

## Economic evaluation of agroforestry practices in Ogun State, Nigeria

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### Abstract

Evaluation of the economic aspects of agroforestry provide basis for estimating financial needs and feasibility, highlights trade-offs between multiple benefits and monitors economic efficiency in a given agroforestry system. This study evaluated the economic aspect of selected agroforestry practices in Ogun State, Nigeria. Multistage sampling technique was used to select 240 respondents involved in agroforestry practices from four agricultural zones in Ogun State (Abeokuta, Ilaro, Ikenne and Ijebu-Ode). Data were collected with the aid of structured and pre-tested questionnaire administered interpersonally to the respondents. Data were analyzed using descriptive statistics and cost and returns analysis. The mean age of the agroforestry farmers was 53 years; and the majority (76.7%) was male; married (89.6%), the average household size of six. Most of the respondents (64.5%) funded their farms from personal savings. The mean farming experience was 19 years and the mean farm size was 2.4 ha; while 68.8% acquired their lands through inheritance. Seven agroforestry practices were identified in the study area, out of which 'scattered trees on farmland' was predominantly practiced (77.5%) when prioritized according to the level of participation. The cost and returns analysis revealed that in all zones (pooled) the total revenue (TR) generated from agroforestry products was ₦411,135.40 (\$2,055.70) and the net profit was ₦190,229.90 (\$951.20). In each zone TR and net profits were Abeokuta [₦467,879.17 (\$2,339.40) and ₦296,369.62 (\$1,481.80)]; Ijebu-ode [₦284,049.17 (\$1,420.30) and ₦134,426.57 (\$672.10)]; Ilaro [₦566,566.67 (\$2,832.80) and ₦244,207.39 (\$1,221.00)] and Ikenne [₦326,046.67 (\$1,630.00) and ₦124,266.98 (\$621.00)] per hectare respectively. Conclusively, agroforestry practices were found to be profitable and capable of providing rural employment and contribute to food security in the study area.

**Key words:** Costs and returns; Trade-offs; Profitability; Prioritization.

### Introduction

In spite of the dominant roles of the petroleum sector as the major foreign exchange earner, agriculture remains the mainstay of the Nigerian economy. Apart from the sector's contribution to the Gross Domestic Product (GDP), it is also the largest non-oil export earner, a key contributor to wealth creation and poverty reduction as well as the largest employer of labour in the country (Ladipo 2010). According to Azeez (2002), a large percentage of Nigeria's populations derive their income from agriculture and agriculture-related activities in which over 75% of rural inhabitants are farmers. However, over the years, the growth rate in agricultural production has stagnated and has failed to keep pace with the needs of the rapidly growing population, resulting in a progressive rise in import bills for food. This has resulted in

a wide gap between demand for and supply of food (CBN 2005).

As a result, productivity in agriculture is far from satisfactory. Within the last two decades, yields from various crops have not been commensurate with the expected level, using the same amount of input. Literature abound, showing substantial decline in yield of crops over the years (Phillip 2005). This was also reflected through the decline in the contribution of agriculture to the GDP which in the early years of independence was about 60 and 80% of export earnings then, were accruable to agriculture but in today's agriculture, the Nigerian agricultural sector accounts for a third of the GDP and < 1% of export earnings (Sanni 2005).

Evaluation of the economic aspects of agroforestry provides a basis for estimating financial needs and feasibility, highlights trade-offs between multiple benefits and monitors economic efficiency. Economic budgeting is a very flexible process but effective application of budgets requires an understanding of the commodity, practice or system to which it is being applied. Agroforestry poses some unique economic budgeting problems because it involves multiple enterprises with varying production cycles, such as trees, agronomic crops, forages and/or livestock (Godsey 2008).

First, unlike most agricultural commodities, agroforestry has a "planning horizon" of greater than one season due to the tree component. A "planning horizon" is simply a time period in which all costs and revenues for a given practice are realized. For soybeans, a planning horizon may be six months to a year. For agroforestry, a simple planning horizon may be as long as 6-8 years when the wood values of trees are taken into consideration (Godsey 2008).

