
Intercropping	42	35.0	
Both	3	2.5	
<b>Total</b>	<b>120</b>	<b>100.0</b>	
<i>Objective of Cultivating Pepper</i>			
Income only	31	25.8	
To meet family needs	11	9.2	
Both	78	65.0	
<b>Total</b>	<b>120</b>	<b>100.0</b>	

Source: Field Survey 2010

### **Estimation of Profitability of Pepper Production in the Study Area**

Table 2 shows the gross margin in Naira per ha/season and the various cost of inputs used in pepper production for the pepper intercrop and sole pepper. The break down of the total costs and returns to pepper farmers in the study area is as shown in Table 2. The pepper farmer (in pepper enterprise combination) incurred a total cost of ₦238,058.55 (US\$1,587.06) and earned a total revenue of ₦622,847.56 (US\$4,152.32). Consequently, the pepper farmer realized a profit of ₦251,496.09 (US\$1,676.64) per ha. The total variable cost and total revenue for pepper-intercrop enterprise per farmer per production season was ₦228,293.06 (US\$1,521.95) and ₦622,847.56 (US\$4,152.32) respectively while the gross margin per farmer was ₦257,878.76 (US\$1,719.19) per ha/season. However, the pepper farmer (in sole pepper enterprise) incurred a total cost of ₦180,909.01 (US\$1,206.06) and earned a total revenue of ₦562,570.90 (US\$3,750.47). Consequently, the pepper farmer realized a profit of ₦397,564.46 (US\$2,650.43) per ha. The total variable cost and total revenue for sole pepper enterprise per farmer per production season was ₦171,143.52 (US\$1,140.96) and ₦562,570.90 (US\$3,750.47) respectively while the gross margin per farmer was ₦407,736.85 (US\$2,718.25) per ha/season. However, there was no significant difference in the gross margin and profit of the two enterprises (Table 3).

The Rate of Returns (ROR) value of 2.62 means that every ₦1 (US\$0.006) (i.e. at ₦150 (US\$1)) invested in pepper-intercrop enterprise in the study area returns a revenue of ₦2.62 (US\$0.017) (i.e. at ₦393 (US\$2.55)) to the farmer while the Rate of Returns (ROR) value of 3.11 means that every ₦1 (US\$0.006) (i.e. at ₦150 (US\$1)) invested in sole pepper production in the study area returns a revenue of ₦3.11 (US\$0.021) (i.e. at ₦466.50 (US\$3.15)).

**Table 2: Gross and Net Margin per Production Season of Pepper Farmers in Ogun State**

<i>Variable</i>	<i>Pepper Intercrop</i>	<i>Pepper Sole</i>
<b>Total Revenue</b>	<b>622,847.56</b>	<b>562,570.90</b>
<b>Variable Cost</b>		
Cost on Land	12747.14	10654.88
Cost of Seed	9,269.57	4,804.04
Labour Cost	197,695.27	148,583.34
Insecticide Cost	1,644.20	1,463.14
Fertilizer Cost	6,936.88	5,638.13
<b>Total Variable Cost</b>	<b>228,293.06</b>	<b>171,143.52</b>
<b>Fixed Cost (Depreciated)</b>		
Hoe	489.99	489.99
Cutlass	963.23	963.23
Knapsack sprayer	3361.73	3361.73
Bowls	262.57	262.57
Basket	271.99	271.99
Gloves	24.64	24.64
Others	4391.34	4391.34
<b>Total Fixed Cost</b>	<b>9,765.49</b>	<b>9,765.49</b>
<b>Total Cost</b>	<b>238,058.55</b>	<b>180,909.01</b>
<i>GM/Season (₦)</i>	<i>394,554.50</i>	<i>391,427.38</i>
<b>GM/ha/Season (₦)</b>	<b>257,878.76</b>	<b>407,736.85</b>
<i>NM/Season (₦)</i>	<i>384,789.01</i>	<i>381,661.89</i>
<b>NM/ha/Season (₦)</b>	<b>251,496.09</b>	<b>397,564.46</b>
<b>ROR</b>	<b>2.62</b>	<b>3.11</b>
<b>RORI</b>	<b>1.62</b>	<b>2.11</b>

NB:- 1  $\Rightarrow$  Student-t calculated value, 2  $\Rightarrow$  Probability ( $\alpha$ ) value.

