ANALYSIS OF FACTORS INFLUENCING ADOPTION OF IMPROVED CEREALSEEDS AMONG RURAL FARMERS IN SABON GARI LOCAL GOVERNMENT AREA OF KADUNA STATE NIGERIA

BY

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DECLARATION

I hereby declare that this thesis titled "**ANALYSIS OF FACTORS INFLUENCING ADOPTION OF IMPROVED SEEDS AMONG RURAL FARMERS IN SABON GARI LOCAL GOVERNMENT AREA OF KADUNA STATE, NIGERIA**" has been written by me and it is a record of my own research work. It has not been presented in any previous application for a higher degree. All borrowed ideas have been duly acknowledged.

Mosimabale Victoria Olufunmilola	**Date**

CERTIFICATION

This thesis titled **"ANALYSIS OF FACTORS INFLUENCING ADOPTION OF IMPROVED SEEDS AMONG RURAL FARMERS IN SABON GARI LOCAL GOVERNMENT AREA OF KADUNA STATE, NIGERIA"** meets the regulations governing the award of the degree of Master of Science in Agricultural Extension and Rural Sociology, Ahmadu Bello University and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This Thesis is dedicated to my Husband Dr. F. O. Mosimabale and my children, Oluwadamilola, Benevolence, Ore-Ofeoluwa and Joseph.

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ABSTRACT

This study examined the factors influencing the adoption of selected improved cereal seeds among rural farmers in Sabon-Gari Local Government Areas of Kaduna State, Nigeria. A multi-stage sampling Technique was used to select a total number of 129 respondents. Analysis of the data was done using descriptive statistics and linear multiple regression. The result of linear multiple regression analysis showed that age, level of education, farm size, extension contact, access to credit and membership of cooperative Society had positive significant influence on adoption of improved seeds. On common sources of seed supply and source of information available to the farmers regarding improved cereal seeds, the study revealed that home saved seeds (43%) are the most common source of seed supply while farmers and friends (23%) also identified as the commonly used source of information. The constraints encountered by the various categories of respondents in the study area range from high cost of improved seeds, non-availability of improved seeds, problem of pests and diseases, high cost of major inputs, high cost of labour, lack of access to credit, inadequate farmer education as well as lack of profitable markets. It was recommended that there should be policy measures by the Government that would guarantee timely seeds supply and distribution at affordable price to the rural areas. Information received from farmers also revealed that most of them and especially rice farmers lack access to profitable markets. Based on this information, it was therefore recommended that importation of rice be banned to encourage local production and invariable improve rural livelihood and food security of the nations.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Improved seed accelerates the achievement of food security as witnessed in developed countries like China and India (National Agricultural Seed Council, 2010). Availability of superior crop varieties (maize, sorghum and rice) with high potential yield qualities will go a long way in increasing the productivity of crop per unit area put under cultivation. Seed being the primary input in food crop production is often not paid the adequate attention it required as the key to a sustainable agricultural production. Improved seed varieties at affordable prices are a critical requirement for an enhanced agricultural development. It is a strategic input of change from low to very high agricultural productivities (Joshua and Omidiji 1999).

The efficacy of other inputs such as fertilizer, pesticide and credit is dependent on the use of high quality seed (FAO, 2002). It is the catalyst and a veritable tool in increasing farm income, wealth creation and employment generation for vast majority of Nigerian rural populace (Kormawa *et al.*, 2002). The uptake of these improved seeds by farmers is the bedrock for achieving food security and industrial development (Shobowale, 2008). This is in accordance with the view of Omaliko (2000) who indicated that "the main issue in food security is that of improved quality seed". He further mentioned that one of the contributing factors to food insecurity include deficiencies in supply and delivery of farm input such as seed and the farmers inequitable distribution of working capital to secure good quality seed for farming purpose. However, Usman (1994), noted that no country or society can develop a market-oriented agriculture without an efficient seed supply system properly put in place. It is for this reason that the Nigerian government has set up the formal seed system which is responsible for improving the quality and quantity of improved seed available to farmers at the right place, time and at affordable price (Usman,1994).

Though agriculture is the most important economic sector in Nigeria contributing about 41% of the country's Gross Domestic Product (GDP), and providing employment to about 80% of the rural population, agricultural production in Nigeria still depends mostly on small scale farmers who are often characterized by the use of traditional practice (Damisa and Yohanna, 2006). One of the major problems of low agricultural productivity encountered by most farmers in the sub-Sudan African countries has been the use of low yielding seeds and insufficient awareness of the economic benefits of improved and high yielding seed. According to Tripp (2001), 60-70% of seed used by rural small holders is saved on farm and the remaining 30-40% is borrowed or purchased locally.

Adoption of improved seed is regarded as a decision to make full use of an innovation or technology (Rogers, 1995). An innovation is an idea, method, object or practice, which is regarded, as new by individuals but which may not always be the result of recent research. Also, Ewuola (1985), notes that adoption is synonymous to transfer of technology. He defines transfer of technology as that which embraces all efforts to make sure that the farmers adopt new technology. Before any technology is adopted, it must pass through a process of adoption, which involved awareness stage (when an individuals first heard about improved practice/innovation): the interest stage (an individual start having interest in the new practice, hence gathering more information about it); evaluation stage (an individuals start judgement, normally on small scale) and adoption stage (an individual decide to continue the full use of the new practice (Rogers and

Shoemaker, 1971). The process of making a decision is not an instantaneous one but rather occurs over a period of time and does not always follow the sequence in practice.

Given the critical role and the ability rural small holders have, to transform agricultural sector, the major task is how to facilitate the improvement of seed system in Nigeria that is capable of generating, producing and distributing new seed varieties that meet the seed needs of a wide spectrum of farmers in a cost effective way.

The need for use of improved package seeds by small rural farmers in Nigeria can be traced to the mandate of the National Agricultural Seed Council (NASC), whose role is the production and regulation of the seed industry in Nigeria.

1.2 Problem Statement

Over 85% of the domestic food production in Nigeria is in the hands of small scale farmers (Soludo, 2007). The farmers get limited returns from their farm produce in spite of the much effort they exert to increase their income (Olayemi, 1991). The income of these farmers is so small that investment in agriculture through the purchase of farm inputs for increased production is highly insignificant (Nafziger, 1994).

Most farmers in developing countries and Nigeria in particular rely heavily on informal channels for access to seeds these include on farm seed saving, farmer to farmer exchanges and unregulated sale outlets. According to Adeolu, (1991) the task of agricultural development cannot be achieved by relying heavily on informal channels for access to seed. Omidiji (2008) reported that one of the challenges to National Seed System is that many farmers about 80-90% still use farmer-saved seeds. In an effort to reverse this trend, the Federal Government of Nigeria through its provision of legal backing, established the National Agricultural Seed Council (NASC) with the mandate for production, promotion, regulation and control of independent seed industry. The national seed policy that is backed up by the National Agricultural Seed Act No 72 of 1992 also emphasizes the seed industry development programme and promotion of communities seed programme for provision of adequate and good quality seed to local farmers. Given the critical role improved seeds(maize, sorghum and rice) play in food production and its role in agricultural development, there seems to be a missing link in the awareness and usage of these improved seeds(maize, sorghum and rice)in Sabon Gari Local Government Area. The need to examine the factors influencing the adoption of improved seeds by farmers in this area becomes imperative. Thus, this study intends to address the following research questions:

i. What are the socio-economic characteristics of the rural farmers in Sabon Gari Local Government Area?

ii. What is the level of awareness of improved seed among the rural farmers in Sabon Gari Local government Area?

iii. What are the sources of information on improved seeds available for farmers?

iv. What are the common sources of seed supply to the farmers in the study area?

v. What are the socio-economic and Institutional factors influencing the adoption of improved seeds by rural farmers?

vi. What are the constraints associated with the adoption of improved seed by farmers in Sabon Gari Local Government Area.?

1.3 Objectives of the Study

The broad objective of this study is to analyze the factors that influence the adoption of improved seeds among rural farmers in Sabon Gari, Local Government Area of Kaduna State, Nigeria.

The specific objectives of the study are to:

i. describe the socio-economic characteristics of rural farmers in the study area,

ii. assess the level of awareness of improved seeds among the rural farmers in the study area,

iii. identify source(s) of information on improved seeds available for the farmers,

iv. assess the common sources of seeds supply for the farmer in the study area,

v. determine the socio-economic and institutional factors influencing the adoption of improved seed by rural farmers in Sabon Gari Local government Area and

vi. identify constraints associated with the adoption of improved seed by the rural farmers in Sabon Gari Local Government Area.

1.4 Justification

Food security is of particular concern to all who are interested in the welfare of the millions of people living in the developing countries, including Nigeria (Charlotte, 2004). Thus, seed is a very important input in agricultural production. The availability of quality seed of improved varieties and the usage by all crop farmers nationwide irrespective of scale will go a long way in increasing productivity and producing enough food for the nation's growing population (Omidiji, 2008). In view of the above, it is therefore hoped that this study will add to available information about the value of improved seed. It is also hoped that this research will benefit extension workers and rural farmers, in strengthening their capacities to promote the adoption of improved seed varieties toward improving agricultural production and livelihood of farmers.

1.5 Hypotheses of the Study

i. There is no significant relationship between socio-economic factors and adoption of improved seeds in the study area.

ii. There is no significant relationship between institutional factors and adoption of improved seeds in the study area.