Secondly, because of the long planning horizon of agroforestry practices, many of the revenues and costs do not occur at regular or predictable intervals throughout the entire planning horizon, but are irregular in occurrence.

Finally, because agroforestry practices typically incorporate a fixed tree component with a crop or livestock component, the crop or livestock component may change over time. For example, an alley cropping practice in US may start out as soybeans (*Glycine max*) grown between rows of eastern black walnut (*Juglans nigra*) trees, but by the time the trees are producing nuts, hay may be the crop grown between the rows of trees because more of a mat is required to harvest the nuts (Godsey 2008).

In spite of the immense contributions of agroforestry practices to household economy in terms of food and fibre production, little information is available about its economic profitability. Hence the study intends to bridge this gap by carrying out a budgetary analysis to provide information on the profitability of the agroforestry practices in Ogun State, Nigeria.

## Material and methods

### Study area

The study area is Ogun State, otherwise known as the Gateway State, that was created out of the former Western State of Nigeria on February 3, 1976 and the State capital is Abeokuta. Ogun State is situated within the tropics, with a total land area of 16,409.26 km<sup>2</sup>, lies within latitude 6°20' and 7°58' in the tropics and longitude 2°40' and 4°35' East of the Greenwich Meridian, and has an estimated population of 3,728,098 people (NBS 2009) of which 67% were farmers (OGADEP 1998). Ogun State shares boundaries with Lagos State in the south, Republic of Benin in the west, Ondo State in the East and Oyo State in the north. Ogun State is politically stratified into 20 Local Government Areas (LGAs). Its natural resources include extensive fertile soil suitable for agriculture, rivers, rocks, lagoons, mineral deposits and an ocean front (Kareem 2003). The State has vegetation ranging from derived savanna to rain forest. The climate follows the usual tropical pattern, with the rainy season starting around March and ending around November each year, followed by a dry season which makes it easy for the production of major agronomic crops in the State. Such major crops include cassava (*Manihot esculentum*), maize (*Zea mays*), rice (*Oryza sativa*), kolanut (*Cola acuminata*), melon (*Citullus lanatus*), fruit and leafy vegetables. The State predominated by Yorubas with dialects which bring about the distinguishable features among the inhabitants, which include the Egbas, Egbados (Yewa), Remos, Ijebus as well as Eguns. There are also some natural endowments such as Olumo rock, Yemoji waterfalls etc.

### Analytical techniques

This study was based on both primary and secondary data. The primary data were obtained through the administration of a structured questionnaire on the respondents. Information collected was supplemented with secondary data which was obtained from journals, monographs, and data from Central Bank of Nigeria (CBN 2005) and Food and Agricultural Organization data bank (FAOSTAT). Multistage sampling technique with a four stage design was used to collect data for this study. 60 farmers were selected randomly from each agricultural zones (Abeokuta, Ilaro, Ikenne and Ijebu-ode) which gave a total of 240 for the study. A structured questionnaire was used to elicit relevant data from the farmers. The schedule of sampling of respondents is presented in Table 1.

### Budgetary tool

Costs and return analysis was used to determine the profit to agroforestry production in the Ogun State.

$$\pi = TR - TC.$$

Where:  $\pi$  = Profit (₦).

TR = Total revenue (₦) given as  $P_y \cdot Y$ .

Where:  $P_y$  = price/ unit of agroforestry product.

Y = output (kg).

TC = Total cost in (₦) is given as: TFC + TVC.

Where: TVC = Total variable cost (₦). TFC = Total fixed cost.

Total Fixed Cost items were depreciated using the straight line method, which assumes a salvage value of zero, for ease of computation. The fixed cost items include: saws, cutlasses, diggers, hoes and tools used in production. While

the variable cost items include: transportation, site preparation, seedling and planting costs.

Table 1. Sampling plan of Ogun State, Nigeria, 2013.

