SOCIO-ECONOMIC FACTORS INFLUENCING ADOPTION OF RECOMMENDED COTTON PRODUCTION PRACTICES BY FARMERS IN ZAMFARA STATE, NIGERIA

By

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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY.

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

DECEMBER, 2012

DECLARATION

I hereby declare that this Thesis titled **"Socio-economic Factors Influencing Adoption of Recommended Cotton Production Practices by Farmers in Zamfara State, Nigeria"** has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another degree or diploma at any institution. All borrowed ideas have been duly acknowledged in the text and a list of references provided.

______________________________ ______________________

Nuhu Muhammad SADDIQ **Date**
Student

CERTIFICATION

This thesis titled **"Socio-economic Factors Influencing Adoption of Recommended Cotton Production Practices by Farmers in Zamfara State, Nigeria"** by Nuhu Muhammad **SADDIQ** meets the regulations governing the award of degree of Master of Science in Agricultural Extension and Rural Sociology. Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge and literary presentation.

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DEDICATION

This work is dedicated to my beloved mother, late Hajiya Barakat Abubakar Saddiq, whose boundless love and care for her children symbolize true motherhood. May her gentle soul rest in perfect peace, Amen.

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ABSTRACT

The bottle neck facing the production of cotton in Zamfara State is the use of traditional method of growing cotton by farmers which leads to poor yield and income from cotton production. Despite the introduction of RCPPs to farmers in Tsafe, Gusau and Bungudu local government areas (LGAs) of Zamfara State, farmers are far from achieving potential yield of 3.0- 3.5 t/ha against 1.3t/ha under farmers' practices. This study was carried out to determine the socio-economic factors influencing the adoption of recommended cotton production practices by farmers in Zamfara State, Nigeria. The specific objectives were to: describe socio-economic characteristics and institutional factors of cotton farmers, determine the rate of adoption of RCPPs by farmers, the yield performers of cotton and income of farmers under RCPPs, socio - economic factors influencing adoption of RCPPs and identify the constraints to adoption of RCPPs. A two stage sampling procedure was used, three LGAs were purposively selected based on intensity of cotton production and coverage by RCPPs. Two communities were selected from each of the three selected LGAs. A sample size of 144 cotton farmers was selected for data analysis. Frequency, percentage, mean and multiple regression were used to analyse the data. The results show that the respondents had a mean age of 40 years. About 40 percent of the respondents had 38 – 48 numbers of people in their household. Also, (45%) of the respondents had koranic education, while the respondents had a mean of 11 years in cotton farming. Majority (65%) of the respondents had contact with extension agents but not too frequently. The results also show that the mean credit need of the respondents was N69, 208 but were only able to receive N18, 451 averagely. The results show that in 2001-2002, the use of good seed - bed preparation had the highest (30%) rate of adoption. Similarly, recommended spacing, use of SAMCOT-9, thinning, and seed treatment had 28%, 25 %, 23% and 21% rate of adoption, respectively. The rate of adoption of RCPPs increases from 2001/2002 to 2009/2010 except in 2005/2006 where the rate of adoption dropped as result of fall in price of cotton in. The findings, reveal that majority (66%) of the respondents reported a mean yield of 2300kg/ha. About 43% of the respondents got N120, 000/ha from sale of cotton. The results of multiple regression reveal that labour was negatively significant, while educational level, farming experience, extension contact, membership of social organization and affordability were positively significant at 5 percent level of probability with an R^2 value of 0.58. It was discovered from this study that low level of education, inadequate and high cost of labour, insufficient fund, storage and marketing problem, were the major constraints faced by the cotton farmers. It is recommended that adult education and pre-season training should be organized for cotton farmers; farmers should form various co-operative groups for land, input, credit, labour and marketing of cotton in order to enhance the adoption of RCPPs and improved cotton productivity in the study area.

Chapter 1

INTRODUCTION

1.1 Background of the Study

Cotton (*Gossypium hirsutum L.*) belongs to the family *Malvaceae.* Its production has a long history in Nigeria stretching beyond the colonial era, although, it was not produced on commercial scale. Commercial cotton production started in 1903 with the activities of the British Cotton Growing Association (BCGA) (Idem, 1999; ICAC, 2010). Food and Agriculture Organization (FAO), reported that cotton is the most important cash crop in the savanna area of West Africa, with the bulk of production coming from Northern Nigeria under rainfed (FAO, 1995). The cotton growing areas in Nigeria are divided into three zones namely:

(i) The Northern cotton zone (comprising of Kaduna, Kano, Zamfara; Kebbi, Jigawa, the northern parts of Kwara, Niger and Plateau States), which produces about 60-65% of the country's output;

(ii) The Eastern zone (comprising of Borno, Bauchi, and Adamawa), contributing 25-30% of the total output, and

(iii) The Southern zone (comprising of Kwara, Benue, Taraba and southern parts of Niger State), contributing less than 5% of the total output (Gbadegesin *et al.,* 2007). Cotton production is, therefore, an important agricultural occupation in the cotton growing zones of Nigeria involving about 800,000 farmers on a total estimated area of 700-800,000 hectares (RMRDC, 2007; Adeniji, 2007).