CHAPTER 2

LITERATURE REVIEW

2.1 Seed

A seed differs greatly from a grain in the sense that though both are biologically formed by the same process the two are quite different with respect to functions and objectives of production. Seed is meant to be used for producing good crops, whereas grain is meant for food, feed or raw materials. Accordingly, both commodities have to be handled differently. Even where there is surplus seed to be considered for use as grain, the issues that may arise are, whether treated seed is safe for consumption or is it economic to do so. On the other hand, any attempt to use grain as seed is bound to reduce the potential yield, and hence should be discouraged (NSS, 1991).

A good quality seed signifies planting materials that possesses the following characteristics:

- Superior, high-yielding variety.
- Good consumer acceptability.
- Genetically pure.
- High germination percentage.
- Free from insect pest.
- Free from other crop seed.
- High seedling vigour.
- Free from noxious weed seed.
- Free from inert matter.
- Safe moisture content.

- Good physical appearance.
- It is with all these attributes in mind that we want to examine the seed systems (NSS, 1991).

2.2. Seed System

Several attempts by Feistritzer and Kelly (1988), Cromwell (1990) have been made to define seed system. Their definitions emphasize seed production and supply of modern varieties by the 'formal' seed section. However, the concept of seed system has developed and expanded to include the role of the informal seed sector in seed supply. This is in accordance with the view of Robertson (1997) who indicated the seed system as the total of the physical, organizational and institutional components, their actions and interactions that determine seed supply and use in quantitative and qualitative terms. Thus, two distinctive, but interacting types of seed delivery system are now recognized: formal and informal seed sector.

2.3 Overview of Seed System in Nigeria

The quality and orientation of a country's agriculture are closely related to the availability and use of high quality seed (Usman, 1994). Agricultural Specialists and planner all over the world have recognized that no country or society in our time has developed or can develop a highly productive market-oriented agriculture without an efficient seed supply system properly put in place. It is in this recognition that the Federal Government of Nigeria approached the Food and Agriculture Organization of the United Nations (FAO/UN) in 1974 for technical assistance in the establishment of Seed Service in Nigeria. The National Seed Service is a specialized unit of the Federal Department of Agriculture in the Federal Ministry of Agriculture and Rural Development. It was established in 1976 and backed by a decree known as the National Seed Decree which is decree No. 72 of 1976.

The development of the National Seed Service (NSS) was supported by two FAO projects; the first project is the improvement in the production and quality control of food crop seed: which took place from 1975 to 1980 and was funded by UNDP and the second project from April 1981 to December 1985 was funded entirely by the Federal Government of Nigeria under a Unilateral Trust Fund arrangement which showed the importance of improved seed production to the Federal Government of Nigeria. During the period, seed processing and seed testing facilities were also provided and installed at Ibadan and Samaru Zaria. A large number of officers were trained and a cadre of seed growers was developed. The FAO was the executing agency while Federal Department of Agriculture was the cooperating agency on behalf of the Federal Ministry of Agriculture. During the final phase of the project, (1988-89) the National Seed System, enjoyed another technical assistance from FAO/UNDP on the improvement of quality seed, through the provision of equipments and training of laboratory staff.

With the development of the NSS, the State Seed System also took-off with collaborative effort of the NSS; each state had a State Seed Multiplication Unit (SSMU) which produced certified seeds for its farmers from the foundation Seeds obtained from the NSS. In 1985, the private sectors were integrated into Nigeria Seed industry. This prompted a more aggressive seed Certification and Quality control scheme to inspect and monitor seed quality at all stages of production, including Research and Development. One seed certification officer is assigned in each state to carry out the seed certification activities, and four Seed Testing laboratories were also established in the region including Abuja for Seed Testing activities.

Nigeria adopted the International Seed Testing Association (ISTA) rules and by 1989 National Seed System had resulted into production and distribution of improved seeds, creating awareness of the benefit of improved seed through seed certification and Quality control system and seed manpower development (Usman 1992). The system in Nigeria will be briefly discussed under three sub-headings: formal, informal and community:

2.3.1 Formal seed system in Nigeria

The present seed system is established by Law under decree 72 of 1992. (Omolako, 1992). It is the chain of seed production and marketing involving the research institutes, both National and International, for research, cultivar development, breeder seed production and varietal maintaince; NASC is for coordination and multiplication of foundation seed, certification and quality control, seed law enforcement and seed industry development, while state ADPs, seed companies and NGOs produces certified seed for the end user (Sule, 2008).

2.3.2 Informal seed system.

The chain of seed production and marketing involving farmers who save seed from harvest to planting, occasionally selling or exchanging seed with other farmers, but without any mechanical processing, testing or labeling (Osborn and Faye,1991). Cromwell (1992), reported that this sector often account for the majority of seed sector activity in most developing countries and involves well established and elaborate mechanisms for the diffusion of seed over relatively wide areas.

2.3.3 Community based seed system

Tripp (2001), reported that, since most of the flow of seed takes place within individual farming communities, based on documented experiences across sub Saharan Africa it is therefore suggested that the seed production system should encourage the informal sector, which can meet the seeds needs of a wide spectrum of farmers. Venkatesen (1994) noted that given adequate training, farmers can be taught to produce good quality seed even that of hybrids. This is in accordance with the initiatives of Ethopian government as reported by Tafesse (2000), that training of farmers in production, cleaning and preservation technology has the ability to sustain agricultural production through adaptation and improvement of indigenous varieties.

According to Tripp (2001), additional source of seed at the local level is the market. Grain or tubers normally sold in markets or shops for consumption may also be used as seed. If farmers have access to markets or shops. They can use these as additional sources of seed.

2.4 Seed Production in other Developing Countries of West Africa

Tripp and Walker (1997) have reported that countries such as Angola, Ghana, Zambia, Mozambique and other developing countries of Africa have a long history of traditional agriculture under which the farmer saves a portion of his harvest to plant the succeeding crop. Organized seed production and supply is of recent origin, mostly initiated after attainment of independence. On-farm seed is often considered as major component of seed supply and seed security in developing countries. Even where there is formal sector, emphases is placed on only few crops mostly high value crops.

2.5 Socio-Economic Characteristics of the Target Farmers

The relatively less-poor segment of the target group has enough family labour to produce sufficient marketable surplus but remain vulnerable. These families can afford small quantities of fertilizer when available, and hire some labour to work on their farm, but the lack of capital for investment in agricultural production usually forces them to sell most of their harvested crops when prices are low. Empirical studies by Atala (1980) and Akanya (1989) showed that farmers' socio-economic characteristics include age, level of education, membership of association, household size, income, cosmopolitness and social status. Other studies (Abdullahi, 2005, Saleh, 2006) indicated that farmers participating in a programme are generally of low literacy and income levels, though having higher score in levels of production and living standard than their non-participating counter parts in the area.

2.6 Level of Awareness of Improved Technologies

Onyenwaku (1991) discovered that lack of awareness of technology is the most limiting factor to adoption. As reported by Ekong (2003) awareness of improved agricultural technologies is the first stage in the adoption process. It is the stage where an individual or group first learns about the existence of a technology. Emah and Siteh (2008) indicated that awareness depends on the number and type of information sources used by farmers while lack of awareness of agricultural technologies and poor dissemination of technical information are significantly related to number of extension agent (Emah 1992). Research has established that farmer's awareness and adoption behaviour is also a function of socio- economic, socio-cultural and institutional factors such as farm size, age, level of formal education, income, household size and frequency of extension contact (Galzark; 1968; Clark and Akinbode, 1968; Basu, 1969; Voh 1979; Ako 1971 and Okwoche 1998).

2.7 Adoption of Improved Technologies

Understanding the farmers and their environment and determining the appropriateness of farm innovation to these situations are prerequisite to adoption of improved technology.

Adoption is the decision by a farmer to use a technology continuously over a period of time (Rogers, 1995). The time taken for adoption varies with nature of the technology: the communication channels used and the characteristics of the social system. Empirical studies by Rogers (1995) GMMYT (1993), Feder and Umali (1993) revealed adoption studies as an important tool for measuring and assessing the impact of agriculture technologies. Abalu *et al.* (1977) reported that when farmers find recommended farm innovation not to be technically feasible, economically viable and culturally compatible, they often reject such innovation. However technology adoption brings potential impact at farm and house hold levels (Sanging et al 1999).

2.8 Impact Assessment on Technology

Impact can be defined as long term influence on the state of the environments surroundings and organization (Kancer et al, 1981). Impact of a technology can be seen in relation to what the services actually do to the people who receive them. According to Patter (1978), it is the actual technology outcomes in relation to the desired goals. In determining the impact of an innovation or a programme therefore, Lunsdaine and Bebbett (1975) suggested that the goals or objectives of the organization rendering the services should be established.

2.9 Constraints to Adoption of Improved Seed by Small Scale Farmers.

A number of constraints to the adoption of improved seed by small-scale farmers have been identified by researchers (Pray and Ramasawmin, 1991: Cromwell *et al,* 1992 and Hansen, 1992). They argued that formal seed sector can only offer seed of a limited range of varieties and within specified quality standard. This is due to its involvement in variety development, evaluation, seed production, quality control, marketing and distributing operation. Cromwell *et al*, (1992) and Sperling *et al*., (1993) have also identified inadequate quantity and quality of seed delivered, seed production costs, price and timeliness of supply, appropriateness of varieties available, rigid government policies, inflexible regulations, poor organizational linkages and inadequate infrastructure.