Zones	Blocks	Cells	Sample sizes
Ilaro (60)	Imeko	Imeko (10), Ayetoro (10), Ilaro (10)	30
	Ado-odo	Ado-odo (10), Atan-ota (10), Igbesa (10)	30
Ijebu-ode (60)	Isoyin	Isoyin (10), Atan (10), Ijebu-ode (10)	30
	Ago-Iwoye	Ago-Iwoye (10), Oru (10), Odosenlu (10)	30
Abeokuta (60)	Olorunda	Olorunda (10), Papa (10), Imala (10)	30
	Ilugun	Odeda (10), Olodo (10), Osiele (10)	30
Ikenne (60)	Isara	Isara (10), Imagbon (10), Orile-oko (10)	30
	Obafemi	Obafemi (10), Kajola (10), Ajebo (10)	30

### Multistage:

Stages → Division of the zones into four to produce primary selection units.

Stage 1: Produce primary selection units → zones (4) – Abeokuta, Ilaro, Ikenne and Ijebu-ode.

Stage 2: Zones → Blocks; 2 blocks were purposively selected from each zone.

Stage 3: Blocks → Cells; 3 cells were purposively selected from each block.

Stage 4: Simple random selection of 10 respondents from each cell which gave a total of 240 respondents.

## Results and discussion

### Socio-economic characteristics of respondents

The socio-economic characteristics of the respondents were expected to impact on the productivity levels of the agroforestry farmers.

A proportion of the agroforestry farmers (23.8%) were in the age group of 41-50 years with a mean age of 53 years (Table 2). This implies that most of the farmers were in the productive and economically-active age range.

Majority of the agroforestry farmers (76.7%) were male while the remaining 23.3% of the respondents were female. This is an indication that men were more involved in agroforestry practices than women in Ogun State. These finding agreed with other studies that farming is more of men's occupation in southwest Nigeria (Ekunwe and Orewa 2007; Adebooye et al. 2010).

Majority of the respondents (89.6%) were married, 5% widowed, and 3.3% were divorced while the remaining 2.1% were singles. This implies that most of the farmers were married and this could serve as support for increased farm productivity because of the access to family labour (*a priori expectation*). It is also an indication that farming can be passed to oncoming generations.

Almost half of the respondents (41.7%) had family size of four to six members and 28.3% had seven to nine members in their households. Also 17.1% of the respondents had 10 and above members while the remaining 12.9% had 1- 3 members in their households. The mean household size was six people.

A proportion of the respondents (39.6%) had primary school certificate; 38.8% had no formal education while 14.2% had secondary school certificate. Only 4.6% of the respondents had tertiary education; 1.7% had adult education while 1.2% had teachers' certificate. This shows

that education influenced adoption of innovations, which in turn influence productivity level. Majority of the respondents (64.5%) funded their farms from personal savings, 30% from *Esusu* (group contributions), while 21.2% funded from cooperative society and only 2.1% sourced fund through bank loan.

This implies that major source of fund is personal savings because of the difficulty encountered in securing cooperative loans and lack of collateral to secure bank loans. This might have a negative effect on the efficiency of production of the farmers because they would not be able to practise on a large scale because of the available fund since

increased scale of production leads to greater efficiency and profitability.

Majority (64.9%) of the respondents had more than 20 years of experience in agroforestry practices, 21.7% had experiences of between 11 to 20 years while 9.2% had 5 to 10 years of experience and only 4.6% had less than 5 years of experience in farming. The average farming experience was 19 years. This implies that majority of the respondents have adequate experience in farming as similarly reported by various studies which agreed that an increasing farming experience boost productivity of farmers (Adeleke et al. 2008; Hassan and Nhemachena 2008; Olafemi et al. 2013).

Table 2. Socioeconomic characteristics of respondent agroforestry farmers in Ogun State, Nigeria, 2013.

