ECONOMIC ANALYSIS OF SOYABEAN PRODUCTION IN KAURA LOCAL OVERNMENT AREA OF KADUNA STATE

BY

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DEDICATION

This thesis is dedicated to my creator the Almighty Father and my parents Mr. and Mrs. Musa Shallangwa for their tender love and care.

DECLARATION

I hereby declare that this thesis was written by me and it is a record of my own work, except where reference is made to published literature and duly acknowledged. It has not been presented before in any application for a degree.

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The Above declaration is confirmed

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CERTIFICATION

This thesis entitled "ECONOMIC ANALYSIS OF SOYABEAN PRODUCTION IN KAURA LOCAL GOVERNMENT AREA OF KADUNA STATE" by R.S MUSA meets the regulations governing the award of Degree of Master of Science of Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge and literary presentations.

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ABSTRACT

Soyabean is one of the leguminous crops that is becoming more prominent as a source of protein to meet both animal and human nutritional requirements. Presently, low yield is one of the problem(s) associated with soyabean production in Nigeria and this is attributed to lack of increased land area put into its production, lack of sufficient improved varieties, low prices for the output and lastly shortage of fertilizer and labour when most needed. In order to increase the production of Soyabean, all the strategies used in production would need to be appropriately employed to allow efficient use of resources. In view of above facts a study was undertaken to evaluate the economic performance of Soyabean in Kaura Local Government Area. The specific objectives were to describe the socio-economic characteristics of the farmers, determine the resource use efficiency, determine the costs and returns and also examine the factors affecting Soyabean production.

A total of 120 farmers were randomly selected from four villages. These villages were purposively selected. Data were collected through structured questionnaire complimented by oral interview. Descriptive statistics such as measures of central tendency, production functional forms (linear, semi-log and double-log) and budgeting techniques (Gross margin) were the analytical tools adopted in the study.

The results from the study show that the average age of the farmers was

39 years, 93.33% of the farmers acquired formal education and the average farming experience of the farmers was 25 years.

The regression results showed that 84 percent of the variations in the output of soyabean was caused by the inputs included in the model. The signs of coefficients estimated were positive for all the inputs and significant at 5% for land, seed and fertilizer but labour was not significant. This might be that the period of labour requirement for Soyabean production coincided with that of labour requirement for other food crops.

The costs and returns analysis revealed that Soyabean production was profitable in the study area. A gross return of N27,173.70 and total variable cost of N4,139.45 were realized per hectare leading to a gross margin of N22.854.25.

It was recommended that farmers should form cooperative societies to help them procure some inputs from government. Also Extension agents should pay constant visitation to the farmers in order to advice them on some of their problems.

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CHAPTER ONE

INTRODUCTION

1.1 Importance of Soyabean in Nigeria.

Soyabean is one of the important leguminous crops that in a span of three to four decades has become a prominent source of protein in human and animal diets. It has also become the leading source of edible oils and fat constituting about 20% of the world supply (Sigh *et al*, 1987).

The annual average output of Soyabean in Nigeria from 1981 to 1985 was 61,000 tones and from 1990 to 1993 it was 171,000 tones (CBN, 1994). Further increase was recorded in 1994-95 - 191,000 tonnes (CBN, 1995) and in 1996 to 1997, the average output was 205. 5,000 tones per annum (FAO, 1997).

Between 1986 and 1989, there was considerable increase in Soyabean output. This was partly due to the introduction of the Structural Adjustment Programme (SAP) by the Federal Government which was intended to stimulate increased domestic production of food and other raw materials. This programme abolished the commodity marketing board system and agricultural prices were deregulated. The importation of major agricultural commodities such as wheat, maize, rice, edible oils and feed cake were banned between 1985 and 1987. This stimulated the domestic oil/feed cake industries and therefore the demand for oil processing commodities increased (Abu, 1995).

After the ban on importation, the processing industries started substituting Soyabean for groundnut and palm oil. In this context, Soyabean production, processing and utilization efforts become intensified. Prior to the devaluation of the currency, only one company with the capacity of 500 tonnes was processing Soyabean as Soyabean oil/feed cake. In 1989, there were six Soyabean oil/feed cake companies with the capacity of over 17,000 tones (Abu, 1995). With the new Soyabean processing plants being established, there was increasing demand for Soyabean by the industries because the industries used Soyabean for producing both human and animal food. Therefore, realizing the high demand for Soyabean by the industries, farmers started to produce Soyabean on a large scale which resulted in an increase in Soyabean output from 1990 to 1997.

Soyabean is used in the industries as raw material for making baby food and in the poultry industries as soyabean meal. It is also used locally in some parts of Nigeria at house-hold level by women to make cheese (wara) and also as substitute for locust bean condiment in a locally prepared food-seasoning material called "Dadawa" which serve as spice in making soup (Ogungbile, 1991).

1.2 Problem Statement

In the past, Soyabean cultivation did not increase substantially due to some inherent factors such as lack of farmers interest, lack of improved technology, poor seed viability lack of processing industries and also management techniques and

extension serves (NAERLS Training Manual, 1994). Presently there has been an increase in the Soyabean production, but more land still needs to be put into its cultivation in order to bridge the gap between the demand and the supply. An estimated 50,000 hectares of land is devoted to soyabean production annually in Nigeria, most of which is in the Gboko area of Benue State. However, about 1.0 million hectares believed to be suitable for growing Soyabean even under traditional farming practices (Omotayo, 1994).

Farmers often respond to prices which they expect would provide them with reasonable returns for their crops. The Soyabean farmers have seldom received prices for their produce sufficiently high to maintain and improve its production relative to other crops. Even where the production prices exceed the actual costs of production, the margin is often so ridiculously low as to discourage the farmers from future production efforts.

1.3 Justification of the Study

It has been observed that the small scale farming system has the potential for providing the most effective means of increasing output and equitable income to many farmers since many of the Nigerian farmers are small-scale holders (Mohammed, 1983).

Most of the farmers in the study area are small-scale farmers who have been introduced to the production of Soyabean for almost a decade.

If Soyabean is to become a successful crop in the study area, it will not only have to be profitable but subsequently more profitable than other conventional crops that could be grown in the same locality. In order to meet this, it is necessary to identify the major problems affecting its production. This study therefore will provide some suggestions on these problems which would be useful to the farmers, change agents and agencies.

1.4 Objectives of the Study

The broad objective of the study is to determine the economic performance of Soyabean production in the study area.