2.10 Theoretical Framework

The theoretical framework for this study will be guided by social change theory.

2.10.1 Social change theory

Social change pervades all aspect of life and may manifest as economic, political, technological, cultural and bahavioural. Rogers and Burdges (1972) defined social change as the process by which alteration occurs in the structure and function of a social system. According to Ekong (2003) it is the modification in human attitudes and behaviours pattern as a result of education.

Social change may be planned or unplanned (i.e. accidental) Ekong (2003) and Rogers (1971) defines planned change as human interventions that seek to introduce idea in order to achieve set goal. NASC innovation is an example of planned change that seek to move the farmers from traditional way of recycling home saved seed to the use of improved seed thereby improving the yield and income level of farmers in the study area through the uptake of improved seeds.

2.10.2 The theoretical model

A model is a figurative representation of a perceived object used to guide one in the pursuit of knowledge (Adeniji, 2002). Ekong (2003), in his own view defined theoretical model, as a broad system of explanation that is founded not so much on prior research finding but largely on untested and perhaps unprovable assumptions. The model for this study posits that socio-economic and institutional variables would influence the uptake of improved seed in the study area. Similarly, this model posits that the uptake of improved seed in the study area will lead to increase in yield and income of small scale farmers. (Fig 1).

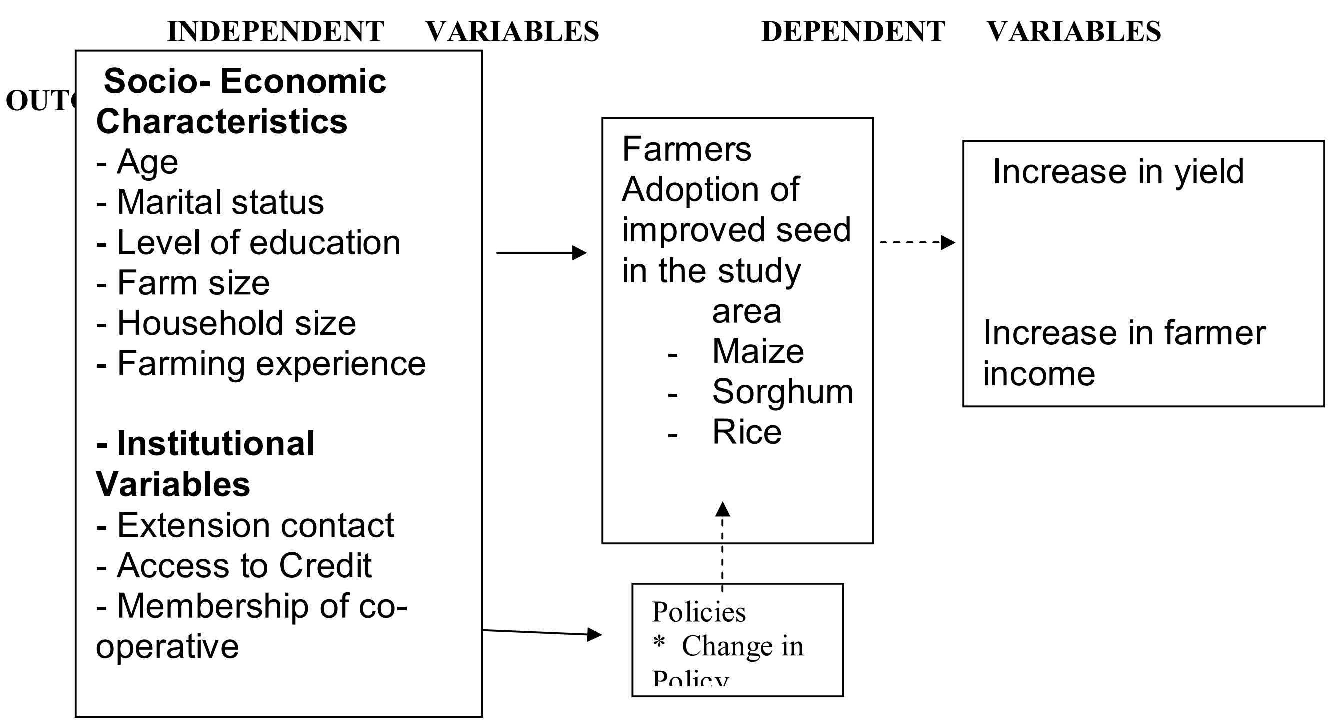

Figure 1: A model showing the relationship between independent and dependent variables and the likely outcome.

CHAPTER 3

METHODOLOGY

3.1. The Study Area

The study was conducted in Sabon-Gari local government area of Kaduna state, Nigeria. The area was purposively selected on the basis of the location of the Seed companies, Institute for Agricultural Research (IAR) and National Seed Council situated at the area.

Kaduna state is located between latitudes 09^0 02'N and 11^0 32'N and between longitudes 06^0 15'E and 08^0 6^oF of the Greenwich median. The state has a population of 6,066,512 people according to 2006 population census it has an estimated cultivable land area of about 45.786km^2 with only about 30,000km^2 under cultivation by traditional low income group (Aku, 1991). The State is marked with two distinct seasons of wet and dry season, the wet season commences in the month of April in the Southern part of the State and May and June in the Northern part. The mean annual rainfall varies between 1107mm in Samaru to 1286mm in Kaduna.

Sabon Gari Local Government Area (LGA) with an area of 70206 km^2 and a projection of 633,096 people (NPC, 2006), is one of the twenty-three LGA's of Kaduna State. The inhabitants of the area are mainly Hausa with a good mix of other tribes. The main occupation of the people is farming with a large number of civil servants and traders. Some of the civil servants and traders are also involved in agriculture on part time basis. Due to the location of Sabon Gari LGA in the Northern Guinea Savanna, it receives an average annual rainfall of 1100mm and a mean temperature range of 27^oC to 35^oC. This climate is suitable for the cultivation of cereal crops and cowpea and also favours the rearing of livestock e.g cattle, sheep and due to the predominance of grasses and browse shrubs in the vegetation of the area. The major crops cultivated in the area include Sorghum, Millet, Cowpea, Rice, Groundnut, Soyabean cotton and Vegetables.

3.2 Sampling Procedure and Sample Size

A multi-stage sampling method was adopted for this study. One Local Government Area (Sabon Gari LGA) was purposively selected in the first stage because a number of seed companies are located there. In the second stage, five villages were selected based on the concentration of maize, sorghum and rice farmers in the areas and these include: Basawa, Dogarawa, Unguwan Gwado, Shika Dam and Zabi. Based on the information gathered from Kaduna State Agricultural Development Programme (KADP), the total number of farmers in the villages is one thousand two hundred and ninety (1,290). This formed the sample frame for the study. Finally, 10% of this population was randomly selected to form the sample size of 129 as shown in Table 1.

Table 1: Distribution of Respondents in the Study Area.

Village	Sample frame	Sample size (10%)
Basawa	250	25
Dogarawa	350	35
Shika Dam Village	280	28
Ungwan Gwado	150	15
Zabi	260	26
Total	**(1,290)**	**129**

3.3 Method of Data Collection

Data collection consisting of primary and secondary data. The primary data were collected through interview method based on the use of structured questionnaire. This was used to elicit information from the farmers. The secondary data on the other hand, was sourced from reports, bulletins, journals from National Agricultural Seed Council (NASC), KADP, Seed companies, NGOs and other stakeholders in seed business, the library and the internet.

3.4 Analytical Techniques

The data collected were subjected to both descriptive and inferential statistics. Descriptive statistics such as, percentages and frequency distribution were used to achieve objectives 1, 2,4,5, and 6 of the study and linear multiple regression analysis was used to analyze data collected for objective 3.The multiple regression analysis is useful for estimating the contributions of each variable to the dependent variable to determine the best variable contributing to the adoption of improved seeds by farmers (Osuala, 1987).

The linear multiple regression model is expressed as follows.

$$Y = a + b_1x_1 + b_2x_2 + \ldots\ldots\ldots\ldots\ldots\ldots + b_{12}x_{12} + U$$

Where Y= (Adoption of improved seed of maize, sorghum and rice)

a = Constant

X_1= Age of farmer (in years)

X_2= Marital Status(Dummy 1=married,0 otherwise)

X_3 = Level of education of farmer (years of schooling)

X_4 = farm size (ha)

X_5= Household size (Number of members)

X_6 = Farming experience (yrs)

X_7= Extension contact (Number of visits)

X_8= Access to credit(Access=1,no access=0)

X_9= Membership of co-operative society

b_1-b_9 = Regression coefficients

3.5 Definitions and Measurement of Variables

3.5.1 Independent variables

3.5.1.1 Age

This is the number of years a person has lived. Age could have an important influence on individual experience, authority and resources to hold on in traditional techniques or recommendations in small scale farming. This was measured in terms of actual age the respondents give at a time of this study.

3.5.1.2 Level of education

This is indicated by stage of education attained by the respondent. This was measured on a scale of 1-5 as follows;

No formal education	1
Primary School	2
Secondary School	3
Tertiary School	4
Others	5

3.5.1.3 Farming experience

Experience in farming could be a relevant indicator for successful operation. It is the length of time the respondent has been in farming. This variable was scored in years according to the number of years of each respondent in farming.

3.5.1.4 Household size

This is the number of persons living under the care of the respondents at the time of the study. Some farmers still depend on strength or household labour to boost productivity. The total number of people in the respondent's household was his score.

