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Benefit Cost Analysis of *Moringa oleifera*-Cowpea Intercrop in Sabon-Gari Local Government Area of Kaduna State, Nigeria

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Abstract

This study examined the benefit cost analysis of *Moringa oleifera*-cowpea intercrop in Sabon-Gari Local Government Area of Kaduna state, Nigeria. Primary data were obtained from 50 farmers who participated in the adoption process with the aid of structured questionnaire. Result of the gross margin analysis indicated that Moringa/Cowpea intercropping is a profitable farming with a net profit of ₦65, 180 which without Moringa stood at ₦27, 680 representing 57.5% rise in profit for the intercropping. The naira spent value of ₦2.20 implied that on every naira invested, the sum of ₦1.20k gain was made at 120% profit value thus Moringa/Cowpea intercrop is a highly veritable and profitable agro-business. It is quite evident that the farmers are not fully aware of the modern ways of propagation and multipurpose uses of *Moringa oleifera*. The need to harness the numerous uses of *Moringa oleifera* through research work, farmers' participation, training and retraining of both extension workers and farmers, involvement of all stakeholders is thus recommended by this study.

Keywords: Moringa, Cowpea, Intercropping, Naira, Kaduna State

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Introduction

Intercropping has been defined as the growing of two or more crops simultaneously or during parts of the component crop life cycle on the same piece of land (Alamu, 2002; Yusuf, *et al.*, 2008). This farming practice is commonly used by subsistence farmers in the semi-arid areas of Africa. It provides the farmer with a variety of returns from land and labour, often increases the efficiency with which scarce resources are used, and reduces the risk of high dependency on a single crop that is susceptible to environmental and economic fluctuations. The reasons for practicing intercropping are rational; however, despite this logic, few research resources have been allocated in the past for investigating the complex interaction between crops growing on the same piece of land. This situation has existed as a consequence of the transfer of western concepts that are considered to be good farming practices and the technical problems involved in experimenting with intercropping. As a result, the biological effects of one crop on another and the economic costs and returns of intercropping have not been well understood. And yet, scientists now accept that intercropping is important to the subsistence farmer and many are convinced that research into the interactions between crops growing together must be undertaken to provide answers that will improve agricultural productivity for the subsistence farmer (Bruce, 1980).

Cowpea is a major staple food crop in sub-Saharan Africa, especially in the dry savannah regions of West Africa. The seeds are major sources of plant proteins and vitamins for man, feed for animals, and also a source of income. The young leaves and immature pods are eaten as vegetables. There is a big market for the sale of cowpea grain and fodder in West Africa. In Nigeria, income of farmers who harvest, and store cowpea fodder for sale at the peak of the dry season have been found to increase by 25% (Dugje, *et al.*, 2009). Cowpea also plays an important role in providing soil nitrogen to cereal crops (such as maize, millet, and sorghum) when grown in rotation, especially in areas where poor soil fertility is a problem. It does not require a high rate of nitrogen fertilization; its roots have nodules in which soil bacteria called *Rhizobia* help to fix nitrogen from the air (Dugje, *et al.*, 2009). Since Moringa does not fix nitrogen, it is expected that intercropping it with cowpea will bring about beneficial interaction.

Moringa (*Moringa* spp.) is one of the world's most useful foods, medicinal and industrial plants. Fuglie, (1999); Foidl, *et al.*, (2001) and Fahey, (2005) have all documented extensively the wonder plant called Moringa. It is a fast-growing tree and is grown throughout the tropics for human food, livestock forage, medicine, dye, and water purification. Moringa is grown traditionally as backyard trees or hedges for its leaves which are used domestically as culinary. The increased awareness of the multiple uses of Moringa leaves and seeds for both domestic and industrial purposes is leading to an increased demand for it. The demand is still on increase all over Nigeria including Sabon-Gari Local Government Area where this study was done with a view to evaluate farmers' response to cultivate Moringa oleifera as intercrop, determine the cost and returns of intercropping *Moringa oleifera* and cowpea and identify the problems facing cultivation and processing of *Moringa-Cowpea* intercropping in the area.