Specific Objectives are To:

1. Describe the socio-economic characteristics of Soyabean farmers in the study area.
2. Determine the resource use efficiency in Soyabean production in the study area.
3. Determine the costs and return associated with Soyabean production.
4. Identify factors affecting Soyabean production in the study area.

CHAPTER TWO

LITERATURE REVIEW

2.1 History of Soyabean in Nigeria

Soyabean is a remarkable crop because of its dual purpose which serve as edible oil and also as a source of protein in human and animal diet. Nigeria is the largest producer of Soyabean food in West and Central Africa. Nigeria, as the largest producer of Soyabean also has the most extensive research programme (Singh *et al*, 1987). Soyabean was first introduced to the country in 1908 (Fennel, 1966), but the first successful cultivation was in 1940 using Malayan variety which was found suitable for commercial production in Benue State (Nyiakura, 1982). Since then, many small-scale farmers in this area of South-Central Nigeria have incorporated Soyabean into their cropping systems. Minor areas of production are in the Southern Kaduna State and in the Federal Capital Territory and adjacent Niger State. Large scale farmers particularly in the Guinea Savanna, on the Jos Plateau and in the derived Savanna of Oyo State, have recently become interested in the prospects of Soyabean production.

The current expansion of Soyabean in Nigeria has been founded on years research. In the mid 1960s (Kuenemann *et al.*, 1983), the Institute for Agricultural Research (IAR) initiated a breeding programme for Soyabean and fostered the release in 1983 of two lines from cross between Malayan and Clemson. These

two lines were Samsoy I (M79) and Samsoy II (M216) which was noted to yield higher than the Malayan. The lines are resistant to shattering and they are shorter season breeds (Leleji and Adedzwa, 1983). These lines mature in 115 to 120 days and have given yield of more than 2 tonnes/ha in the Guinea Savanna (Jackai, 1985). Also they are capable of nodulating with the indigenous rhizobia, a trait of the local Malayan variety. Another variety Jupiter was more suitable for areas around Ibadan in Oyo State (Hawaiian - Agronomics, 1980).

2.2 Nutritional Value of Soyabean

Soyabean, the "golden" crop is an excellent source of number of important nutrients. Soyabean has 40% protein and 20% fat by dry weight. While Soyabean contains 18% oil, 25% carbohydrate and 4.8% ash. While Soyabean meal contains about 40% protein, 50% oil, 33% carbohydrate and 6.0% ash (Nyiakura, 1983).

Soyabean protein has an amino acids profile which is close to the optimum recommended by FAO. The World Health Organisation suggested requirements for four essential amino acids. These amino acids are, Lysine, Tryptophan, Theonine and Sulfur amino acids. The compositions are Lysine 1.6%, Tryptophan 0.5%, Threonine 9.0% and Sulfur 1.7% (Karl, 1998).

Soyabean fat is considered nutritionally desirable because it contains large amount of unsaturated fatty acids. Legumes and Cereals are not classified as

complete protein source because legumes are poor in lysine (Faryna, 1978), however when Soyabean and Cereals are combined in diet, the protein in the diet becomes complete. Soyabean has the potential of ameliorating the incidence of protein deficiency and mal-nutrition such as Kwashiorkor in children, since traditional source of animal protein have become prohibitively expensive (Singh *et al*, 1987).

Soyabean protein and other nutrients can be used as human diets in various forms. It is used as flour, grits, paste which serve as an ingredient in baby food, also as supplement in flour for making bread, sausages, cheese (wara) and also high protein biscuits (Joshi, 1985). It is also used in producing milk and yoghurt. Soyabean is used in some part of Nigeria as substitute for (Locust bean) in a locally prepared seasoning called "Dadawa" and also as a supplement in some local dishes such as Egusi, Moin-Moin, Kosai and Soy-Ogi etc (Ogungbile, 1991). Another form in which Soyabean is used in the country in human diet, is like Soyabean oil. The seed is use as raw materials in the oil mill industries to produce Soyabean oil.

Apart from human diet, Soyabean is also used in Nigeria as Soyabean meal, for making livestock feeds. Knipscheer and Ay, (1982) are of the opinion that the potential for increasing Soyabean production in Nigeria today arises especially from the use of Soyabean as Soyabean meal in Nigerias' poultry industries.

2.3 Production Technique of Soyabean

Soyabean production in Nigeria is relatively new or rudimentary in most farming systems in Nigeria and infact completely unknown in others. It is expected that demand for Soyabean and other Soyabean product will grow remarkably as national population grow and as high protein energy source from livestock diminishes (Singh *et al*, 1987). The potential average yield of Soyabean under good management and also the use of high yielding variety is 2000 to 3000kg/ha (Singh *et al*, 1987 and NAERLS Training Manual, 1993). Therefore to meet future demand for Soyabean, it depends largely on clear understanding and application of agronomic practices by the farmers. These agronomic practices are: site selection, land clearing and preparation, variety of seed, time of planing and planting population, fertilizer and its application method, weed control, insect pest and disease control, harvesting, threshing and also drying and storage.

2.3.1 Site Selection

It is important to select fields that are well-drained and fairly levelled. The soil type is sandy-loam to clay loam and the minimum amount of rainfall is about 750mm. In areas of high rainfall its time of maturity should coincide with periods of dry season. Soyabean tolerate wet soil condition better than any other crop but water-logged areas should be avoided (NAERLS Training Manual, 1993). Similarly, textured soil surface should be avoided because of potential problem

such as crosting and poor seedling emergence. Soyabean grows best in soil pH of 5.8 - 7.0 (Singh *et al*, 1987).

2.3.2 Land Clearing and Preparation

Land clearing means clearing bush for crop production. In land clearing, there are different methods involved and mostly manual which involve the use of hoe, matchet, axe etc. Also there is the mechanical method which involve the use of machineries such as Crawler tractor and bull-dozer to cut down big trees. Chemicals are also used in land clearing such as herbicides which help in controlling regrowth of weeds. After clearing the land is ploughed, fertilized and harrowed to incorporate fertilizer into the soil. Soyabean can be sown on ridges or flats. Ridges should be made of about 50 - 75cm apart across the slope (Olufaju, 1994).