3.5.1.5 Farm size

This is the size of farm operated by the farmer. One of the characteristics of small scale rural farmers is fragmented land holding (Olayide, *et al.*, 1980). This was measured in hectares and the number of farm plots operated will be aggregated.

3.5.1.6 Access to credit

This is the access to external sources of fund by farmers for the purpose of farming. This was score as 1 for access and 2 for no access.

3.5.1.7 Membership of cooperative society

This was measured by the respondents' claims to belonging to any society as at the time of this study. The score .is 1 for membership and 0 for non-membership

3.5.1.8 Contact with extension workers

This is the frequency of visits by the extension agent to the farmers. It was measured by the number of visits the respondent received in the last one year by extension workers.

3.5.2 Dependent variable

Adoption is the decision to make full use of improved seeds in farm production as the best course of action on a continuous basis. For the purpose of this investigation the adoption of the three cereal crops selected were measured by allotting percentage scores to each respondent based on their level of use of improved seeds.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter presents, describes and analyses the results of the study using descriptive and inferential statistics with focus on the findings related to the objectives of the study and testing of the hypotheses generated.

4.1 Socio-economic and Institutional Characteristics of Farmers in the Study Area.

The first objective of this thesis was to describe the socio-economic and institutional characteristics of farmers in the study area. Table 4.1a and b is the summary of distribution of respondents according to their socio-economic and institutional characteristics.

4.1.1 Age of respondents

The study found that majority of the farmers were between the ages of 36, 45 and 44 years. Also, about 32 % of the respondents represented farmers whose age fell between 46 and 55 years. Only 7% of the respondents were above 55 years while 17% were in the age bracket 20-35. The most active and virile group of 20–35 years were low with 17%. This may be due to the fact that most of the farmers or respondents in the age bracket had preference for white collar jobs, trading or other crops not covered by this investigation. Age classification is necessary in this study because physical ability, productivity and agility depend on age.

4.1.2 Gender

The study found that majority of the farmers were males. This group makes up 91% of the respondents. Only 9% of the respondents were females.

4.1.3 Marital status

The result of this study show that majority of respondents were married. 95% of the respondents were married while 5% were single.

4.1.4 Level of education

The findings showed that most of the respondents (51%) had no formal education. 49% of the respondents had one form or the other of of formal education. Education plays a major role in awareness creation among farmers and has shown to influence adoption of improved agricultural practices (Ogunfiditimi, 1981; Voh 1982; Igbokwe 2000; Onomolease, *et al*., 2001 and Ogunbameru, et al., 2008).

4.1.5 Farm size

The result in table 4.1a shows that 84(65)% of the respondents had farm sizes of less than 2 hectares while 40(31%) and 5(4%) of the respondents had farm sizes of between 2-4.5 hectares and greater than 4.5 hectares. The data showed that 65% of the respondents had farm sizes of less than 2 hectares. This implies that most of the respondents in the study area were small scale farmers. This conforms with Olayide *et al*., (1981); Asuquo, (1984); Erie, (1996) and Omohan, (1996) with farm size classification of 0.1-5.9 hectares as small scale farms. The inclusion of farm size as variable in this study is relevant because it can determine farm output and farm income of farmers (Amodu, 2010).

4.1.6 Household size

Responses on household size as a variable indicate that 76% of the respondents had more than 5 people in their households and 24% had a household size of 1-5 members.

Respondents with the largest household size of 20 and above had the lowest percentage of 5%. The data suggest that since over half of the respondents 76% had a household size of above 5 members; they may not have to look for hired labour for their farming activities. A large family may be a source of pressure for improving farm output and farm income.

4.1.7 Farming experience

Experience is gained with age. The more experience the farmer is, the more likely is his ability to make effective farm decisions. Table 4.1a shows that 11% of the respondents had been in farming for 5 years or less, 25% have been in farming for 6-11years, 25% for 12-17 years and 39% have been farming for 18 years and above. Respondents with farming experience of 6 years and above had the highest percentage of 89%. With this level of farming experience, it is expected that farmers in the study area are likely to make sound and quick farm management decisions about the types of seed they use for production activities. This view is justified by the studies of Atala and Abdullahi (1988) who stated that farming experiences of the farmer influences their response to adoption of improved farm practices and that a farmer adopts a new practice more easily when it conforms to his previous experience and skills.

4.1.8 Extension contact

The findings in table 4.1b showed that 48% of the respondents were not visited by extension agents, 39.50% were visited between 2 and 3 times while only 12.50% had more than three visits from extension officers. In all 52% of the respondents had contact with extension personnel.

4.1.9 Membership of cooperative society

The study revealed that only 49% of the respondents belonged to any cooperative society. The remaining 51% did not belong to any social organisation in the form of cooperatives.

4.1.10 Access to credit

The findings showed that most of the respondents did not have access to credit. 42% said they had accessed credit in the year preceding this study while 58% reported lack of access to credit. Considering the role of credit in agricultural production, this lack of access to credit could a limiting factor to enhanced production.

Table 1a: Distribution of Respondents according to Socio-economic Characteristics.

Variables	Frequency	Percentage
Age(Yrs)		
≤ 35	22	17.05
36-45	57	44.20
46-55	41	31.78
> 55	9	6.97
Gender		
Male	117	90.70
Female	12	9.30
Marital Status		
Married	122	94.60
Single	7	5.40
Level of Education		
No formal education	66	51.20
Primary school	29	22.50
Secondary school	14	10.90
Tertiary	16	12.40
Others	4	3.10
Farm Size(Ha)		
0.5-2.0	84	65.10
2.0-4.5	40	31.00
> 4.5	5	3.90
Household Size		
1-5	31	24.03
6-10	55	42.63
11-15	21	16.28
16-20	15	11.63
>20	7	5.43
Farming Experience(Yrs)		
0-5	14	10.85
6-11	32	24.81
12-17	32	24.81
18-23	21	16.28
24-29	14	10.85
≥30	16	12.40

Table 1b: Distribution of Respondents according to Institutional Characteristics.

Variables	Frequency	Percentage
Extension Contact		
0-1	62	48.00
2-3	51	39.50
>3	16	12.50
	129	100
Membership of Cooperatives		
Yes	63	48.80
None	66	51.20
	129	100
Access to Credit		
Access	54	41.90
No Access	75	58.10
	129	100

4.2 Level of Awareness of Improved Seeds among Farmers in the Study Area

Objective two was designed to provide knowledge about the extent of awareness of improved seeds among farmers in the study area. Three selected cereal crops; maize, rice and sorghum were included in the survey and awareness score of each respondent for each of the crops was calculated in percentages of the farmers that are aware of the availability of improved maize, sorghum and rice in the study area.

The objective was to assess the extent to which the farmers were aware of the three selected crops. lt was revealed that most of the farmers were aware of the existence of the improved cereal seeds. About 93% were aware of the improved seeds while only 7% were not aware. The study revealed that the awareness level was generally high. This may be due to the fact that most of seed companies are located within the study area, or they had contact with extension workers among other things. It has been reviewed in literature that awareness of farm innovations are crucially dependent on the availability and frequency of farmers contact with extension workers Akinola,(1983); Igbokwe, (2000); Tologbonse and Adekunle, (2000) and Giroh *et al.,* 2007).

Table 2: Distribution of Respondents according to the Extent of Awareness of Improved maize, sorghum and rice Seeds

Awareness	**Frequency**	**Percentage**
Aware	120	93.00
Not Aware	9	7.00
Total	**129**	**100**

4.3 Sources of information on Improved Seeds and Common sources of seed supply to Farmers in the Study Area

Objective three findings of this study show that 9% got their information from demonstration farms around, Samaru. The ADP was the source of information to 6% of the respondents while extension agents provided information for 15.50%. 19% respondents got information from both the ADP and the extension agents. Research institutes provided information for 8% of the respondents with the various seed companies providing information to 15.5% of the respondents. The most used source of information was other farmers/friends, accounting for 23% respondents. Radio and television was reported as the least used source of information on improved seeds. The study shows that information on improved seeds is readily available from formal sources in the study area.

Table 3: Distribution of Respondents according to their Source of information on Improved Seeds

Sources	Frequency	Percentage
Demonstration farms	12	9.30
ADP Offices	8	6.20
Extension Agents	20	15.50
Extension Agent/ ADP	24	18.60
Research Institute	10	7.75
Seed Company	20	15.50
Other farmers/friends	30	23.25
Radio/TV	5	3.87
Total	**129**	**100**

Table 4: Distribution of Respondents according to their Source of supply of Improved Seeds

Sources	Frequency	Percentage
Friends/other farmers	19	14.74
Open market	10	7.74
Home saved	55	42.64
Seed company/Institute	20	15.50
ADP/LGA Offices	25	19.38
Total	**129**	**100**

On the common sources of seed used by farmers in the study area which is objective 4. Table 4 shows that most of the respondents 43% got their supply from home saved seeds. Formal sources of seed supply comprising the research institutes, seed companies and the ADP/LGA offices supply 36% of the respondents. 15% of the respondents source their seed supply from friends/other farmers while 8% of the respondents source their seed from the open market. The study shows that informal sources account for most of the supply of seeds to farmers in the study area. This cast doubt on the quality of seeds used by farmers in the study area.

4.4(a) The Extent of Adoption of Improved Seeds in the Study Area.