Source: Field Survey 2010

**Table 3: Profitability Differentials between Sole Pepper and Intercrop of Pepper Farmers in Ogun State**

<i>Statistic</i>	<i>Pepper Intercrop</i>	<i>Pepper Sole</i>	<i>Decision</i>
<i>Df</i>	119		-
<i>GM/ha/Season (₦)</i>	257,878.76	407,736.85	<i>Reject H<sub>a</sub></i>
<i>t-cal</i>	1.40		
<i>Prob.</i>	0.17		
<i>NM/ha/Season (₦)</i>	251,496.09	397,564.46	<i>Reject H<sub>a</sub></i>
<i>t-cal</i>	1.35		
<i>Prob.</i>	0.18		

NB: *t-cal*  $\Rightarrow$  Student-t calculated value; \*\*\*Sig. at 1%, \*\*Sig. at 5%, \*Sig. at 10%.

### **Description of Pepper Farmers according to Constraints in Pepper Production**

Table 4 shows that majority (84.2 percent) of respondents had problems in sourcing for inputs such as viable and disease resistant seeds, fertilizer, pesticides and insecticides for improved crop establishment and to combat pests and diseases outbreak. In order to address these problems, a mechanism ensuring availability of inputs should be instituted by the government given the time bound nature of pepper farming so that production and productivity may be improved. Majority (67.0 percent) of the respondents were faced with problem of pests and diseases attack. This implies that there will be reduction in yield and income accruable to the pepper farmers if this problem is not tackled.

With respect to transportation, majority (90.8 percent) of the farmers did have problem of transportation. This, according to them, was due to bad roads leading to high cost of transportation which could be contributing to problems in sourcing for improved/hybrid seeds and fertilizer.

Problems of inadequate storage of pepper also abound in the study area. About 87 percent of the farmers had problems in storing their produce (Table 4). This problem could be addressed if research in agricultural engineering and food technology could be focused on viable methods of storing pepper. According to the respondents, it was reported that due to perishable nature of pepper, produce from pepper farming are stored mostly for consumption purposes. Processing is only in the form of parboiling with palm oil after which the pepper is sun-dried in order to reduce the water content that aid perishability but the sun-dried pepper seeds could not be used in production due to the termination of the life of the living cells of the pepper fruit.

Credit is one of the essential ingredients in agricultural production. It helps to improve capacity utilisation and also provide opportunity for purchase of adequate inputs for more efficient production. It can also be used to expand farm business to take advantage of economies of scale as well as acquisition of new technologies and payment for hired labour and related services. It is also needed to acquire capital assets like farm machinery and equipment and for working capital to purchase improved seedlings, fertilizer and agrochemicals. About 91 percent of the farmers had problem of finance/credit (Table 4). This implies that inputs and benefits e.g. acquisition of production inputs, transportation, pests and diseases control may be difficult to be obtained by the respondents. Problems encountered in pepper production had significant ( $p < 0.01$ ) influence on the returns (i.e. gross and net margins) in pepper enterprises (Table 5).



**Table 4: Distribution of Respondents by Constraints in Pepper Production**

<i>Problems</i>	<i>Frequency</i>	<i>Percent</i>
<i>Input Supply/Production Cost</i>		
Yes	101	84.2
No	19	15.8
<b>Total</b>	<b>120</b>	<b>100.0</b>
<i>Disease/Pest</i>		
Yes	80	66.7
No	40	33.3
<b>Total</b>	<b>120</b>	<b>100.0</b>
<i>Transportation</i>		
Yes	109	90.8
No	11	9.2
<b>Total</b>	<b>120</b>	<b>100.0</b>
<i>Storage</i>		
Yes	104	86.7
No	16	13.3
<b>Total</b>	<b>120</b>	<b>100.0</b>
<i>Financial/Credit</i>		
Yes	109	90.8
No	11	9.2
<b>Total</b>	<b>120</b>	<b>100.0</b>

*Yes indicates those that were faced with the problems while No indicates those that were not faced with the problems*

**Source: Field Survey 2010**

**Table 5: Influence of Production Constraints on Pepper Returns**

<i>Variable</i>	<i>Statistic</i>	<i>df</i>	<i>x<sup>2</sup></i>	<i>Prob.</i>	<i>Decision</i>
<i>GM/ha/Season (₦)</i>	665,615.61	42	71.49***	0.003	Reject <i>H<sub>o</sub></i>
<i>NM/ha/Season (₦)</i>	649,060.55		74.87***	0.001	Reject <i>H<sub>o</sub></i>