2.3.3 Seed Variety

The first step in ensuring good uniform stands and consequently high yield is the use of adopted varieties. Until recently the only Soyabean variety available for cultivation in Nigeria was the Malayan, a late maturing (about 138 days), low yielding, shattering and lodging susceptible type. Recently breeding efforts have resulted in the development of cultivars with desirable characteristics such as early maturity, good tolerance to shattering, lodging and promiscuous nodulations. The

varieties are classified into maturity groups: early maturing 90 - 100 days, medium 110 - 120 days, and late above 120 days. These early maturing varieties are TGX 536-02D, TGX 1019-2E-N, TGX 1019-2E-B. For medium maturity, Samsoy I and II, TGX 849-313D, TGX 923-2E and M351 were used, while for late maturity the varieties are, TGX 306-036C and TGM 344 were recommended (Olufajo, 1994).

2.3.4 Time of Planting and Planting Population

Too early or too late planting have been found to have adverse effects on crops performance because, prolonged dry spell after planting may result in permanent wilting of the crop and need for replanting may arise.

The recommended dates for planting Soyabean for different ecological zones differs and they are: humid forest, first week to 30th July, forest Savanna 20th to 30th June, Southern Guinea Savanna late June to mid July, Northern Guinea Savanna 5 - 15th June. These dates depend on the varieties that are being planted (NAERLS Extension Bulletin No 68).

The recommended seed rate is about 40 to 50kg/ha depending on the spacing and seed size. Drill planting technique is used at a spacing row of 50 to 70cm and intra-row spacing of 4-7cm depending on the width of the row. It is very important to plant early as the length of raining season becomes shorter (*Singh et al*, 1987).

2.3.5 Type of Fertilizer and Method of Application

Phosphorus has been demonstrated to be the most important inorganic fertilizer in the Savanna ecological zone. Rate of application however, depends on previous cropping history of land. On newly cleared land phosphorus fertilizer is applied at a rate of 26 to 39kg/ha. On good soils that have been fertilized in the past, 13 to 18kg/ha is recommended. Since Savanna soils are often deficient in sulphur, single superphosphate which contains sulphur and calcium in addition to P_2O_5 is the best source of phosphorus (Olufajou, 1994). The fertilizer is applied through broadcasting or incorporated during land preparation. In open land it is placed in groves 8cm away from the plant immediately after germination (NAERLS Training Manual, 1993).

2.3.6 Weed Control

Weeds may be controlled manually by hoe weeding especially before closed canopy attainment. For effective weed control, Soyabean fields normally are hoe-weeded twice at 20-25 days and 40-45 days after sowing (Extension Guide No 3).

Some herbicides have been found effective for chemical weed control in Soyabean and they are Alachlor (Lasso), chloramben (Uniben), Metalachlor plus metabromuron (Galex) etc. This use depends on the predominant weed species and availability of the herbicides (Olufaju, 1994).

2.3.7 Insect, Pest and Disease Control

Several insects have been reportedly associated with Soyabean but the extent of losses caused by the insects are yet to be fully documented. The insects that reduce the yield of Soyabean are the foliage feeders, flowers and pod borers. Chemicals for controlling insect pests are Sherpa plus at 2 litres/ha and Thiodan at 2 litres/ha. The seeds can be treated with Farnasan d, Apron plus etc. before planting (Oyekan and Ayeni, 1992).

The disease that affects Soyabean are bacterial pustule, leaf spot, Soyabean mosaic virus. It can be controlled by using clean seeds, planting resistant varieties and also good farming systems such as crop rotation (NAERLS Training Manual, 1993).

2.3.8 Harvesting, Threshing and Storage

Soyabean is a crop that requires timely harvesting to check excessive yield losses. Soyabean is ready for harvesting when the pods are fully matured, turned brown with the seed tough in hand and when most of the leaves have fallen off.

Harvesting can be carried out when 85% of the pods are dry, and it should not be delayed for more than 5 to 10 days after maturity. Harvesting should be done in the morning and late afternoon to avoid shattering and breakage of seeds. During harvesting the stem are cut near the ground level and dried for about a week (Extension Bulletin No 68).

Threshing is done by beating the cut plant with stick and are then winnowed to remove debris.

Soyabean is stored when the moisture content is 13% wet basis. Storage structures for Soyabean are, jute bags, synthetic bags and ware-houses or wooden platforms. It can be stored upto 8 months in the Savanna regions and 6 months in the river-rine areas (NAERLS Training Manual,, 1993).

2.4 Resource Use Efficiency

The theory of efficiency is derived from the production process which involves transformation of inputs into outputs. This process is normally undertaken by producing units or firm-farms in agriculture whose ultimate objective may be profit maximization, satisfying food security, sales maximization or a combination of some of these objectives (Olayide and Heady, 1982).

According to Upton (1969) and Sanni (1969), it is assumed that in the production process, the quantity and quality of output realized at a particular point in time is a function of the quantity of input used. Also according to Kohler (1982), the concept of efficiency is concern with the relative performance of the processes used in transforming inputs into outputs. Resource use efficiency is of two types. There is the "technical" and "allocative" or "economic" efficiencies.

Technical efficiency is measured by relating the level of output achieved to the level of inputs used (Upton, 1969). According to Olayide and Heady (1982),

a firm is said to be technically efficient if it yields the maximum possible output per unit of variable resources. Also according to Timmer (1970), technical efficiency exists within a firm when it is impossible, with given technical knowledge to produce a large output from a given set of inputs.

Economic or allocative efficiency is defined only if resources and enterprises are chosen and combined in such a way that they attain or are near economic optimum (Upton, 1969). Also, allocative or economic efficiency is concerned with the choice of an optimum combination of inputs consistent with relative factor prices.

Allocative efficiency is determined by calculating the ratio of the marginal value product (MVP) to the marginal factor cost (MFC). The MVP is calculated from the respective regression coefficient using the appropriate formular depending on the lead equation or functional form, while the market price of one unit of the input concerned is the MFC. A ratio of one (1.0) means economic optimum allocative efficiency, while a ratio less than one implies that the input is being over used. When the ratio is greater than one it means the input is under used (Olukosi and Ogungbile, 1989).

Relating efficiency of resource allocation to the farmers production goals, Phiri (1991), is of the opinion that where the profit maximization and household approaches applied small scale agriculture, the results have always been at odds with each other. Farmers' performance measures based on the profit maximization approach, leads to a conclusion that small scale farmers allocate resources

inefficiently and that they are lazy and irrational decision makers. Whereas measures based on the household objectives lead to the conclusion that farmers allocate resources efficiently according to their subjective judgement of future outcome.