Table 4a was designed to provide knowledge about the extent to which selected cereal crop farmers in the study area have adopted the three selected crops in their production. Table 4.4a shows that 53.44% adopted improved maize seeds only, 32.56% of the respondents have adopted sorghum only while 14.00% adopted the improved rice seeds. The findings of this study shows that maize seeds had the highest level of adoption among the farmers followed by sorghum and rice seeds in that order.

Table 4a Distribution of Respondents according to the Level of Adoption of Improved Maize, Sorghum and Rice Seeds

Improved Seed	**Frequency**	**Percentage**	**RANK**
Maize Only	69	53.44	1
Sorghum Only	42	32.56	2
Rice Only	18	14.00	3
Total	**129**	**100**	

Although awareness of any innovation might not necessarily results to its adoption, it is only logical that farmers will adopt technologies that they are aware of and have evaluated, thus the technologies with high level of awareness should record high level of adoption among respondents. The data also revealed that improved maize seed was most adopted by the respondents followed by sorghum.

These findings suggest a above average level of adoption of improved maize seeds among farmers in the study area. Adoption of new agricultural practice requires that the farmers must be aware of the practice, evaluate it, afford it, try it out and then take steps of adoption Rogers, (1995). In the same vein, Ganpat and Seapersad, (1996) indicated that for a successful adoption of a new technology, farmers must not only know it but must be able to follow the recommendations given.

4.5 Relationship between some Selected Socio-economic and Institutional Variables Influencing Adoption of Improved Maize, Sorghum and Rice Seeds.

The fifth objective of this study was to determine the relationship between socio-economic and institutional variables and level of adoption of improved selected cereal crops in the study area. The socio-economic characteristics in this study include age, marital status, level of formal education, farm size, household size and farming experience. While the institutional characteristics comprise of extension contact, access to credit and membership of c-operative society.

The result of multiple linear regression model in Table 4 shows that three of the six socio-economic variables considered in the study have significant influence on the level of adoption of improved seeds by farmers in the study area. Age was found positive and significantly related to adoption at 1% level of probability. This implies that increase in age would increase the level of adoption. The coefficient obtained for level of education was positive and significant at 1% level of probability. This implies that the higher the level of education, the higher the level of adoption. Generally, the low level of education of the farmers is inimical to the adoption of innovation. Marital status, household size and farming experience were found to have no significant influence on the adoption of improved seeds. Furthermore, the coefficient of farm size was positive and significant at

1% level of probability. The positive coefficient suggests that increase in the size of land would increase the level of adoption. The data analysis further revealed that age, level of education and farm size have positive and significant influence on adoption at 1 percent level of significance while marital status, household size and farming experience were found to have no significant influence on the adoption of improved seeds even 5% level of significance. The negative influence of farming experience on adoption is surprising. The reason may be that much experience in farming may encourage shift in interest away from the use of improved seeds to the recycling of seeds. The negative and non-significance of household size is expected. Increasing household size puts pressure on household income and the cutting of corners . This is a major disincentive to the annual purchase of improved seeds therefore resulting to the use of home saved seed. Marital status had a positive effect but it did not have significant influence on adoption of improved seeds at the designated level of significance. Generally, farm size would be expected to be significantly related to or to have significantly influenced adoption of farm innovations. In this study farm size was positive, and it influenced adoption at designated level of significance. Maiangwa, (2006) found farm size to be positively related to adoption of agro-forestry in Rano and Ajiwa, and negative in Danbata and Funtua zones in North-West zone of Nigeria. The first null hypothesis, which states there is no significant relationship between socio-economic characteristics of the farmers and their adoption of improved seeds is therefore, rejected as there was significant relationship between age, level of education and farm size and the adoption of improved seeds.

The second part of the study's objective was to determine the relationship between some selected institutional variables and adoption of improved seeds in the study area. The institutional variables considered are extension contact, access to credit, and membership of cooperative society. The result of the multiple linear regression analysis in Table 5 shows that access to credit was positively significant at 1% level of probability. The other variables such as extension contact and membership of cooperative were also significant at 1% probability level. An explanation for these is that farmer' chances of adopting improved seeds will be greatly enhanced over time through improved access to credit, increased extension contact, and membership in cooperative society. This finding conforms to that of Ojo (2009), who reported significant influence of co-operative membership and amount of credit received on adoption of recommended cassava production practices. Atala, *et al*., (1992) found insignificant correlation between amount of credit and adoption of farm innovation and farm output in Kaduna State. The second null hypothesis which states that there is no significant relationship between institutional variables and adoption of improved seeds is therefore rejected as there was significant relationship between extension contact, access to credit and membership of cooperative and adoption of improved seeds in the study area.

Table 5: Multiple Regression Result of Socio-economic and Institutional variables and level of Adoption of Improved Seeds

Variables	Coefficient	Standard Error	T-Value
Constant	-4.824	1.290	3.739*
Age of Respondent	0.091	0.040	2.275*
Marital Status	0.112	0.241	0.465NS
Level of Education	0.360	0.091	3.956*
Farm Size	0.497	0.205	2.242*
Household Size	-0.110	0.200	-0.550NS
Farming Experience	-0.041	0.037	-1.108NS
Access to Credit	0.892	0.364	2.450*
Extension Contact	0.267	0.063	4.238*
Membership of Coops.	0.491	0.215	2.284*
Adjusted R^2	0.693		
F-Value	42.054*		

*Coefficients are significant at 1% probability level.

Based on the above analyses, the socio-economic and institutional variables which determined the adoption of improved seeds were age, level of education, and farm size, access to credit, extension contact, and membership of cooperative society. The F-value which measures the joint significance of all explanatory variables in the multiple linear regression model was 42.054 and it was significant at 1 percent level of probability. The adjusted R^2 was 0.693 indicating that the regression equation explains 69.30 % of the relationship between the level of adoption of improved seeds and the identified independent variables.

4.6 Major constraints faced by Farmers in their Quest for Improved Seeds in the Study Area.

The respondents were requested to state what they considered as the major constraints they face in the quest for improved seeds. The responses are as shown in Table 6 the study revealed the most critical constraints to the adoption of improved seeds in the study area were not different from the constraints faced by farmers generally. The constraints are; high cost of improved seeds, high cost of labour, seeds not readily available when needed, high cost of major inputs like fertilizer, lack of access to credit, problem of pests and diseases and inadequate extension education. The most pressing constraint was the high cost of the improved seeds followed closely by high cost of labour. All (100%) of the respondents were constrained by the high cost of the seeds while 74% were constrained by non availability of improved seeds when needed and the problem of pests and diseases associated with rice seed. The third in ranking was the problem of high cost of major inputs like fertilizers and agrochemicals. These inputs are required in the appropriate proportions for successful use of improved seeds. 85% respondents reported this constraint.

Table 6 Constraints Encountered by Maize, Sorghum and Rice Farmer in the Study Area.

S/No	Constraints	Frequency*	%	Ranking	
1	High cost of seeds	119	100	1st	All the farmers
2	High cost of Labour	112	87	2nd	
3	High cost of major inputs	110	85	3rd	
4	Seeds Not readily available	96	74	4th	Sorghum and rice farmers
5	Lack of access to credit	80	62	5th	All the farmers
6	Inadequate farmer education	78	60	6th	Sorghum and rice
7	Pests and diseases	112	87	7th	Rice farmers

*Multiple responses

High labour cost ranked second with 87% while lack of access to credit, and inadequate farmer education ranked fifth 62% and sixth 60% respectively as reported by respondents. These constraints are believed to have serious negative implication on farmer's production efforts and farm income due to their discouraging effects. Other constraints reported are unavailability of tractors and implements to ease farm operations and lack of access to profitable market in the study area. The attendant effects can be unwillingness to adopt expensive improved seeds and continue with the old seed system of carrying over home saved seeds.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary, conclusion and recommendations based on the findings of the study.

5.1 Summary

The broad objective of this study was to examine the adoption of selected improved cereal seeds among rural farmers in Sabon Gari Local Government Areas of Kaduna State. The specific objectives were to investigate the socio-economic and institutional characteristics of the farmers, identify the extent to which the rural farmers were aware of and had adopted the use of improved seeds, identify sources of information on improved seed available to farmers, assess the common sources of seed supply for the farmers, identify the specific socio-economic and institutional factors that influence the adoption of improved seeds and identify the constraints faced by the farmers in their quest to use improved seeds in their production activities. Multi-stage sampling method was used to select the sample size of 129 rural farmers from the purposively selected Sabon Gari Local Government Area of Kaduna State.

The data were collected through structured questionnaire and interview schedule, administered to 129 rural farmers. Descriptive and inferential statistics were used to analyze the data. There was a high level of awareness of improved seeds in the study. Maize was the most adopted of the three crops under study followed by sorghum and rice. The level of adoption was above averages for maize which was the most adopted of the selected improved seeds. On common sources of supply and source of information available to the farmers regarding improved cereal seeds, the study revealed that home saved seeds are the most common source of seed supply while farmers and friends were also identified as the commonly used source of information.

The result of linear multiple regression analysis showed that age, level of education, farm size, extension contact , access to credit and membership of cooperative society had positive and significant influence on adoption, while marital status, household size and farming experience had no significant influence on adoption of improved seeds.

Constraints such as high cost of improved seeds, non-availability of improved seeds, problem of pests and diseases, high cost of major inputs, high cost of labour, lack of access to credit, inadequate farmer education as well as lack of access to profitable markets among others were reported to inhibit the adoption of improved seeds by respondents.