Characteristics	Frequency	Percent (%)	Mean / mode
Age (years)			
21 – 30	12	5.0	
31 – 40	51	21.2	
41 – 50	57	23.7	
51 – 60	52	21.7	
61 – 70	42	17.5	
71 -80	21	8.8	
81 and above	5	2.1	
Total	240	100.0	53 year
Gender			
Female	56	23.3	
Male	184	76.7	
Total	240	100.0	Male
Marital status			
Single	5	2.1	
Married	215	89.6	
Divorce	8	3.3	
Widowed	12	5.0	
Total	240	100.0	Married
Household Size			
1 – 3	31	12.9	
4 – 6	100	41.7	
7 – 9	68	28.3	
10 and above	41	17.1	
Total	240	100.0	6 people
Educational level			
Tertiary education	11	4.6	
Teachers' college	3	1.2	
Secondary school	34	14.2	
Adult education	4	1.7	
Primary school	95	39.5	
No formal education	93	38.8	
Total	240	100.0	Primary education
Sources of Funds*			
Bank Loan	5	1.8	
<i>Esusu</i>	72	25.3	
Personal savings	157	55.0	
Cooperative society	51	17.9	
Total	285	100.0	Personal savings
Farm size (ha)			
> 5	38	15.8	
0.1 – 0.99	60	25.0	
1.0 – 1.99	72	30.0	
2.0 – 4.99	70	29.2	
Total	240	100.0	2.4 hectares
Farming experience (years)			
< 5	11	4.6	
5 to 10	22	9.2	
11 to 20	52	21.7	
> 20	155	64.5	
Total	240	100.0	19 years
Land acquisition*			
By purchase	25	9.1	
By inheritance	172	62.5	
Rent / leasehold	78	28.4	
Total	275	100.0	Inheritance

\* Multiple responses.

Majority (71.7%) of the respondents acquired their land through inheritance, 32.5% of them acquired land through rent/ leasehold, while 10.4% purchased their land. The respondents (30%) owned farmland ranging from 1- 1.99 ha, while 29.2% had farm sizes of between 2.0 and 4.99 ha and 25% possess farm sizes ranging from 0.1-0.99 ha. Only 15.8% of the respondents had farmland less than 5 ha and the mean farm size was 2.4 ha. It can therefore, be concluded that land is a major resource in farming activities and is adequately available to most of the farmers.

#### Prioritization of agroforestry practices in the study area

Seven different agroforestry practices were identified in the study area (Table 3). 'Scattered trees on farmland' (planting trees scattered across farmland) was the most predominantly practised involving 77.5% of the respondents; agrisilviculture (which involved planting trees with agricultural crop only) was the second in order of priority with 68.7% followed by Biomass Transfer (green manure, 37.5%), and improved fallow (enhancement of natural fallow vegetation by introducing trees or shrubs, 34.6%). Other agroforestry practices that were practiced include alley cropping (hedgerow intercropping, 18.6%); home garden (mixed cropping of perennials with annual crops, in combination with animals, 13.8%) and live fencing (lines of trees or shrubs planted on farm boundaries, 5.0%).

Table 3. Prioritization of agroforestry practices in Ogun State, Nigeria, 2013.

Agroforestry practices	Fre*	Per (%)	Ord
Scattered trees on farmland	186	77.5	1
Agrisilviculture	165	68.7	2
Biomass transfer	90	37.5	3
Improved fallow	83	34.6	4
Alley cropping/hedgerows	45	18.6	5
Home garden	33	13.8	6
Live fencing	12	5.0	7

\* Multiple responses (i.e., respondents could practice more than one). Fre – frequency; Per – percentage; Ord – Order of priority.

#### Cost and returns analysis of agroforestry practices in all the zones (Pooled)

The total variable costs (TVC) was \$860.00/₦172,003.70 (one hundred and seventy-two thousand and three naira, seven kobo) which is equivalent to 77.86% of the total cost; this implies that variable cost items (such as labour, transportation, seed/seedlings) accounted for a larger proportion of the total cost expended on farming activities (Table 4). The total fixed cost was found to be \$244.50/₦48,901.82 (forty-eight thousand nine hundred and one naira, eighty-two kobo) which is equivalent to 22.14% of the total cost, while the total cost was \$1,104.50/₦220,905.50 (two hundred and twenty thousand, nine hundred and five naira, five kobo). However, the total revenue (TR) generated from agroforestry products per hectare was \$2,055.70/₦411,135.40 (four hundred and eleven thousand, one hundred and thirty-five thousand, and four kobo), while the gross margin (i.e., TR-TVC) was found to be \$1,195.70/₦239,131.70 (two hundred and thirty-nine thousand, one hundred and thirty-one naira, seven kobo) and the profit/net income (i.e., TR-TC) equals \$951.20/₦190,229.90 (one hundred and ninety thousand, two hundred and twenty-nine naira and nine kobo); this implies that agroforestry production was profitable in the study area.