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

The study was conducted in Kaura Local Government Area of Kaduna State. This is because Soyabean is produced by almost every household in the area. The Local Government comprises two Chiefdoms, headed by the chiefs of Kagoro and Moroa. In each chiefdom, there are three districts. These are, Kadarko, Kukum and Fada-districts in Kagoro Chiefdom. While Zankan, Manchok and Bondon Districts are in Moroa Chiefdom.

The Local Government Area is about 300km South of Kaduna, Kaduna State. The area is located within the Southern Guinea Savanna. The Local Government Area is bounded on the north by Zangon Kataf Local Government Area, on the east by Barkin-Ladi Local Government Area of Plateau State, on the West by Kauru Local Government Area and on the South by Jama'a Local Government Area.

Kaura Local Government Area has abundant rainfall for about five to seven months in a year. The rains start from the month of April to the month of October with peak rainfall between August and September. The annual rainfall ranges between 1020mm and 1700mm, with mean annual rainfall of about 1650.2mm. The Local Government Area lies between latitude 09°N and longitude 08^{0}E. The

population figure of the area is 159,000 according to 1991 population census.

The people of Kaura Local Government Area are predominantly agriculturist, mostly subsistence farmers. Prominent among the crop grown in this area are, Millet, Rice, Maize, Soyabean, Beans, Ginger, Cassava, Sweet Potato, Groundnut, Hungry Rice (acha), Pigeon Pea, Cocoyam and Beniseed etc. Apart from crop farming, livestock is also reared in this area and they are pigs, chicken, ducks, sheep, goats and guinea fowl etc. However, there are some other income earning activities which are being carried out by the farmers such as basket and mat weaving, wood carving and blacksmitting. While others are in the civil services.

3.2 Sampling Technique

The study was carried out in Moroa and Zankan Districts. Four villages were selected purposively from these districts and they are Kaura, Zankau, Gizagwai and Fada-Atakar. These Villages produce Soyabean on a large scale.

Random sampling, where each farmers had equal chance of being selected was used. The sample is chosen by some random process i.e cards. In this method, plain papers are cut, and an inscription of Yes or No is written on the paper and wrapped. Farmers with Yes were then selected. A total of one hundred and twenty farmers were selected and interviewed through a structured questionnaire (i.e 30 farmers in each village).

3.3 Data Collection

The research was based mainly on primary data collected with the aid of structured questionnaire, complimented by oral interview.

However, secondary data were collected from the Local Government Area Headquarters to satisfy other aspects of the study. Data collected from the Local Government Area Headquarters are climatic condition, location and population figures.

3.4 Analytical Tools

Analytical tools used in this study were:

3.4.1 Descriptive Statistics

Simple descriptive statistical tools such as measures of central tendency (mean, percentages, and frequency distribution) were used to analyse farmers variables such as age, family size, educational level, farming experience and occupation of the farmers. Also it was used to achieve objective (iv).

3.4.2 Production Function Analysis

According to Olayide and Heady (1982), the production function stipulates

the technical relationship between inputs and outputs in any production scheme or processes. In mathematical terms, this function is assumed to be continuous and differentiable.

There are many algebraic equation of forms which can be used to derived production functions; they are Linear, Spillman, Cobb-Douglas, Quadratic, Semi-log, Square roots and Exponential functions etc.

But for this study Linear, Cobb-Douglas and Semi-log were tried to achieve objective II.

Data collected from the field were fitted into the three functional forms of the model and the coefficient of multiple determination (R^2) was obtained as a measure of goodness of fit. The functional form with the highest R^2 value and significant contribution of the independent variables and t-values was used because it explains the variation best and was regarded as a better fit (Heady and Dillon, 1972).

3.4.2.1 Linear Production Function

The Linear production function assumes linear relationship between the output and inputs as well as constant marginal productivity of the resource used. The model is given as:

$$Y = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + e$$

where:

Y = Total output of Soyabean in kilogramme.

X^1 = Farm size in hectare(s).

X_2 = Quantity of seed in kilogramme.

X_3 = Quantity of fertilizer in kilogramme.

X_4 = Labour in man-days.

a = Constant term in estimation.

$b_1 - b_4$ Regression coefficients of x_1 to x_4.

e = Error term.

3.4.2.2 Cobb-douglass Production Function

According to Olayide and Heady (1982), this function has some unique characteristics which are useful in empirical analysis.

i. The function is easy to fit and coefficient represents direct elasticities of each inputs.

When:

ii. $\sum_{i=j}^{n} b_i = 1$ we have constant return to scale

iii. $\sum_{i=j}^{n} b_i = \leq 1$ we have decreasing return to scale

iv. $\sum_{i=j}^{n} b_i = \geq 1$ we have increasing return to scale

The above features make computation easy and convenient. However, there are some limitations to the use of the model. The model does not allow for all increasing, decreasing and constant marginal productivity, it can not also be used for data with both positive and negative marginal product. It normally exhibits a non-linear relationship and it does not give a definite maximum response at all input level, thus restricting its usefulness. The model is given as:

$$Y = a\, x_1^{b1}\, x_2^{b2}\, x_3^{b3}\, x_4^{b4}\, e$$

In logarithmic form the function is.

$$\text{Log } Y = \text{Log } a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 \text{ x e.}$$

where:

Y = Weight of Soyabean in kilogramme

X_1 = Farm size in hectare.

X_2 = Quantity of seed in kilogramme.

a = Constant term.

$b_1 - b_4$ = Regression coefficients.

e = Error term.

3.4.3 Rationalization/Measurement of the Selected Variables

1. Output of Soyabean:

This is represented by Y and it is the quantity of Soyabean harvested from the sample fields. It was measured in kilogrammes.

2. Farm Size:

This is decoted by X_1 and it was measured in hectare(s). This variable is included in the model because of the universe relationship between farm size and productivity in farm management studies (Sanni, 1969).

3. Quantity of Seed:

This is represented by X_2 and it was measured in kilogrammes. The inclusion of this will show its influence on Soyabean output.

4. Quantity of Fertilizer:

Quantity of Fertilizer is represented by X_3 and it was measured in kilogrammes. This is included in the model because of the variation in quantity by the farmers and the extent to which its variations can influence

Soyabean output.

5. Labour Input:

Labour inputs is denoted by X_4 and it was measured in man days. It was measured based on manual, hired and communal labour.