5.2 Conclusion

The study revealed a high level of awareness and above average level of adoption with average of 93% and 53% respectively. The study revealed that the general high level of awareness is as a result of the presence of seed companies in the study area as well extension contact with farmers. The low level of adoption recorded for rice and sorghum could be due to the relative high cost of labour and low level of availability of improved seeds in the study area. The determinants of adoption of the improved seeds were age, level of education, farm size, extension contact, access to credit and membership of cooperative society. There were reported indications that the adoption of improved seeds is constrained by the high cost of the seeds and the cost of major inputs like fertilizers and agrochemicals required for their effective use and high cost of labour among other constraints.

5.3 Recommendations

Based on the findings of this study, the following recommendations were made:

i. Institutional variables related significantly to adoption of improved seeds more than the socio-economic variables as recorded in this study. The difficulties that the change agents are experiencing are the inadequate understanding of the socio-economic characteristics of the farmers. It is important therefore, to obtain adequate knowledge of the rural farmers' socio-economic characteristics which is the basis of any social change program. This will enable the change agents to design social change programs to gain acceptance and the relevant approach to take in order to reach and persuade the rural farmers to accept and use improved seeds.

ii. High cost of seeds was the major challenge encountered by farmers in the study area. It is therefore recommended that the rural farmers form and participate in a functional cooperative groups so as to enable discount pricing of both seeds and related inputs.

iii. Research effort by the research Institutes should also focus on the production of cheaper and early maturing varieties that may be more profitable for the farmers.

iv. Policy measures that would guarantee timely seed supply and distribution at affordable price to the rural areas is recommended.

v. Importation of rice be banned to encourage local production.

REFERENCES

Abolagba, E.O; Aigbekhaen, E.O and Omokhafe, K.O .(2003). "Farm Gate Marketing of Natural Rubber in the South-East Rubber Marketing Zone in Nigeria". *Nigeria Journal of Agriculture and Rural Development.6: 40 – 48.*

Abolagba, E.O. (1997). Socio-economic Analysis of the Acquisition and Utilization of Farming Information Among Rubber Farmers in Delta State. Unpublished M.Sc Thesis, Department of Agricultural Economics and Extension Services, University of Benin, Nigeria.

Adedayo, K and Okuneye, P.A .(2004). "Economics of Agricultural Extension". *In S.F. Adedoyin (ed.) Proceedings of Agricultural Extension Society of Nigeria (AESON).* pp78 – 90.

Adekoya, E.A and Tologbonse E.B .(2004). "Adoption and Diffusion of Innovations." *In S.F. Adedoyin (ed.) Proceedings of Agricultural Extension Society of Nigeria (AESON).* Pp64 – 70 *Agricultural Extension Society of Nigeria (AESON) in Nigeria.*

Adeniji O. B. (2002): "Adoption of improved technologies for cotton production by farmers in Katsina State, Nigeria". Unpublished PhD Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University. Zaria, Nigeria.

Adeolu, B.A .(1970). Economics of Food Crop Production and Processing in Oyo North Area of Oyo state. Unpublished M.Sc Thesis. Department of Agricultural Extension, Obafemi Awolowo University, Ile – Ife, Osun state.

Adeolu, B.K. (1991): The economic of Cassava production, processing in Oyo Northern Area of Oyo State. Unpublished, M.Sc Thesis submitted to the Department of Agricultural Extension, Obafemi Awolowo University, Ile-Ife, Ogun State.

Agbamu, J.U. (1995). An Analysis of Farmers Characteristics in Relation to Adoption of Soil Management practices in Ikorodu Area of Nigeria. *Japanese Journal of Tropical Agriculture* 39 (4):213 – 222.

Aghimien, C.I. (1997). Small holder Rubber Exploitation: Implications for the Rubber Industry in Edo state, Unpublished M.Sc Thesis Department of Agricultural Economics and Extension Services, University of Benin, Nigeria.

Aigbekaen; E.O; Imarhiagbe, E.O and Omokhafe K.O. (2000). Adoption of Some Recommended Agronomic Practices of Natural Rubber. *Nigeria Journal of Agriculture, Forestry and Fishery .1:24-46.*

Ajayi, A.R. (1989). Role of Perception of Ondo State Agricultural Science Teachers in Young Farmers Club Programme. *Journal of Agricultural Extension, 2:38-491.*

Ajayi, P.O.S. (2003). *Comprehensive Geography for Secondary Schools.* Johnson Publishers ltd. Lagos.

Ajayi R and Onuche, L.B. (2005). "Extension implication in production cost and consumption pattern of Cassava and its production under Democratic Economy in Odekina Local Government Area of Kogi State". *Journal of Agricultural Extension Society of Nigeria (AESON)* 8: 41-49.'

Akinola, C.A. (1983). An Analysis of Some Factors Related to the Adoption of Selected Crop Production Recommendation by Farmers in Funtua ADP. Ph.D Thesis Submitted to the Department of Agricultural Extension Services, University of Ibadan. 118pp.

Amodu, M.Y (2010). Economic Analysis of Part-time Farming in Idah, Local Government Area of Kogi State, Nigeria. Unpublished Msc Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

Arokoyo, T. (2005). "Effective Extension Delivery and Food Security; its Implications." *An invited key note Address delivered at the 18th Annual South – West REFILS Workshop*. IAR & T, Moor Plantation, Ibadan February 15 – 19 2005.

Asuquo, O.U. (1984). Financing the Production and Marketing of Rubber in Nigeria. *Symposium on "Natural Rubber in our Economy in the 80's"* Nigeria Rubber Board. Benin City. 2p.

Atala, T.K. (1980). Factors Affecting Adoption of Agricultural innovations, Uses of Sources of Information and Level of Living in Two Nigeria Villages. Unpublished M.sc Thesis, Iowa state University, Ames Iowa,U.S.A.

Atala T.K. (1984). The relationship of socio-economic factors on Agricultural Innovations and Utilization sources of Innovation in two Nigerian villages. *Journal of Agricultural Extension 2(1&2); 1-10*.

Atala, T.K and Abdullahi, Y.A .(1988). Improved Agricultural Technologies for Small Scale. Nigerian farmer's. Proceedings of the National Farming Systems Research Workshop held in Jos – Plateau state, Nigeria. May 10th – 13th. *A publication of the Nigerian National Farming system Research*. Abalu G.O.I and Kalu, B.A (eds).

Atala, T.K., Arokoyo T. and Omata P.A. (1992). The impact of Training and visit system of Extension on Adoption of Farm Innovation and Farm output in Kaduna State. *Journal of Agricultural Extension 2 (1&2): 1-10.*

Charlotte, M. (2004). Implementing a human rights approach to food security in: Sustainable Solution for Ending Hunger and Poverty (ed.) 2020 Africa Brief

Conference, *International Food Policy Research Institute*, Washington D.C, USA.

Climmyt (1993). "The Adoption of Agricultural Technology A Guide for survey Design" Centro International de Mejoramento de maizy Trigo, Mexico.

Cromwell, E. (1990): *Seed Diffusion Mechanism in Small Farmer Communities, from Asia, Africa and Latin America. London*.

Damisa M.A and Yohanna, M. (2006): "Economic Analysis of Agro forestry Adoption in Zaria Area of Kaduna State: A logistic Model Approach" *Journal Crop Res for Agroforestry and Environment* 1: 76- 87.

Daniel, W.S .(1997). Diffusion Theory and Instructional Technology. *Http/intro: /base org/docs diffusion* .February 20 1997.

Delabarre,M.A and Serrier J.B .(2000). *Rubber. The Tropical Agriculturalist*. Macmillan Education Ltd.

EADP, (2000). *Edo Agricultural Development brochure*. University of Benin Press Limited pp 1- 30.

Edo ADP (2002). Edo Agricultural Development Projects. *Crop Area Yield Survey*. Edo Agricultural Development Coordinating Unit, Benin City, Edo State.

Ehika, S.N .(2000). *Latex Exploitation Techniques*. Rubber Research Institute of Nigeria, Iyanomo, Benin City – Nigeria.

Ekong, O.E. (2003). *An Introduction to Rural Sociology*. 2nd edition. Dove Educational Publishers, Uyo Nigeria.

Ekong E.E (2003) *Introduction and Analysis of Rural Nigeria*. Nigeria Dove Educational Publishers, Uyo.

Enabor, E.E. (1985). Industrial Utilization of Rubber (*Hevea brasilinesis*) Seed, Latex and Wood. *Proceedings of a National Conference on Industrial Utilization of Natural Rubber (Hevea brasiliensis) Seed, Latex and Wood*; Rubber Research Institute of Nigeria, Iyanomo, Benin City. 22 – 24 January 1985. E.E. Enabor (ed). RRIN publishers.

Erie A. P. (1996). "Communication in Extension."In Modern Agriculture .Pon Publishers Ltd. *pp54-63*.

Esekhade, T.U (2005). Rubber based Cropping System – Past, Present and Future Research Trends. *A seminar paper presented at the Rubber Research Institute of Nigeria (RRIN)* 17th July 2005.

Esekhade, T.U., Ugwa, I.K and Ogeh, J. (1998). Effects of Rubber/Cooking Banana (c.v cadaba) Inter Crop on the Physio – Chemical Properties of an Acid Sandy Soil, and the Growth and Development of Rubber Saplings: *In Proceedings of 24th*

Annual Conference of Social Science Society of Nigeria, held in December 7 – 11, 1998 at Abubakar Tafawa Balewa University, Bauchi pp24 – 28.