#### Costs and return analysis of agroforestry practices (Abeokuta Zone)

In Abeokuta zone, the total variable cost (TVC) was found to be \$592.50/₦118,501.94 (one hundred and

eighteen thousand, five hundred and one naira, ninety-four kobo) which is equivalent to 69.09% of TC (Table 5). TFC was \$265.00/₦53,007.61 (fifty-three thousand and seven naira, sixty-one kobo) which means 30.91% of TC and the total cost (TC) was \$857.60/₦171,509.55 (one hundred and seventy-one thousand, five hundred and nine naira, fifty-five kobo). The TR generated in the zone per hectare was \$2,339.40/₦467,879.17 (four hundred and sixty-seven thousand, eight hundred and seventy-nine naira and seventeen kobo). The Gross Margin was \$1,746.90/₦349,377.22 (three hundred and forty-nine thousand, three hundred and seventy-seven naira, twenty-two kobo) and profit/net income was \$1,481.90/₦296,369.62 (two hundred and ninety-six thousand, three hundred and sixty-nine naira, sixty-two kobo) which implies that agroforestry production is highly profitable in the zone.

Table 4. Costs and Return Analysis of Agroforestry practices in all the zones (Pooled) by hectare.

Description	Amount (₦)	TC (%)
Variable cost (VC)		
Labour	115,275.40	52.18
Harvest transportation cost	6,584.35	2.98
Tractor hiring	15,440.00	6.99
Seed/seedlings	2,614.29	1.18
Fertilizers	23,449.09	10.61
Herbicides	8,640.56	3.91
Total variable cost (TVC)	172,003.68	77.86
Fixed cost (FC)		
Files	1,604.78	0.73
Bowls	3,385.71	1.53
Knapsack sprayer	2,935.31	1.33
Cutlasses	3,918.37	1.77
Hoes	2,401.46	1.09
Special baskets	3,235.71	1.46
Rents	14,779.22	6.69
Land purchases	15,781.25	7.14
Other fixed costs	860.00	0.39
Total fixed cost (TFC)	48,901.82	22.14
Total cost (TC = TVC+TFC)	220,905.50	100.00
Total revenue	411,135.40	-
Gross margin	239,131.70	-
Net income/respondent	190,229.90	-
Profit	190,229.90	-

Table 5. Costs and return analysis of agroforestry practices (Abeokuta Zone) by hectare.

Description	Amount (₦)	TC (%)
Variable cost (VC)		
Labour	75,714.58	44.15
Harvest transportation cost	5,000.00	2.92
Tractor hiring	13,666.67	7.97
Seed/seedlings	2,000.69	1.17
Fertilizers	22,120.00	12.90
Total variable cost (TVC)	118,501.94	69.09
Fixed cost (FC)		
Files	1,672.34	0.98
Bowls	0.00	0.00
Knapsack sprayer	3,760.68	2.19
Cutlasses	4,296.55	2.51
Hoes	2,156.36	1.26
Special baskets	0.00	0.00
Rents	12,291.67	7.17
Land purchases	28,830.00	16.81
Other fixed costs	0.00	0.00
Total fixed cost (TFC)	53,007.61	30.91
Total cost (TC = TVC+TFC)	171,509.55	100.00
Total revenue	467,879.17	-
Gross margin	349,377.22	-
Net income/respondent	296,369.62	-
Profit	296,369.62	-