6. Error Term:

This was denoted by e and it was included in the model to account for unquantifiable variables such as managerial ability and climatic variables that are not included in the model. It also accounts for error in the observation and measurement of these variable included.

3.4.4 Farm Budget Analysis

The farm budget as a tool of analysis is one of the simplest used in farm management and production studies.

According to Olukosi and Erhabor (1988), a farm budget is a detailed physical and financial plan for the operation of a farm for certain period. The aim of a farm budget is to compare how profitable different kinds of enterprise combinations can be. This was used to satisfy objective III by evaluating the costs and returns associated with Soyabean production. In this study the form of budget analysis used was Gross Margin Analysis.

3.4.4.1 Gross Margin Analysis

Gross margin analysis involves evaluating the efficiency of an individual enterprise or farm plan so that comparison can be made between enterprises or different farm plans. Purpose of the model is to identify the costs and profitability or loss per hectare. The total revenue represents the value of the output from the farm (i.e physical quantity of the crop multiplied by the unit price). The total cost on the other hand is made up of the "variables" and fixed components. (Olukosi and Erhabor, 1988). Both costs and returns was measured on per hectare basis. Hence the gross margin was based on per hectare basis.

The model is given as:

GM = GR - TVC.

where:

GM = Gross margin in ₦/ha

GR = Gross return in ₦/ha

TVC = Total variable costs in ₦/ha.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of Soyabean Farmers in the Study Area

Farmers socio-economic characteristics such as age, family size, level of education, farming experience and farmers occupation were examined and described to satisfy objective(I). In some studies, the socio-economic characteristics of the farmers are among the factors that influences the level of farm output. However this study did not determine the influence of these factors on Soyabeqan production but only described the variability of the factors among the samples farmer in the study area.

All the farmers at the time of survey are males. The average age of the farmers was 39 years. The farmers age categories are shown in Table 4.1

Table 4.1 The Distribution of Farmers Age

YEARS OF THE FARMERS	FREQUENCIES	PERCENTAGES
0 - 20	1	0.83
21 - 30	13	10.83
31 - 40	40	33.33
41 - 50	37	30.83
51 - 60	13	10.83
61 - 70	11	9.17
71 - 80	5	4.17
Total	**120**	**100**

Source: Field Survey, 1998.

Only 6.67% of the farmers were illiterate while 93.33% of the farmers acquired formal education by attending either primary, secondary, adult eduction, or tertiary institutions. The level of farmers education are presented in Table 4.2.

Table 4.2: The Educational Status of the Sample Farmers

NAME OF INSTITUTIONS	FREQUENCIES	PERCENTAGES
Primary	31	25.83
Secondary	32	26.67
Teachers College	21	17.5
Adult Education	25	20.83
Tertiary	3	2.5
Not Attended	8	6.67
Total	**120**	**100**

Source: Field Survey, 1998

Since education is one of the factors that determine the rate of adoption of improved technologies, it can be assumed that any improved technology on production will be easily adopted by majority of the farmers in the study area since almost all the farmers are literate and this will help to increase output of soybean in the study area.

The average family size of the farmers was 10. Examining the family size, it is justifiable for the available labour need for Soyabean production within the household. The categories of farmers based on family size are shown in Table 4.3.

Table 4.3: Distribution of Family Size of the Sampled Farmers

NO OF SIZE	FREQUENCIES	PERCENTAGES
0 - 2	7	5.83
3 - 5	28	23.33
6 - 8	34	28.33
9 - 11	41	34.17
12 - 14	10	8.33
Total	**120**	**100**

Source: Field Survey, 1998.

About 33.33% of the farmers have farming experience of 21 - 30 years, which means that Soyabean had been introduced in the Local Government Area for long. The farming experience of the farmers by years are presented in Table 4.4.

Table 4.4: **Distribution of Farmers according to Farming Experience by Years.**

YEARS	FREQUENCIES	PERCENTAGES
0 - 20	22	18.33
21 - 30	40	33.33
31 - 40	28	23.33
41 - 50	20	16.67
51 - 60	6	5.0
61 - 70	4	3.33
Total	**120**	**100**

Source: **Field Survey, 1998.**

About 33.33% of the sample farmers were full time farmers, they farm throughout the year, i.e they farm both during on and off season, so they had no other occupation apart from farming. While the remaining farmers combine *farming with other activities such as trading, basket and mat weaving,* blacksmitting and others work with the civil services. The categories of farmers occupation are presented in Table 4.5.

Table 4.5: Distribution according to Farmers Occupation

TYPES OF OCCUPATION	FREQUENCIES	PERCENTAGES
Trading	22	18.33
Full-Time Farming	40	33.33
Black Smiting	28	23.33
Wood Craving	20	16.67
Basket and Mat Weaving	16	5.0
Civil Services	4	3.33
Total	**120**	**100**

Source: Field Survey, 1998

Most of the farmers sampled indicated planting of other crops apart from sole Soyabean during the same cropping season but on separate fields.

4.2 Resource Use Efficiency

According to Kohler (1982), the concept of efficiency is concerned with the relative performance of the processes used in transforming inputs into output.

Regression Analysis was used to determine the resource use efficiency in Soyabean production in the study area (i.e objective two). Three functional forms (Linear, Semi-log and Double-log) were tried. Among the three Double-log provided the best line of fit with its coefficient of multiple determination R^2 being

the highest. Significant t - value was also used to determine the level of significance of the variables included in the model. Table 7 shows the Regression results from the three functional forms that were tried for the analysis.

Table 4.6 Regression Results from the three functional forms for Soyabean production in the study area

Functional	Regression Coefficients					Other Parameters		
Forms	Land (X1)	Seed (X2)	Fertilizer (X3)	Labour (X4)	Constant (a)	R^2	R^{-2}	F
	***		**	**				***
Linear	1569.79	1.16	19.36	11.22	1061.49	0.74	0.70	23.52
	(367.72)	(1.22)	(7.47)	(5.55)	(1031.90)			
	***		**					***
Semi-log	2800.96	1109.50	2096.38	1202.44	16072.13	0.74	0.70	23.61
	(922.33)	(665.09)	(942.47)	(1032.34)	(5478.06)			
	***	***	**					***
Double-log	0.519	0.290	0.300	0.113	4.92	0.84	0.83	46.71
	(0.118)	(0.085)	(0.119)	(0.132)	0.70			

Source: Field Survey, 1998

(a) *** Significant at 1%.