Ewuola, S. O. (1985). "An Analysis of The Effectiveness of Small Holder Farmers Credit Programme in Ondo State. Unpublished Ph.D. Thesis, University of Ibadan, Nigeria.

EWLG, (1996). Esan-West Local Government Area in Picture. 18pp.

Fasina, A.B. (1998). *Investment Opportunities in Rubber Industries in Nigeria*. A Paper Presented at International Rubber Development Board (IRDB) Meeting held at Abuja p.18

Feistritzer, W.P. and Kelly, A.F. (1998). Improved Seed Production. A Manual on the formulation, implementation and evaluation of Seed Programmes and Projects, FAO, Rome.

Federal Government of Nigeria (2006). *Presidential Committee Report on Rubber Production and Export*. p47.

Food and Agricultural organization of the United Nations (FAO) (2002). FAO Year Book FAO, Rome, Italy.

Food and Agricultural Organization of the United Nation (FAO 2002). FAO year Book FAO, Rome.

Ganpat, W and Seapersad. (1996). An Analysis of Linkages in a Rice Based Knowledge System in Trinidad Education. *(AIAEE) held in Arlington,Virginia* pp 131 – 136.

Giroh, D.Y., Ephraim, J.J., Fannap, D., Igbinosun, F.O., and Ogwuche, P. (2007). A qualitative Analysis of Adoption of natural Rubber Production technologies Among Farmers in Southern Nigeria. *Journal of sustainable Tropical Agricultural Research* 21:11-18.

Haralambos, M and Holborn, M .(2008). *Sociology*. Themes and Perspectives. Collins. 7th Edition.

Henderson, P.A. and Singh R. (1990). NGO-Government links in Seed Production case studies from the Gambia and Ethiopia. Agricultural Administration Research and Extension Network, London; Overseas Development Institute, Paper No. 14.

Idemudia, E.P.A .(1984). Study of factors Affecting Extension in Nigeria with particular Emphasis on Rubber Farming in Bendel State. M.sc Thesis. University of Guelph. Pp85 – 97.

Igbokwe, E.M .(2000). The Relationship between Socio – Economic Variables and Adoption Rate of Rice Farmers in Agwu Agricultural Zone Enugu state. *Journal of Agricultural Extension,* 4: 9 - 14.

Jibowo, A.A .(1980). Adoption of OS6 variety of Rice in Ife division, Oyo state of Nigeria. *Ife Journal of Agriculture* vol. 2 No 2 pp113 – 127.

Joshua, A. and Omidiji M. O. (1999), Basic Concepts of Quality Seed Production. A Papers Delivered in course proceedings in Comprehensive Training in Production, Processing, Storage, distribution and marketing PP 49-52.

Kormawa P.E and Okechuwa R. (2002) Assessment of Seed- Sub Sector Policy in Nigeria Study No Port, 11TA P.M.B 5320, Ibaan, Nigeria

Kpolo, D.M .(1999). *Rubber Production in Africa.* Rubber International 1:55-70.

Laogun, E.A .(1983). Evaluation of University Based Extension System. A case Study of Isoya Rural Development Project. *Nigerian Journal of Rural Extension and Development* 1(2 and 3): 28 – 39.

Lionberger, H.L. (1960). *The Adoption of New Ideas and Farm practices*. University Press Iowa States.

Maduagwu, A .(2004). *Growing in Oguta*. The Economics of Rural Poverty in Nigeria. *www. Atbis.com/Analyze*.

Maiangwa, M.G. (2006). Socio–economic Factors Associated with Adoption of Agro forestry in the North – West Zone of Nigeria. *Samaru Journal of Agricultural Research Volume* 22 June 2006. pp41 – 50

Malinda Smale, MarcJ. Cohjhen, and Lathha Nagarajan (2009) Local Markets, Local Verities: Rising Food and small Farmers Access to Seed. International Food Policy Research Institutes issue Brief 59 February 2009 FAO

Mgbeje, I.A.B .(2005). The Nigeria Small Holder in African Program. *A paper presented at the workshop for Rubber Small holder Organized by the Federal Ministry of Commerce, held at Motel Plaza, Benin city, Edo State*.

Monu, E.D and Omole, M.M .(1983). Adoption of Recommended Farm practices by Nigerian Cocoa Farmers. *Nigeria Journal of Extension*,1(2):54 – 63.

Nafziger, E.W.(1994) The Economics of Developing Countries Worth Publishing Cob Month U.S.A

National Seed Service (1991). Technology of Seed Production and Certification in Nigeria. Produced cooperatively by National Seed Service and Department of Agriculture, pp 1-5.

National Agricultural Seed Council (2010) Seed Enterprise Development through producers/sellers scheme: A paper presented at the occasion of Cowpea Variety Registration and Release Seminar held at IAR, Zaria in November, 2009.

National Population Commission (2006). Census Office, Benin City, Edo State, Federal Republic of Nigeria Official Gazette No. 2 vol. 96, Abuja 2nd February, 2009.

National Population Commission (2006). Census Office Benin City, Edo State.*Federal Republic of Nigeria Official Gazette No 2 vol.* 96, Abuja 2nd February 2009.

National Agricultural Extension and Research Liaison Services (NAERLS) (2001). *Rubber Production in Nigeria.* Extension Bulletin No 213. Forestry Series No 14.

Ndubuizu, T.O.C. (1982). Problems and Prospects of Tree Crop Production. Unpublished Manuscript, Department of Crop Science, University of Nigeria, Nsukka.

Nweke, F.I and Akorie, J.A.. (1983). "Determinant of New Technologies Among Small Holders and Implications for the Administrator Transfer Programmes" A case study of Rice Production in Plateau state of Nigeria. *Journal of Agricultural Administration* 9 (1) 30 – 35.

Olayemi, J.K. (1991) Farm Management in Peasant Agriculture, *A Handbook for Rural Developpment,* Planning in Africa. Praages Publisher, New York.

Omaliko C .P.E (2000) Nigeria Seed Industry and its Potential Role in Food Security within the West and Central African sub – Region Federal Ministry of Science and Technology Abuja Nigeria.

Omidiji, M.O. (2008). Supply and Demand of Improved Seed in Nigeria: A paper presented at the stakeholders workshop on *Challenges of the Nigerian Seed Industry and Forward*, Abuja, 8-9 October, 2008.

Onyenwaku, C. E (1991) The Adoption of the Seed Yam Miniset Multiplication Technique by Farmers in Anambra State, Nigeria, Nigerian Journal of Agricultural Extension Vol.6, pp. 26-33.

Osborne, T. and Faye, A. (1991). Using Farmer Participatory Research to improve seed and Food Grain Production in Senegal.

Obasi, M.O., Obine, C.P.O. and Ejembi, E.P. (1994) .Appraisal of selected factors that influence the Adoption of Improved Farm Practices among Soyabean Farmers in Benue State. *Journal of Rural Development and Administration. Vol. XXVI (3) July.pp33-39.*

Odekina, F.O. (2009). An assessment of Effects of Pilferage on Arable Crops Farmers in Idah Local Government Area of Kogi State, Nigeria.Unpublished M.Sc. Thesis, Department of Agricultural Economics and Rural Sociology, Ahamdu Bello University, Zaria.

Ogunbameru, B.O., Undiandeye, U.C. and Ani, A.O. (2008). Factors Affecting Adoption Agricultural Technologies: In *Agricultural Extension Methodologies.* Ogunbameru B.O., Undiadeye U.C. and Ani A.O.(eds). Apani Publications in Association with Loud Books & Publishers. pp 37-41.

Ogunfiditimi, T.O. (1981). Adoption of Improved Farm Practices. A Choice Under Uncertainty. *India Journal of Extension Education* 17 (1 & 2):30 – 35.

Okpeke, R.O. (1978). The Multiple Roles of AERLS in Transfer of Technology in Agriculture. *Proceedings of the 1st National Workshop on Role of AERLS in Improved Technology Transfer in Agriculture,* IAR & T, University of Ife, Moor Plantation, Ibadan.

Ojo, H.I. (2009). Analysis of Factors Influencing Women Adoption of Recommended Cassava Production Technologies in Mopa Muro Local Government Area of Kogi *State.* Unpublished M.Sc Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.

Olayide, S.O., Ogunfowora, S.M. Essang S. and Idachaba F.S. (1981). Elements of Rural Economics. Ibadan University Press Publishing House, Ibadan. P. 76.

Ohaji, P.E. (1986). Farmers Adoption of Recommended practices for maize in Kainji Lake Basin of Nigeria. Unpublished M.sc Thesis, Department of Agricultural Extension University of Ibadan, Ibadan pp84.

Omaliko C. P. E (2000) The Nigerian Seed Industry and its potential role in Food security within the West and Central African Sub-region. Federal Ministry of Science and Technology. Abuja, Nigeria.

Omaliko C. P. E (1992) Strategies for the National Seed Sub-sector development plan. Federal Ministry of Agriculture and Natural Resources CBN Annual Report. Pp 10-17.

Omohan, D. A. (1996). Diffusion of Innovation; *Faculty of Social Sciences Quarterly Journal*, Edo State University. 1: 24-31.

Onomolease, E.A., Aghenemu, A.S., and Adisa, T. (2001).Secondary School Student's Perception About Agriculture As a Profession. *Journal of Teacher Education and Teaching* 1(5):144 – 148.

Olayide, S.O. (1980). Agricultural Technology and Nigeria's Small Farmers. *In: Nigeria Small farmers. Problems and Prospects in Integrated Rural Development.* University of Ibadan, Nigeria Publishers.