### Costs and return analysis of agroforestry practices (Ijebu-ode Zone)

In this zone, the TVC was found to be \$629.40/₦125,879.60 (one hundred and twenty-five thousand, eight hundred and seventy-nine naira, sixty-kobo) which is 84.13% of the TC (Table 6). TFC was \$118.70/₦23,742.99 (twenty-three thousand, seven hundred and forty-two naira, ninety-nine kobo) which is equivalent to 15.87% of TC while TR generated per hectare was \$1,420.30/₦284,049.17 (two hundred and eighty-four thousand and forty-nine naira, seventeen kobo). The Gross Margin was \$790.90/₦158,169.56 (one hundred and fifty-eight thousand, one hundred and sixty-nine naira, fifty-six kobo) and the net income / profit gained was \$672.10/₦134,426.57 (One hundred and thirty-four thousand, four hundred and twenty-six naira, fifty-seven kobo). It can be deduced that agroforestry production is also profitable in this zone.

Table 6. Costs and return analysis of agroforestry practices (Ijebu-ode Zone) by hectare.

Description	Amount (₦)	TC (%)
<b>Variable cost (VC)</b>		
Labour	88,078.72	58.87
Harvest transportation	3,526.92	2.36
Tractor hiring	9,500.00	6.35
Seed/seedlings	1,961.46	1.31
Fertilizers	22,812.50	15.25
<b>Total variable cost (TVC)</b>	<b>125,879.60</b>	<b>84.13</b>
<b>Fixed cost (FC)</b>		
Files	1,681.25	1.12
Bowls	0.00	0.00
Knapsack sprayer	2,201.52	1.47
Cutlasses	3,800.00	2.54
Hoes	2,560.23	1.71
Special baskets	0.00	0.00
Rents	9,700.00	6.48
Land purchases	2,800.00	1.87
Other fixed costs	1,000.00	0.67
<b>Total fixed cost (TFC)</b>	<b>23,742.99</b>	<b>15.87</b>
<b>Total cost (TC = TVC+TFC)</b>	<b>149,622.60</b>	<b>100.00</b>
Total revenue	284,049.17	-
Gross margin	158,169.56	-
Net income/respondent	134,426.57	-
Profit	134,426.57	-

### Costs and return analysis of agroforestry practices (Ilaro Zone)

In this zone, TVC was found to be \$1,309.90/₦261,975.95 (two hundred and sixty-one thousand, nine hundred and seventy-five naira, ninety-five kobo) which is equivalent to 81.27% of the TC (Table 7) TFC was \$301.90/₦60,383.32 (sixty thousand, three hundred and eighty-three naira, thirty-two kobo) which is 18.73% of the TC while TR generated per hectare was \$2,832.80/₦566,566.67 (five hundred and sixty-six thousand, five hundred and sixty-six naira, sixty-seven kobo). Gross Margin was \$1,523.00/₦304,590.72 (three hundred and four thousand, five hundred and ninety naira, seventy-two kobo) and net income / profit was \$1,221.00/₦244,207.39 (two hundred and forty-four thousand, two hundred and seven naira, thirty-nine kobo). This implies that agroforestry production is also profitable in this zone but more profitable in Ilaro zone than Ijebu-ode and Ikenne zones.

### Costs and return analysis of agroforestry practices (Ikenne Zone)

TVC in this zone was found to be \$788.00/₦157,666.31 (one hundred and fifty-seven thousand, six-hundred and sixty-six naira, thirty-one kobo) which is equivalent to

78.14% of TC (Table 8). TFC was \$220.60/₦44,113.37 (forty-four thousand, one hundred and thirteen naira, thirty-seven kobo) which is 21.86% of TC, while TR generated per hectare was \$1,630.00/₦326,046.67 (three hundred and twenty-six thousand, forty-six naira and sixty-seven kobo). The Gross Margin generated was \$841.90/₦168,380.35 (one hundred and sixty-eight thousand, three hundred and eighty naira, thirty-five kobo) and the net income / profit generated was found to be \$621.30/₦124,266.98 (one hundred and twenty-four thousand, two-hundred and sixty-six naira, ninety-eight kobo). This indicates that agroforestry production is equally profitable in this zone but not as profitable as in other zones in the study area.

Table 7. Costs and return analysis of agroforestry practices (Ilaro Zone) by hectare.