Materials and Methods

This study was conducted in Sabon-Gari local Government area of Kaduna State, Nigeria. It is estimated to cover an area of about 600sqkm and has an estimated population of about 1.2 million people according to 1991 census. The population is projected to be about 1.8 million people in 2011. It is located on latitude 11°12' north of the equator and longitude 07°37' east of the prime meridian. It has average annual rainfall of 1500mm. Humidity is low in January between 15-35% and high in July between 65-85%. Annual temperature is between 24-28°C. The soil is generally described as sandy loam. Major occupation of the people is farming, trading, fishing and civil servants.

Descriptive statistics and Gross Margin Analysis were used to achieve the objectives of this study. Descriptive statistics involved the use of frequency distributions, percentages and ranking using pie chart. The gross margin analysis was employed to determine the difference between the farmers' gross income and total variable cost. The selected farmer's costs and returns, per hectare of land cultivated and average cost and average revenue per hectare of land cultivated was obtained from the gross margin analysis.

The mode for gross margin is expressed as:

$$GM = GI - TVC$$

Where:

GM	=	Gross Margin (N)
GI	=	Gross Income
TVC	=	Total Variable Cost

Gross Margin is a good approximation of Net Farm Income since small scale farmers usually have negligible fixed costs (Olukosi and Erhabor, 1988).

Results and Discussion

The result of farmers' response to intercropping of Moringa with Cowpea is presented in Table 1. 42% of the farmers responded positively and are ready to go into Moringa-cowpea intercropping, 40% said no while 18% were undecided. This explains reservation people have to new innovation. The results in Table 2 present the Costs, Returns and Profitability of Moringa/Cowpea Production. The result showed that 1ha plantation of *Moringa oleifera* gave a return of thirty seven thousand five hundred naira (₦37, 500) whereas cowpea on the same land gave returns of eighty two thousand, four hundred naira (₦82, 000). The gross margin of ₦65, 180 was realized from Moringa/cowpea intercrop. Sole cropping of cowpea

generated gross margin of ₦27,680 representing 45.5% of the profit. It is also noteworthy that Moringa and Cowpea cost of production is complemented and not distinctive thus saving cost of planting them separately. The naira spent value of ₦2.20 implies on every naira invested, the sum of ₦1.20k gain is made thus Moringa/Cowpea intercrop is a veritable business and profit oriented

In Figure 1, 60% of the population agreed that Moringa products are accessible, 36% did not agree and 4% undecided. This is implicative that there is future for Moringa marketing. Figure 2 revealed that 72% of the population agreed that Moringa has market acceptability if processed while the remaining 28% did not agree. This result however strengthens the conviction that marketability of Moringa products is on the positive side. Figure 3 revealed Farmers' response to reality of problems in Moringa intercrops. 64% of the population agreed that there are challenges facing Moringa intercropping while remaining 36% do not see any challenge. This majority subscription is a factor negating farmers' readiness to involve in mass production. Figure 4 showed the ratio of farmers attempt to manage challenges facing Moringa intercropping. 32 farmers that agreed there are challenges facing Moringa cultivation, 75% had made attempt to resolve the challenges while remaining 25% did nothing. Figure 5 showed Farmers' success in resolving the challenges that only 29% were successful, 23% partially successful and majority represented by 48% were not successful.

Conclusion and Recommendations

It is evident from this study that Moringa oleifera cultivation either as sole or intercrop is still a novel idea among Nigerian farmers despite its acclaimed economic values and importance. Many farmers are not aware of the multi various uses of the plant but a lot of them are willing to plant it if introduced to them. The need to place action on popularizing the plant among the Nigerian farmers is becoming evident. The result of this study has demonstrated beyond doubt that many farmers are aware of the existence of *Moringa oleifera* and are quite familiar with its traditional usage. Their understanding of its modern use is still at the mediocre level and thus the need to expose them further to its various processing becomes more relevant. Their readiness to adopt and utilize various technique learnt during the study is real and commendable but such enabling atmosphere of available land, storage facilities, equipment for processing, accessibility to all marketing chains are very evident. This study therefore recommends that there is a need for more training and awareness campaign for both farmers and extension agent in harnessing all the potentials of Moringa which should be prerogative of colleges, universities, research institutes and all stakeholders of agriculture including communal farmer associations, creation of seed bank to serve as the basis for collection, research and improvement on Moringa should be collective programme of research institutes and provision for local farmers' participation to have access to this innovation and the effects of plantation densities and pruning techniques and frequency on yields are only known about in an empirical way and in conditions that are hard to compare. These farming practices must be tested in monitored conditions so that it is possible to advise farmers and investors about the best technical routes, based on the desired product.