Oriakhi, H.O. (2006). Accessibility of Arable crops farmers to Agricultural information in Edo state. Unpublished M.Sc. Thesis, Department of Agricultural Economics and Extension services. University of Benin pp77.

Okonji, E.C., and Aghimien, C.I. (2006). Cost – Return Analysis of the Substitution of Food Crops for Rubber in Small Holder Cropping System of Southern Nigeria. *Quarterly Journal of International Agriculture*, 25, No 3 July – September p255 – 256.

Osuala, E.C. (1987). *Introduction to Research Methodology*. African FEP Publishers Limited p288.

Osuji, L.O (1983). Institutional Factors Associated with the Adoption of New Techniques Among Farmers in Eastern Nigeria. *The Nigeria Journal of Agricultural Extension* 1 (2) p43 – 53.

Partel, A.U and Anthonio, Q.B.O (1971). Analysis of selected factors that influence the Adoption of farm practices Among Tobacco Farmers in western state of Nigeria. Nigeria Agric. Journal 8 (2).

Philips, T.A. (1977). *An Agricultural Notebook. With special Reference to Nigeria.* Longman Publishers London.

Robert Trip (2001) Seed Provision and Agricultural Development.

Robertson, A.F. (1997). *The Dynamics of Production Relationships. African Share Contacts in Comparative perspective*. Cambridge University Press.

Rogers, E.M (1982), "*Diffusion of Innovations"*. A Study of factors Associated with Adoption of Recommended Practices in a Nigerian Village. Agricultural Administration. 4th Edition, New York:The Free Press.

Rogers, E.M. (1995). *Diffusion of Innovations*. 4th edition. New York, The Free Press.p247.

Rogers, E.M. (1960). *Social Change in Rural Society. A Text Book in Rural Sociology.* Appleton century – crafts inc. New York p401.

Rogers, E.M and Shoemaker, F.F (1971). *Communication of Innovations. A cross Cultural Approach*. The Free Press, New York. pp20-26

Shobowale, O.J. (1999). Methods of Production, Management and Utilization of a foundation seed program. A paper delivered in Course proceedings in *Comprehensive Training in Seed Production, Processing, Storage, Distribution and Marketing* Vol. 11, Published by food and Agriculture Organization of the United Nations, Rome, Pp. 61.

Shuiab, B., Aliyu, A. and Bakshi, J eds (1997). *Nigeria National Agricultural Research, Strategy Plan 1996 – 2010*. Federal Department of Agricultural Science, Federal Ministry of Agricultural and Natural Resources Abuja, Nigeria.

Sule, B. (2008). Over view of formal seed system in Nigeria: Challenges and Way Forward. A paper presented at the Stakeholder workshop on the *Formal and Informal Seed System of Nigeria,* Kano, 10-11November.

Soludo, C.C. (2007), Nigerian Economy: can we Achieve the vision 2020 8th Jan, 2007 Down load from www.cenbank org.

Swanson, B.E .(1996). Strengthening Research–Extension Farmer–Linkages.In: Swanson, B.E, R.P Bentz and A.J Sonfranko (eds) (1984). *Agricultural Extension. A Reference Manual*. pp 165 – 172.

Todaro, M.P. (1992). *Economics Development in the third World,* 4th edition. New York.Longman Publishers.

Tologbonse, E.B and Adekunle, O.A. (2000). "Adoption of Cowpea Protection Recommendations by Rural Farmers in Benue State". *Journal of Agricultural Extension* 4:44 – 55.

Tripp, R. and Walker, B. (1997). Seed Provision and Agricultural Development, Pp. 104-123.

Tripp R. (2001): Seed Provision and Agricultural Development pp: 104, 123

Usman, 1.A) 1994) Evolving the Nigerian Seed Development Plan. Proceedings of the National Seed Workshop on the *Strategies for seed Industry Development in Nigeria* November 24- 27 1992, Welcome Address.

Uzu, F.O., Ihenyen, G.A., and Imoebe, S.O (2000). *Processing, Analysis and Uses of Natural Rubber Oil and Cake. A Hand Book.* p 22 – 2

Verner, D. and verner, D and Verner, M. (2005), Economies Impact of Professional Training Program in Cotedvoire World Bank Policy Research Working Paper 3668, July 2005 Pp 5-14.

Voh, J.P. (1979). An Exploratory Study of Factors Associated with Adoption of Recommended Farm Practices Among Giwa Farmers. *Samaru Miscellaneous Paper, No 73* Institute of Agricultural Research (IAR),Ahmadu Bello University, Zaria, Nigeria.

Voh, J.P .(1982). A Study of Factors Associated with Adoption of Recommended Practices in a Nigerian Village. *Agricultural Administration* (11): 17–27

Williams, S.K.T., Fenley J.M and Williams C.E .(1987). *A Manual for Agricultural Extension Workers in Nigeria.* Les Slydraden, Ibadan, Nigeria .pp 119 – 131.

**DEPARTMENT OF AGRICULTURAL ECONOMICS
AND RURAL SOCIOLOGY
FACULTY OF AGRICULTURE
AHMADU BELLO UNIVERSITY, ZARIA.**

TOPIC: ANALYSIS OF FACTORS INFLUENCING THE ADOPTION OF IMPROVED SEED AMONG RURAL FARMERS IN SABON GARI LOCAL GOVERNMENT AREA OF KADUNA STATE, NIGERIA

QUESTIONNAIRE

Name of Respondent:____

A. Socio-Economic/Institutional Variables

1. Age: (year) ___________________________

2. Gender: male [ ] female [ ]

3. Marital status: married [ ] single [ ]

4. Level of Education: ________________________

   (a) No formal education [ ]

   (b) Primary [ ]

   (c) Secondary [ ]

   (d) Tertiary [ ]

   (e) Others (specify): ____

   ____

   ____

5. Farm Size (ha) [ ]

6. Household size (No) [ ]

7. Farming experience (yrs) [ ]

8. Do you hold any leadership position Yes [ ] No [ ]

9. If Yes, In what capacity____

10. How has your leadership role influence your adoption of improved seed

____

11. How many times did you have extension contracts during the last farming season [ ]

12. Are you a member of a co-operative society? Yes [ ] No [ ]

13. IF Yes, How many? ______________________________

14. Have you received credit before? Yes [ ] No. [ ]

15. If Yes how much did you receive N______________________________

16. What did you do with the credit you receive? ________________________

Section B: Awareness

17. Are you aware of any improved maize, sorghum, and rice varieties? Yes [ ]No [

18. If Yes, Which of them? ___________________________

19. Do you have demonstration farm of improved maize, rise and sorghum seed variety in your community? ___________________

20. What are your other sources of information about improved maize, rice and sorghum?

a. ____________ b. ___________ c. ___________ d. __________e. __________

21. What is your most common source of seed supply?

(a) Friends/family [ ]

(b) Market [ ]

(c) Home saved seed [ ]

(d) Research Institute/seed companies [ ]

(e) LGA/ADP [ ]

(f) Others (specify) ____

Section C: Level of adoption of improved maize, sorghum and rice seed.

22. Have you planted improved seed of maize, sorghum and rice varieties before?

Yes [ ] No [ ]

23. List the varieties of improved maize, sorghum and rice seed you have been planting.

Types of Crop	Names of Variety
Maize	
Sorghum	
Rice	

24. For how long have you been using the improved Maize, Sorghum and Rice varieties

Maize ______________ years, sorghum _____________ year, Rice ________________ years

25. Did you buy any improved Maize, Sorghum and Rice seed in the following season?

Year	Yes			No		
	Maize	Sorghum	Rice	Maize	Sorghum	Rice
2010						
2009						
2008						

26. How many hectares did you devote to each crop in the last three years?

Crop	Number of Hectares		
	2010	2009	2008

Maize			
Sorghum			
Rice			

27. How many kilograms of improved maize, sorghum and rice did you harvest last three years.

Crop	**Quantity in Kilograms**		
	2010	**2009**	**2008**
Maize			
Sorghum			
Rice			

28. What was the estimated value of income you got in the last two years

Crop	**Estimated Income in ₦**	
	2009	**2010**
Maize		
Sorghum		
Rice		

29. Generally, would you say there has been an increase or decrease in yield

Maize increase [ ] decrease [ ]

Sorghum increase [ ] decrease [ ]

Rice [ ] decrease [ ]

30. If there was decrease or increase what do you think are the reasons for the decrease and increase. Maize: reason for decrease ____________________

Reason for increase ____

Sorghum: reason for decrease____________________________________

Reason for increase____

Rice: reason for decrease____

Reason for increase ____

31. What are your other source of income apart from farming ________________

Section D: Constraints

32. Do you experience any constraint that is associated with the use of improved maize, sorghum and rice seed variety? Maize [ ] Sorghum [ ] rice [ ]

33. If Yes, indicate the problems you encounter in maize, sorghum and rice production?

Tick as appropriate to you:

	Maize	Sorghum	Rice
a. High cost of Seed			
b. Lack of Credit			
c. Lack of land			
d. Pest and diseases infestation			
e. Not available at the time of planting and not at the right quantity.			
i. Available at the right time and at the right quantity			
ii. Available at the right time but not at the right quantity			
f. Not profitable			
g. Low yield			

h. High cost of input

i. Lack of modern processing equipment

j. Others (Specify)

34. What are your suggestion and recommendation on how to improve farm production in your areas.

____