

Costs and Returns of Moringa (*Moringa oleifera*) Production in Zuru Local Government Area of Kebbi State, Nigeria

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Abstract: This study was carried out to investigate profitability associated with Moringa production in Zuru local government area of Kebbi State. It examined the costs and returns of Moringa production as well as constraints faced by Moringa farmers in the study area. Data were collected from a total of 100 Moringa farmers using purposive sampling technique in 2013. Descriptive statistics and farm budgeting technique were used in the analysis of the data. The study revealed that 48% of Moringa farmers in the study area belong to the active population in the age bracket of 31 - 40 years, majority (78%) of Moringa farmers were females, majority (69%) of Moringa farmers had formal education at various levels, majority (89%) of Moringa farmers in the study area had a farm size of 0.5 – 1.0 hectares and 46% had experience in Moringa production within the range of 16 – 20 years. The costs and returns analysis indicated that, variable cost constituted 42.27% of the total cost of Moringa production in the study area, while the fixed cost constituted 57.73%. However, the average total cost of production per hectare was ₦75, 350, the average total revenue was ₦187, 500 and the net income was ₦112, 150 indicating that Moringa production was profitable. Despite the profitability of Moringa production, farmers identified pest and disease, lack of technical advice and lack of capital as their major constraints. It is therefore recommended that trained personnel to educate Moringa farmers with new method of Moringa production in the study area should be emphasized. Moringa farmers should form cooperative societies to enable them have easy access to improved inputs, credit and other forms of assistance.

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1.0 Introduction

Moringa (*Moringa oleifera*) originated from India. Today the tree is common to all landscape all over the tropics of the whole world, from south Asia to West Africa. It is mostly visible in eastern and southern parts of Africa. It is also now finding its way into gardens of many pacific islands from Kiribati to the northern Marianas (Maydeu, 1986). Moringa plant species initially originated from the northern parts of India as back as 500 years ago (Umbertor, 2000). It later moved into the southern parts of the country where it is known as “*Munungai Keerai*” meaning Moringa leaves and “*Murungai Kaai*” meaning Moringa vegetable. The cultivation of Moringa tree had spread to most parts of Asia, Africa, South America, southern parts of north America and some parts Europe. Moringa is today widely cultivated in central Africa, South America, Sri lanka, India, Mexico, Malaysia, Indonesia and Philippines. It is considered one of the world’s most useful trees; almost every part of Moringa can be used for food or has some other beneficial properties. In the tropics, it is used as forage for livestock (Umbertor, 2000).

Moringa belongs to the family *Moingaceae*. Moringa has been found useful in nutrition, agriculture, improving soil fertility, water purification, industrial

application, livestock feeds and also for treating various types of illness in humans as well as livestock. Moringa pods are important commercial vegetable crop throughout India. The leaves have a high protein content of about 27% and are rich in vitamin A and C, calcium, iron and phosphorus. Moringa leaves have calcium equivalent of 4 glasses of milk, the vitamin C content of 7 oranges, potassium of 3 bananas and 3 times the iron of spinach, 4 times the amount of vitamin A in carrot and 2 times the protein in milk (Osilon *et. al.*, 2001). Moringa is one of the most useful trees in semi-arid and drought prone areas. It is quite often cultivated as vegetables in backyards or gardens, where its succulent leaves are harvested daily for soup sauce or salads. These palatable leaves are high in protein, vitamin A and C. It also makes a major contribution human health treating various types of illness (Maydue, 1986).

Moringa *oleifera* is a non-leguminous multipurpose tree, and the most widely cultivated species of a monogenetic family, the *Moringaceae*, that is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. It has a high crude protein in the leaves (251g/kg DM) and negligible content of tannins and other anti-nutritive compounds (Makkar and Becker, 1996). The multiple uses and

potentials of *Moringa oleifera* have attracted the attention of researchers in recent times. Although the plant is not completely strange in West Africa, it has been grossly underexploited as it is restricted to the arid northern zone where it is used mainly as live fence and as vegetable salad. Preliminary investigation showed that the plant grows fast, it has potentially high biomass production and exceptional biochemical properties, but there has been no systematic attempt to exploit *Moringa* either in terms of its agronomic or nutritive attributes (Akinbamijo *et al.*, 2004).

Moringa oleifera, because of its socio-economic and cultural importance, is raising a growing international interest among NGOs, scientists, public and private sectors. But then, it is imperative to note that while a number of studies have been carried out on the origin, morphology and chemistry of *Moringa oleifera* (Fuglie, 2001), little or no effort has been made to unearth the prevailing profitability of the crop amongst its custodians (farming families). While research on costs and returns of *Moringa oleifera* could lead to invention or new discovery, investigation on its prevailing profitability could accelerate the cultivation of the crop and enhance sustainable development, most especially among rural farming families.