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Tables**Table 1:** Farmers' response to intercrop Moringa with cowpea

Responses	Frequency	Percentage (%)
Yes	21	42
No	20	40
Undecided	9	18
Total	50	100

Table 2: The Result of Gross Margin Analysis

Items of Costs and Returns (₦)	Total	% contribution
Income:		
Moringa Revenue	37,500	31.4
Cowpea Revenue	82,000	68.6
Gross Income	119,500	100
Variable Costs:		
Land preparation	8,000	14.7
Moringa seeds	5,100	9.4
Cowpea seeds	6,720	12.4
Pesticides	4,000	7.4
Planting	2,800	5.1
weeding	13,200	24.3
harvesting	4,000	7.4
Transport	4,000	7.4
Logistics	6,500	11.9
Total Variable Costs	54,320	100
Gross Margin (intercrop)	65,180	57.5
Gross Margin (cowpea)	27,680	42.5
Return per N spent	2.20	120

Figures

Figure 1: Farmers' response to Moringa marketability

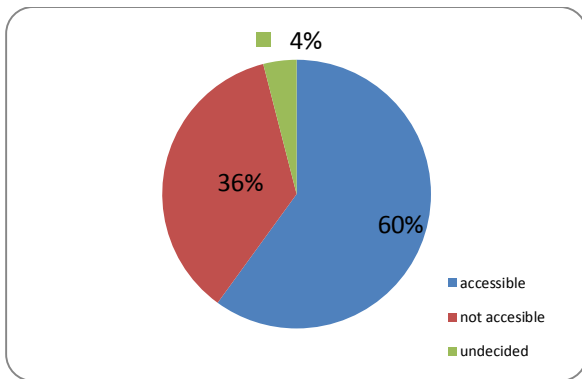


Figure 4: Farmers' percentage attempted to solve the challenges

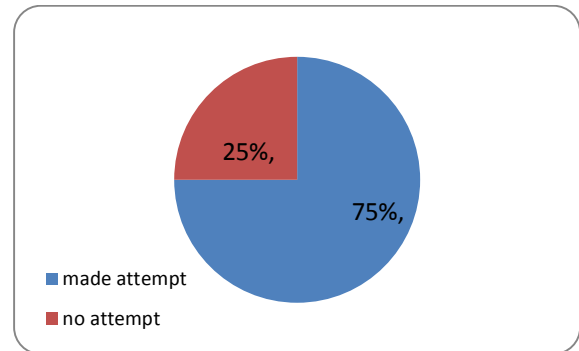


Figure 2: Farmers' response to market acceptability

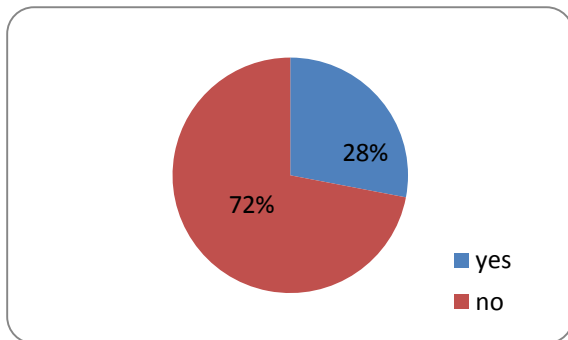


Figure 5: Farmers percentage of success in solving the challenges

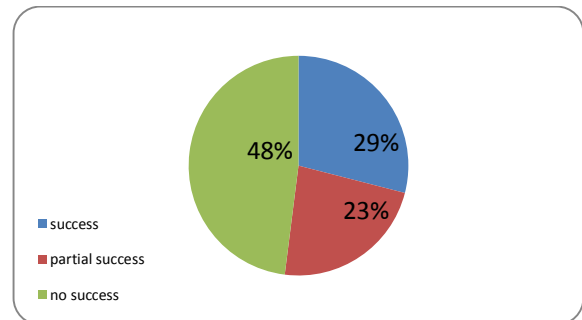


Figure 3: Farmers percentage facing challenges in Moringa management