Description	Amount (₦)	TC (%)
<b>Variable cost (VC)</b>		
Labour	176,869.57	54.87
Harvest transportation	3,370.97	1.05
Tractor hiring	40,000.00	12.41
Seed/seedlings	3,193.75	0.99
Fertilizers	38,541.67	11.96
<b>Total variable cost (TVC)</b>	<b>261,975.95</b>	<b>81.27</b>
<b>Fixed cost (FC)</b>		
Files	1,414.89	0.44
Bowls	0.00	0.00
Knapsack sprayer	2,335.09	0.72
Cutlasses	3,718.52	1.15
Hoes	2,193.40	0.68
Special baskets	3,000.00	0.93
Rents	22,750.00	7.06
Land purchases	23,971.43	7.44
Other fixed costs	1,000.00	0.31
<b>Total fixed cost (TFC)</b>	<b>60,383.32</b>	<b>18.73</b>
<b>Total cost (TC = TVC+TFC)</b>	<b>322,359.27</b>	<b>100.00</b>
Total revenue	566,566.67	-
Gross margin	304,590.72	-
Net income/respondent	244,207.39	-
Profit	244,207.39	-

Table 8. Cost and returns analysis of agroforestry practices (Ikenne Zone) by hectare.

Description	Amount (₦)	TC (%)
<b>Variable cost (VC)</b>		
Labour	121,642.59	60.28
Harvest transportation	12,131.58	6.01
Tractor hiring	0.00	0.00
Seed/seedlings	3,182.14	1.58
Fertilizers	20,710.00	10.26
<b>Total variable cost (TVC)</b>	<b>157,666.31</b>	<b>78.14</b>
<b>Fixed cost (FC)</b>		
Files	1,665.91	0.83
Bowls	3,385.71	1.68
Knapsack sprayer	2,714.29	1.35
Cutlasses	3,832.00	1.90
Hoes	2,732.08	1.35
Special baskets	3,260.53	1.62
Rents	18,680.00	9.26
Land purchases	7,542.86	3.74
Other fixed costs	300.00	0.15
<b>Total fixed cost (TFC)</b>	<b>44,113.37</b>	<b>21.86</b>
<b>Total cost (TC = TVC+TFC)</b>	<b>201,779.68</b>	<b>100.00</b>
Total revenue	326,046.67	-
Gross margin	168,380.35	-
Net income/respondent	124,266.98	-
Profit	124,266.98	-

### Cost and returns analysis of the identified agroforestry practices

Out of the seven identified agroforestry practices, 'scattered trees' on farmland was found to be most profitable with a net income (NI) of five thousand, eight-hundred and fifty-two naira, eighty-two kobo (\$29.26/₦5,852.82);

followed by Agrisilviculture (planting of agric crops with forest trees) which had a net income of five thousand, six hundred and ninety-six thousand, sixty-five kobo (\$28.48/₦5,696.65). The third agroforestry practice in this category is improved fallow with a net income of two thousand, five hundred and sixty-three naira, and twelve kobo (\$12.82/₦2,563.12). The least profitable agroforestry practice was live fencing which had a net income of three hundred and sixty-four naira, twenty-one kobo (\$1.82/₦364.21).

In comparison, Abeokuta zone was the most profitable zone with the highest gross margin (GM), profit and the least TVC because of access to all needed social amenities while Ilaro, Ikenne, and Ijebu-ode zones came second, third and fourth respectively.

These findings agree with the result of Gangadharappa et al. (2003) which noted that farmers were earning an average of \$800.00/₦160,000.00 or Rs.31466.20/every year from one acre of agroforestry plot which is much profitable than any traditional system. The farmers were also able to save surplus money in the bank, which is a positive sign of economic sustainability.

### Conclusion

This study concluded that male farmers are more involved in agroforestry production than their female counterparts in Ogun State. There are more married farmers with a minimum of six people in their households. Majority of the respondents were educated with an average farming experience of 19 years and funded their farms from personal savings. Most of the respondents acquired their land through inheritance. Also, agroforestry practices were found to be more profitable in Abeokuta than any other zone in Ogun State.

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