2.0 Methodology

The study was carried out in Zuru Local Government Area (LGA) of Kebbi State. The Area is located within latitude $11^{\circ} 35'$ and $11^{\circ} 55'N$ and longitude $4^{\circ} 45'$ and $5^{\circ} 25'E$ of the equator approximately (KBSG, 2003). Zuru LGA is geographically located in the south-eastern part of the state. The estimated population of the LGA is 165,547 people (NPC, 2006). The weather is marked by a single rainy season and long dry season, the average rainfall is 1025mm/annum, the rainy season is between May to October, the rainy season last for four – five months. The climatic condition of the area is characterized by hot and wet season as in the tropics; the month of November to January is the harmattan period. The soil type is sandy loam and rich, which makes it suitable for agriculture (KBSG, 2003). Purposive sampling method was employed to select farmers. One hundred (100) *Moringa* farmers constitute the sample size for the study. The main instrument for data collection was structured questionnaire. Data were collected on socio-economic characteristics of *Moringa* farmers, prices of input and output and constraints faced by *Moringa* farmers. Analysis of the data was done using descriptive statistics and farm budgeting technique. Simple descriptive statistics such as frequency counts and percentages were used. The budgeting technique employed was the net farm income.

2.1 Model Specification

Net Farm Income - The difference between the gross revenue (GR) and total cost (TC) gives the net revenue (NR), net farm income (NFI) is expressed as:

$$NFI = GR - TC \dots \dots \dots \text{Eq. (1)}$$

Where;

NFI = Net Farm Income

TC = (TVC + TFC) = $P_x X$

GR = $P_y Y$

GR = Gross Return

P_y = Unit Price of Output

Y = Quantity of Output

P_x = Unit Price of Input

X = Quantity of Input

TC = Total Cost (₦)

TFC = Total Fixed Cost (₦)

TVC = Total Variable Cost (₦)

3.0 Results and Discussion

3.1 Socio-economic Characteristics of Farmers

The result indicated that majority (78%) of *Moringa* farmers are female, while the remaining 22% are males. This indicates women domination in *Moringa* production in the study area. This implied that women contribute greatly to the agricultural sector of the economy. This assertion is however, confirmed by Azeez *et al.* (2013) that 50% of the food in Nigeria is produced by women. The study reveals that majority (48%) of *Moringa* farmers fall within the age range of 31 - 40 years, 22% are within the age of 20 – 30 years, 20% are within 41 – 50 years of age while 10% fall within 51 and above years. It is believed that people within this age range of 31 – 40 years fall within the productive sector of the economy. About 38% of *Moringa* farmers had primary education, 31% had no any form of formal education, 20% had secondary education while 11% had tertiary education. This indicated that majority of *Moringa* farmers in the study area had formal education at various levels. This finding has therefore reflected the importance of education in agricultural production activities. The more an individual is exposed to any form of education, the more likely he will have a better understanding of his environment. Results revealed that 71% of the *Moringa* farmers were married as against 29% single; indicating that *Moringa* production in the study area is most common among couples. This may be for income generation and food. However, the result further revealed that 89% of *Moringa* farmers have a farm size of 0.5 – 1.0 hectares, 6% have between 1.5 – 2.0 hectares of farmland, 4% have 2.5 – 3.0 hectares while 1% have 3.5 and above hectares of farmland. This is in line with the finding of Osilon *et al.* (2001) which stated that majority of *Moringa* farmers are small scale farmers in which their total farm size for *Moringa* production is less than 1 hectare and farm size is an important factor in agricultural production not

only the output but also the level of profitability (Umbertor, 2000). This finding agrees with the finding of Azeez *et al.* (2013) that 41.7% of Moringa farmers in Isokan Local Government Area of Osun State had their farm size between 0.11 – 0.30 hectares. Result also revealed that majority (46%) of Moringa farmers had 16 – 20 years of farming experience, 24% had 11 –

15 years, 14% had 21 and above years, 9% had 6 – 10 years while 7% had 1 – 5 years of farming experience. Years of experience in agricultural production helps in determining the accuracy in decision making and in allocation of scarce resources wisely. The more years' farmers had in producing a particular crop the more experienced they become in producing that crop.