(b) ** Significant at 5%.

(c) Figures in parenthesis are the computed standard errors.

From Table 4.6, the value of coefficient of multiple determination (R^2) for Double-log was 0.84 which indicated that 84% of the variations in the Soyabean yield among sampled fields were explained by the variable inputs included in the

model. Other factors not included in the model might be responsible for the remaining 16% of the yield variations in Soyabean production.

The signs of coefficients estimated are positive for all the inputs, indicating that any increase in the inputs used will lead to increase in the yield of Soyabean. The coefficients were significant at 1% for land and seed inputs and 5% for fertilizer. The coefficient for labour was not significant, this might be that labour requirement for Soyabean production coincide with the labour requirement for other food crops especially during ploughing, planting, harvesting and threshing. Essentially Soyabean is a cash crop, farmers will always ensure food security for the family first, therefore at that critical period they may use the labour more on food crops. The coefficients for each variable input were further used to determine how efficiently the resources were being used. The other regression results by villages are presented in appendix B.

Table 4.7 shows the values for MPP, MVP, MFC for inputs used in Soyabean production among sampled farmers in the study area.

Table 4.7 MPP, MVP and MFC for In;us used in Soyabean Production in the Study Area

Variables	MPP kg/ha	MVP (₦)	MFC (₦)	MVP/MFC(₦)
Land(X_1)	14,08.05	14,081	1000	14.1
Seeds(X_2)	14.40	144	**15**	9.6
Fertilizer(X_3)	41.09	417	**36**	11.6
Labour(X_4)	4.76	48	16	3.0

Source: Field Survey, 1998

The marginal physical product and marginal value product for each variable inputs were determined. for Double-log, the model is differentiated first to obtain the marginal physical product. The coefficient for each variable inputs from Table 4.6, was multiplied by the mean of the output and then divided by the mean of each variable input. While for the marginal value product, the marginal physical product was multiplied by the unit price of the output. The model for marginal physical product and marginal value product are presented in the Appendix A. The marginal factor cost values are the unit price of each inputs.

From Table 4.7, the marginal physical product (MPP, 1408kg/ha) and marginal value product (MVP, ₦14,081/ha) from land were the highest when compared with the values obtained from other inputs. While the labour inputs had the lowest value for the marginal physical product (MPP, 4.76kg/man-hr) and

marginal value product (MVP, ₦48/man-hrs).

In order to determine whether the inputs have been used efficiently, the marginal value product was divided by the marginal factor cost i.e. the unit price of each input. From Table 4.7, all resulting ratios were greater than unity indicating that the resources were under-utilized for the production of Soyabean in the study area. The fact is that most of these farmers are small-scale and engage themselves in the production of other crops apart from Soyabean within the same cropping season nd other non-farming activities as described in the socio-economic characteristics of the sample farmers, therefore the inefficiency in the utilization of all the resources in the model might be due to the fact that the sampled farmers used these resources especially labour that gives the lowest value for the production of other crops or other activities. But for seed, it might be attributed to lack of improved varieties that are high yielding and resistant to shattering since the sampled farmers indicated that they still use the local variety that was introduced to them i.e the Malayan. While for fertilizer, the unavailability and high costs of it may affect the use of it. Although satisfactory yields can also be obtained without the use of micro-nutrients but substantial yields increases due to the addition of micro-nutrients. Therefore the resources were not efficiently used because the resources were not appropriately allocated to the production of Soyabean as indicated in Table 4.7.

4.3 Costs and Returns

The costs and returns associated with the use of the different resources for Soyabean production among sample fields in the study area were determined through the Gross margin analysis. The model for Gross margin analysis was presented in the methodology.

The total value of the gross returns for the production of soyabean per hectare was ₦27,173.70 while the total variable cost was ₦4,319.45 per hectare leading to a gross margin of ₦22,854.25 per hectare. The costs and returns analysis revealed that the production of soyabean in the study area was profitable as shown in Table 4.8, even though the resources were not efficiently utilized as indicated in Table 4.7, where all the values were greater than one.

Table 4.8 Value of Gross Margin Analysis Per Hectare

Items	Kg/ha	Value (₦/kg)	Total Value (₦)
Yield	2717.37	10	27173.70
Inputs			
Seed	56.15	15	842.25
Fertilizer	21.23	36	764.28
Labour	75.36	16	2712.96
TVC			4319.45
Gross Margin (GM)			22,854.25

Source: Field Survey, 1998

Note:

TVC = Total Variable Cost

GM = Gross Margin.

Table 4.8, shows the gross return and the total value for the gross margin. The average gross return or yield of the sample farmers is satisfactory even though the resources were under-utilized, but not substantially satisfactory because according to Singh *et al*, 1987 and NAERLS Training Manual 1993, the average yield of Soyabean per hectare under good management can be up to 3000 kg/ha. Therefore if these resources were efficiently utilized, the farmers could expect a better harvest which will be more profitable than the total gross return obtained.

4.4 Constraints Militating Against Soyabean Production in the Study Area

Most of the farmers sampled indicated lack of improved varieties, they still use the local variety that was introduced to them i.e the Malayan. Also majority of the farmers (about 63.33%) responded that fertilizer supply was very much inadequate in the area, which actually supported the results obtained from the determination of resource use efficiency where it was found that fertilizer and other resources were under utilized.

Majority of the farmers interviewed were also engaged in production of

other crops at the same cropping season with Soyabean therefore the labour requirement for Soyabean production was not easily met at the right time especially at some critical production period. Supporting services such as provision of improved technologies like tractor, ridges and harrowers etc and Extension services were not reaching the farmers to their satisfaction. Also low prices for farmers' output at the farm gate by the marketing agencies hinder the farmers from producing Soyabean on a large scale because the prices of other crops are better than the prices for Soyabean.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

Soyabean is an important crop because of its nutritive value in both human and animal diet, which in a span of three to four decades, it has become a prominent source of protein. It has also become a leaching source of edible oils and fat constituting about 20% of the world supply.

The annual average output of Soyabean in Nigeria from 1981 to 1997 was 144,000 tonnes. Soyabean is used in the industries as raw materials for making baby food, in the poultry industries as Soyabean meal. It is also used locally in some part of Nigeria by women at house-hold level to make cheese (wara) and also as substitute for locus been in a locally prepared food-seasoning material called "Dadawa".