*x<sup>2</sup> ⇒ Chi square; \*\*\*Sig. at 1%, \*\*Sig. at 5%, \*Sig. at 10%.*

### **Conclusion and Recommendation**

Pepper farming is a profitable enterprise in the study area considering the profit realised by the farmers as indicated by the Rate of Returns (ROR) value of 2.62 and 3.11 realised from pepper-intercrop enterprise and sole pepper production respectively which means that every ₦1 (US\$0.006) invested in pepper-intercrop enterprise in the study area returns a revenue of ₦2.62 (US\$0.017) and ₦1 (US\$0.006) invested in sole pepper production in the study area returns a revenue of ₦3.11 (US\$0.021) to the farmer despite the various constraints being faced by the farmers. However, since there is no significant difference in returns for the two enterprises, pepper production irrespective of the enterprise (either sole or pepper intercrop enterprise) is profitable in the study area. Furthermore, the problems identified by the farmers had adverse effect on the profitability of pepper production.

Given that access to credit is a factor that improves production, credit supply schemes by banks under an arrangement of low interest rate and reduced bureaucracy will boost pepper production. Also, policies should be devised and implemented by the (Ogun) State Government to provide financial assistance, incentive, empowerment programme and training with minimum collateral requirements and appreciable payback period so that they can access adequate farm resources and expand the existing scale of production. Credit should be augmented by effective and efficient basic inputs supply system to provide inputs like fertilizer, insecticides, and pesticides at subsidized rates and this should be delivered in good time given the time bound nature of pepper farming to farmers in order to access adequate farm resources and expand the existing scale of production.

## References

- Adigun, J.A.: Influence of intra-row spacing and chemical weed control on the growth and yield of chilli pepper (*Capsicum frutescens L.*) in the Nigerian Northern Guinea Savannah. *Nigerian Journal of Horticultural Science* 5: (2001) 67-73.
- Alegbejo, M. D: Evaluation of Pepper Cultivars for Resistance to Pepper Veinal Mottle Polyvirus in Northern Nigeria. *Journal of Arid Agriculture* 12: (2002) 93-103
- Berke, T., Black, L.L., Talekar, N.S.*et al*, Wang, J.F., Gniffke, P., Green, S.K., Wang, T.C., and R. Morris: "Suggested Cultural Practices for Chili Pepper." In: International Co-operator's Guide, AVRDC—The World Vegetable Centre. Ed. T. Kalb. P.O. Box 42, Shanhua; Taiwan 74199; ROC (2005)
- Bosland, P.W. and Votava E.J.: *Pepper: Vegetable and Spice Capsicum*. CABI publishing, New York, (2000) Pp. 1-16
- Bosland, P. W.: Chiles: History and uses. In: G Charalambous (ed), spices, herbs and edible fungi. Elsevier publication, New York (1994) pp 366
- Businessday (2007): Producing pepper for export market 2007: [www.businessdayonline.com](http://www.businessdayonline.com)
- Erinle, I.D.: "Present status and prospects for increased production of tomato and pepper in Nigeria." In: AVEDC Ed. Proc. Inter. I Sympt. *Integrated Management Practices* (1989) 536-547.
- Grubben, G. J. H. and Tahir I. M.: Capsicum species, In: Grubben, G. J. H. and Denton, O. A. (Editors). Plant Resources of Tropical Africa 2, Vegetables PROTA Foundation, Wageningen, Netherlands/Backhugs Publishers, Leiden, Netherlands/ICTA, Wageningen, Netherland, (2004) Pp 154–163. (<http://www.prota4u.org/protav8.asp>)
- Howard, L. R., Talcott, S. T., Brenes, C.H. and Villalon B.: Changes in phytochemical and antioxidant activity of selected pepper cultivars (*Capsicum sp.*) as influenced by maturity. *Journal of Agriculture and Food Chemistry*, 48: (2000) 1713- 1720.
- Leung, A. Y. and S. Foster (1996): *Encyclopaedia of common natural ingredients used in food, drugs and cosmetics*, 2nd edition, New York: John Wiley and sons Inc.
- National Bureau of Statistics (2009): *Annual Abstract of Statistics*. Abuja, Nigeria. [www.nbs.gov.ng](http://www.nbs.gov.ng).
- Rubatzky, V. and Yomguchi, M. (1997): *World Vegetables* 2<sup>nd</sup> Edition. International Thomson Publishing, USA. pp. 553-562.