Table 1: Socio-economic Characteristics of Moringa Farmers

Variables	Frequency	Percentage
Sex		
Male	22	22
Female	78	78
Total	100	100
Age (Years)		
20 – 30	22	22
31 – 40	48	48
41 – 50	20	20
51 and Above	10	10
Total	100	100
Educational Level		
Primary	38	38
Secondary	20	20
Tertiary	11	11
No Education	31	31
Total	100	100
Marital Status		
Married	71	71
Single	29	29
Total	100	100
Farm Size (ha)		
0.5 – 1.0	89	89
1.5 – 2.0	6	6
2.5 – 3.0	4	4
3.5 and above	1	1
Total	100	100
Farming Experience (Years)		
1 – 5	7	7
6 – 10	9	9
11 – 15	24	24
16 – 20	46	46
21 and above	14	14
Total	100	100

Source: Field Survey Data and Computation by the Researcher, (2014).

3.2 Costs and Returns of Moringa Production

The profitability of any business can be deduced from the relationship between the cost incurred in running the farm business and the returns accruing to it (Adegeye and Dittoh, 1985). The costs and returns associated with Moringa production in the study area are presented in Table 2. The result of the farm budgeting analysis revealed that the variable costs constituted 42.27% of the total cost of production of Moringa, while total fixed capital accounted for 57.73%. However, the average total cost of production

per hectare was ₦75, 350, the average total revenue was ₦187, 500 and net farm income was ₦112, 150.00. The result showed that farmers realized profits; however, profit can be enhanced if they improve on the management practices. This finding agrees with the findings of Ojiako *et al.* (2011) that investing in *Moringa* is a viable enterprise. With a breakeven yield of 1,295kg/ha; profitability index of 2.047/ha per year and net return of ₦11, 965,000.00/ha per year. In a related study Isah (2012) in his study of profitability of Moringa production in Magama local Government

Area of Niger State, Nigeria reported that Moringa production is profitable with net farm income of ₦39, 152.

Table 2: Average Costs and Returns of Moringa Production/Hectare

Items	Average Value (₦)	Percentage
Variable Costs		
Labour	4,850.00	6.44
Seeds	8,500.00	11.28
Fertilizer	7,000.00	9.29
Herbicides	5,750.00	7.63
Pesticides	5,750.00	7.63
Total Variable Cost (TVC)	31,850.00	
Fixed Costs		
Rent on Land	36,000.00	47.77
Depreciation on Farm tools	7,500.00	9.96
Total Fixed Cost (TFC)	43,500.00	
Total Cost (TC)	75,350.00	
Revenue		
Sales of Moringa Leaves and Seeds	187, 500.00	
Total Revenue (TR)	187,500.00	
Net Farm Income (NFI) = TR-TC	112,150.00	

Source: Field Survey Data and Computation by the Researcher, (2014). **Note:** Depreciation on Farm tools was calculated using the straight line method.

3.3 Constraints Faced by Moringa Farmers

The major constraints faced by Moringa farmers in the study area were pests and diseases 45.7%, lack of technical advice 25.9% and lack of capital 16.5%. This is followed by seed viability constraint 7.1% and drought 4.7%. Fahey (2005) reported that Moringa is resistance to most pests and diseases, but outbreak may occur under certain

conditions. For example; diplovia root rot may appear in water logged soils, causing severe wilting and death of plants, also mite population can increase during dry and cool weather. This assertion disagrees with the finding of this study as majority of Moringa producers (45.7%) reported to have pests and disease as their major constraint.

Table 3: Constraints Faced by Moringa Farmers

Constraints	Frequency*	Percentage
Drought	6	4.7
Pests and Diseases	58	45.7
Seed Viability Problem	9	7.1
Lack of Technical Advise	33	25.9
Lack of Capital	21	16.5

Source: Field Survey Data and Computation by the Researcher, (2014). *Multiple Responses.

4.0 Conclusion and Recommendations

The production of Moringa by small-scale farmers as components of agro-forestry and food security crop is expected to bring about sustainable agricultural production and income. It is based on this premise that this research was carried out. Based on the findings of this research therefore, it could be concluded that variable costs and fixed costs are the major variables which significantly explain changes in income (returns) of Moringa production in the study. It

can also be concluded that Moringa production in the study area was profitable.

It is therefore, recommended that more Moringa producers in the study area and elsewhere should go into its production because of its profitability, improve variety of Moringa seeds should be develop by research stations to boost production. Moringa farmers in the study area should form cooperative societies to enable them have easy access to inputs, credit and other forms of assistance. Also trained personnel to educate farmers

with new method of Moringa production in the study area should be encouraged.

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