The major problem of Soyabean production is low yield which is attributed to lack of large land area devoted for its production, low prices received by the farmers at the farm gate, lack of improved varieties and good agronomic practices.

The main objective of the study is to assess the performance of Soyabean production in the study area while the specific objectives are to: describe the socio-economic characteristics of the farmers, determine the resource use efficiency in Soyabean production, determine the costs and returns associated

with Soyabean production among sampled farmers and lastly, to examine the factors affecting Soyabean production in the study area.

The study was conducted in Kaura Local Government Area of Kaduna State. The Local Government comprises two chiefdoms i.e. Kagoro and Moroa. This study was carried out in Moroa Chiefdom. This Chiefdom has three districts and they are, Zankan, Moroa and Bondon. For the purpose of this study, Zankan and Moroa districts were selected because they produce Soyabean on a large scale base on survey carried out by the researcher. Four villages were selected purposively from these districts. These villages are Kaura, Gizagwai, Zankan and Fada Atakar. Farmers sampled were selected randomly by using a random process called the card method. A total of one hundred and twenty farmers were interviewed through a structured questionnaire.

Data collected for the study was based mainly on primary data collected with the aid of structured questionnaire. However, Secondary data was collected from the Local Government Area Headquarters which include, climatic condition location and population.

The tools of analysis used for this study were, descriptive statistics such as measures of central tendency (mean, percentages and frequency distribution), production functions (Linear, Semi-log and Cobb-Douglas) and also Budget analysis (Gross margin analysis). Among the production functional forms that were tried, Double-log was selected because it provided the best line of fit with its coefficient of multiple determination R^2 being 0.84. The signs of the coefficients

estimated were positive for all the inputs and significants at 1% and 5% for land, seed and fertilizer. While the coefficient for labour was not significant. The MPP and MVP were determine for each input as shown in Table 4.7, from the results all resulting ratios were greater than unity indicating that the resources were under-used for Soyabean production.

Costs and returns associated with soyabean production were determined by using the budget analysis. Among the budgeting techniques, gross margin analysis was used.

The costs and returns analysis revealed that soyabean production was profitable in the study area. A gross return of ₦27,173.70 and a total variable costs of ₦4,319.45 were realized leading to a gross margin of ₦22,854.25 per hectare. The total yield of soyabean per hectare was ₦2,717.37 kg/ha as shown in Table 4.8.

It is believed from literatures that if resources are efficiently use, the average yield of Soyabean per hectare is upto 3000kg/ha, therefore farmers still awaits a better harvest if these resources could be used efficiently, the profit of Soyabean will be higher than what is being obtained.

The factor militating against Soyabean production in the study area are, lack of improved variety of seed, inadequate supply of fertilizer, shortage of labour requirement at some point of time and also low price for their output.

5.2 Conclusion

With reference to all the various problems against increased Soyabean production in the study area, the research has shown that some significant level of profit could be realized since the average yield of Soyabean for the sample farmers was 2717.37 and the gross margin was ₦22,854.25 which accounted for 84% of the total yield. However, if the resources could be appropriately utilized, the farmers can still attain the maximum output of 3000kg/ha.

Due to the multipurpose use of Soyabean recently, which made some researchers and policy makers to call it the "wonder bean" of the country, there will be no doubt that the production of Soyabean will continue to increase rather than decreasing.

5.3 Recommendation

Considering Soyabean with its potential to ameliorate the incidence of protein deficiency and malnutrition such as Kwashiorkor in children and also as a source of protein in human and animal diet. In view of all the constraints earlier high-lighted in the production of Soyabean in the study area, some better harvest awaits the farmers if these constraints can be solved.

Farmers should form co-operative societies and also increase land areas put into Soyabean production. Through these cooperative societies, the farmer can acquire certain benefit from the government through their specialized

agencies, such benefits could be tractors, fertilizers, improved varieties of seeds at the right time, place and also affordable prices.

Since the abolition of the Commodity Marketing Boards, there was no adequate arrangement for marketing of farm produce. Hence the farmers at the farm gate do not receive reasonable prices for their product as indicated in Table 4.7. Therefore, the government should try and view this with the intent to help farmers dispose of their products at a fairly reasonable prices from the marketing agencies in order to encourage the farmers to produce Soyabean on a large scale.

Extension agents should also try and make a constant visitation to the farmers in order to solve some of their immediate problems especially on appropriate techniques use in production of crops. Also they should try as much as possible to educate the farmers on the need to form cooperative societies since most of the farmers are literate.

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APPENDICES

(A) $\text{Log } \bar{y} = a + b_i \log \bar{x}_i$

$\partial \log \bar{y} = b_i \partial \log \bar{x}_i$

$\frac{\partial \bar{y}}{\bar{y}} = b_i \frac{\partial \bar{x}_i}{\bar{x}_i}$

$\frac{\partial \bar{y}}{\partial \bar{x}_i} = MPP_x = b_i \frac{\bar{y}}{\bar{x}_i}$

where:

b_i = Coefficient of the inputs from Regression results.

$\bar{x}_i$ = Arithmean of each inputs.

$\bar{y}$ = Mean of the outputs.

MVP = MPP. Py.

where:

Py = Price of the unit output.

MPP = Marginal physical products.

MVP = Marginal value products.

MFC = Px.

where:

Px = Price of the unit input.

MFC = Marginal Factor costs.

(B) Regression Results by Villages

(i) Zankan

Functional	Regression Coefficients				Other Parameters			
Forms	Land (X1)	Seed (X2)	Fertilizer (X3)	Labour (X4)	Constant (a)	R^2	R^{-2}	F
Linear	*** 1569.81	1.16	** 19.35	** 11.22	1061.50	0.74	0.70	*** 23.51
	(367.71)	(1.23)	(7.47)	(5.54)	(1031.90)			
Semi-log	*** 2800.95	1109.51	** 2096.38	1202.44	1607.13	0.74	0.70	*** 23.61
	(922.33)	(665.10)	(932.51)	(1032.34)	(5478.06)			
Double-log	*** 0.519	*** 0.291	** 0.300	0.113	4.92	0.84	0.83	*** 46.71
	(0.117)	(0.085)	(0.119)	(0.132)	(0.70)			

Source: Field Survey, 1998.

*** Significant at 1%

** Significant at 5%

Figures in parantheses are standard errors.

(ii) Kauran

Functional	Regression Coefficients				Other Parameters			
Forms	Land (X1)	Seed (X2)	Fertilizer (X3)	Labour (X4)	Constant (a)	R^2	R^{-2}	F
Linear	*** 1569.79	1.16	*** 19.36	** 11.22	1061.50	0.74	0.70	*** 23.52
	(367.72)	(1.23)	(7.47)	(5.55)	(1031.90)			
Semi-log	*** 2800.96	1109.51	** 2096.40	1202.44	1607.13	0.74	0.70	*** 23.61
	(922.33)	(665.10)	(932.47)	(1032.34)	(5478.06)			
Double-log	*** 0.519	*** 0.291	** 0.300	0.113	4.92	0.84	0.83	*** 46.71
	(0.118)	(0.086)	(0.119)	(0.132)	(0.70)			

Source: Field Survey, 1998.

*** Significant at 1%

** Significant at 5%

Figures in parantheses are standard errors.

(iii) Fada - Atakar

Functional	Regression Coefficients				Other Parameters			
Forms	Land (X1)	Seed (X2)	Fertilizer (X3)	Labour (X4)	Constant (a)	R^2	R^{-2}	F
Linear	*** 1569.78	1.16	*** 19.36	** 11.22	1061.49	0.74	0.70	*** 23.52
	(367.72)	(1.22)	(7.47)	(5.54)	(1031.90)			
Semi-log	*** 2800.96	1109.51	** 2096.40	1202.44	1607.13	0.74	0.70	*** 23.61
	(922.33)	(665.10)	(932.51)	(1032.34)	(5478.10)			
Double-log	*** 0.521	*** 0.290	** 0.300	0.113	4.921	0.84	0.83	*** 46.71
	(0.117)	(0.085)	(0.119)	(0.132)	(0.70)			

Source: Field Survey, 1998

*** Significant at 1%

** Significant at 5%

Figures in parantheses are standard errors.

(iv) Gizagwai

Functional	Regression Coefficients				Other Parameters			
Forms	Land (X1)	Seed (X2)	Fertilizer (X3)	Labour (X4)	Constant (a)	R^2	R^{-2}	F
Linear	*** 1569.81	1.20	*** 19.41	** 11.22	1061.49	0.74	0.70	*** 23.52
	(367.72)	(1.23)	(7.51)	(5.55)	(1031.90)			
Semi-log	*** 2800.96	1109.51	** 2096.40	1202.44	1607.13	0.74	0.70	*** 23.61
	(922.33)	(665.10)	(932.51)	(1032.34)	(5478.10)			
Double-log	*** 0.521	*** 0.290	** 0.300	0.113	4.921	0.84	0.83	*** 46.71
	(0.121)	(0.085)	(0.119)	(0.132)	(0.70)			

Source: Field Survey, 1998

*** Significant at 1%

** Significant at 5%

Figures in parantheses are standard errors.

(C) Appendix "C" is the questionnaire format.

DEPARTMENT OF AGRICULTURAL ECONOMICS & RURAL SOCIOLOGY
AN EXPLANATORY SURVEY OF SOYABEAN PRODUCTION IN KAURA L.G.A. OF KADUNA STATE

A. BACKGROUND INFORMATION

Village..... Date.....

1. General

(i) Name..... Age.....

(ii) Educational Status:

Primary.....
Secondary.....
Adult Education.....
Teacher's College.....
Quranic School.....
Others.....

(iii) Family size..... Woman.....

(a) No. of children available for farm work . . . . . .

(b) No not available for farm work . . . . . .

(iv) Categories of farmers occupation . . . . . .

(a) Full time farming . . . . . .

(b) Wood Carving/Blacksmitting . . . . . .

(c) Basket and mat weaving .....

(d) Trading .....

(e) Civil Services .....

(v) Farming Experience (Years) .....

(vi) Mode of Cultivation..... Manual.....

Oxen..... Tractor.....

2. Crops and Cropping Pattern

Field Number	Sole Soyabean		Mixed Cropping								
	Field Size (Ha)	Distance from home		Field size	1st Name	Crop		2nd name	Crop	3rd name	Crop

3. Information on Inputs Used

(a) Seed

(i) What type of Soyabean variety do you normally grow?

(ii) Indicate the size of field cultivated and the type of varieties used.

Field No.	Field Size (Ha)	Name	Local Seeds					Improved Seeds	
				Quantity Used	Costs ₦	Name	Source	Quantify Used	Costs ₦
			Source						

Quantity Used: Kg, Bag, Tiya Basket, Basin etc:

(b) Fertilizer

(i) Did you apply fertilizer to the field where you plant Soyabean? Yes or No.

(ii) Of No, why .....

.....

(iii) If Yes, indicate, the source, type of fertilizer used.

Field No.	Field Size	Type	Source	Quantity	Costs ₦

Manure

Field No.	Field Size	Name of crop	Cattle		Sheep/Goat		Donkey	
			Quantity Used	Costs ₦	Quantity Used	Costs ₦	Quantity Used	Costs ₦

(C) Chemicals

(i) Do you treat the seeds with chemicals before planting? Yes/No.

(ii) If No, why .....

.....

(iii) If Yes, indicate below in the table

Field No.	Field Size (Ha)	Insecticides				Herbicides			
		Name	Source	Quantity	Costs	Name	Source	Quantity	Costs ₦

Quantity, Kg/Littre

(iv) How did you apply the chemicals (Method of Application)

(4) Labour Inputs

(a) Clearing

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Female No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(4b) Riding

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Female No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(C) (i) Planting

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Female No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(c) (ii) Replanting

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Femal e No.	Childre n No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(D) (i) Weeding

1st Weeding

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Female No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(D) (ii) 2nd Weeding

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Femal e No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(E) Spraying

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Female No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(F) Harvesting

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Female No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(G) Threshing

Field No.	Field Size	Date of operation	Family Labour			Hired Labour						
			Male No.	Female No.	Children No.	No. Hrs.	No. Days	No of Male	No of Female	No of Children	No of Days	Costs

(5) (a) Information on Outputs

Field Number	Field Size (Ha)	Unit Harvest	No of Unit Harvested

Unit Harvested: Kg, Bag, Tiya, Basket etc.

(b) Distribution and Sales of Output

Field No.	Field Size	Unit Used	House Used	Stored for Seeds	Gifts	Marketed	Costs ₦

(6) (a) Have you been assess to Extension visits? Yes or No .....

(b) If Yes, how many times? .....

(c) If No, why? .....