The major feature of cotton production in Nigeria is that about 80% of total production is by peasant farmers under rainfed conditions. Cotton is also cultivated on small farms with simple tools and animal drawn implements. Yet there are over 40 textile mills and similar number of ginneries in Nigeria which compete for the acquisition of this cotton. In the last 8 years farmers have received progressively better prices (ICAC, 2010).

Cotton is a crop whose products and by-products play vital roles in the socio-economic life of Nigeria. Its economic importance includes: (i) the lint which is used in making bags, belts, twines, carpets, stuffing material for pads and cushions (Adeniji, 2007) (ii) Oil is extracted from the seeds and used as vegetable (edible) oil and for industrial purposes, (iii) the seed is used as cotton seed cake for animal feeds. In addition, it is used as a trap-crop for *striga* control (Ariga and Bernor, 1995; Lagoke *et al*., 1997; ICAC, 2010).In view of the usefulness of the crop to the socio-economic lives of Nigerians, it is necessary to exploit its full potentials. However, the potentials cannot be fully achieved without the adoption of recommended production practices for the crop.

1.2 Problem Statement

The bottleneck facing the production of cotton in Zamfara State is the use of traditional methods of growing cotton by the farmers in the area. Traditional method in this study refers to the farmers' practices of growing cotton such as wide spacing, the use of the same seed year in year out which the yield potential is reduced while the recommended cotton production practices (RCPPs) is a package targeted to improve the cotton farmers' practices .It is known that the Institute for Agricultural Research (IAR) has been working in Gusau (Zamfara State) since 1965 but activities targeted at cotton production practices were not stable over the years until 1999 when renewed efforts were stated again (Idem, 1999). However, despite the renewed and collaborative efforts of IAR and Zamfara State Agricultural Development Project (ZADP) in introducing the RCPPs since 1999 to the farmers in Tsafe, Gausau and Bungudu Local Government

Areas of Zamfara State, farmers are still getting low yield (1.3 ton/ha) of cotton and poor quality of lint and seed (Ogunlela 2004; ICAC,2010). Idem (1999) argued that cotton yield can be increased substantially by adoption of recommended practices or by expanding the area under cotton cultivation, or both. Increase in yield on existing small farms certainly, requires the adoption of recommended production practices for the crops concerned.

The process of increasing output of cotton production through modernization depends mainly on the extent to which farmers become aware of the existence of such recommended practices, develop interest in them, evaluate, try and become convinced of their relevance. It is only then that it can be expected that the farmers would adopt completely all the components of the recommended production practices. The ten RCPPs studied were:

(i) good land preparation (seed beds/ridges 15cm high with fine particles of soil);

(ii) use of improved and most suitable variety(SAMCOT- 9);

(iii) seed treatment (1 sachet of apron plus for every 10kg of cotton seed);

(iv) recommended planting date (mid-June–1st week of July);

(v) recommended spacing(45cm between stands and 90cm between rows/ridges);

(vi) thinning (two plants per stands at three week after sowing (WAS);

(vii) recommended fertilizer rate (4 bags of NPK and 2 bags of urea/ha at 2–3 and 7–8 WAS);

(viii) timely weed control (hoe weeding at 2– 3, 5–8, and remoulding at 8–10 WAS or application of pre-emergence herbicide: *pendimethalin* 400ml per 20L of water at 0–1 day after sowing and remoulding at 8–10 WAS);

(ix) use of insecticides (*cypermethrin* + *diemthoate* 100mL/20L of water at 8–12 WAS or when there is infestation and

(x) harvesting (picking at 50% split bolls) to achieve the expected potential yield of 3.0–3.5t/ha against the farmers current yield of 1–1.5t/ha(Gbadegesin *et al.,* 2007). In spite of the efforts of the Institute for Agricultural Research (IAR), Zamfara State Agricultural Development Project (ZADP) and the National Agricultural Extension and Research Liaison Service (NAERLS) in promoting the adoption of recommended cotton production practices, farmers are still far from achieving the potential yield.

Based on this background, the following pertinent research questions were raised:

(i) What are the socio-economic characteristics and institutional factors of cotton farmers in the study areas?

(ii) What is the rate of adoption of recommended cotton production practices by the farmers?

(iii) What is the level of yield and income the farmers from recommend cotton production practices in the area?

(iv) What are the socio-economic factors influencing the adoption of recommended cotton production practices?

(v) What are the constraints to the adoption of recommended cotton production practices in the study area?

1.3 Objectives of the Study

The broad objective of the study was to examine socio-economic factors influencing the adoption of recommended cotton production practices by small- scale farmers in Zamfara State. The specific objectives were to:

(i) describe the socio-economic characteristics and institutional factors of cotton farmers in the study area;

(ii) determine the rate of adoption of recommended cotton production practices by the farmers;

(iii) determine the yield performance of cotton and income of the farmers under recommended cotton production practices in the area;

(iv) determine the socio-economic factors influencing the adoption of recommended cotton production practices, and

(v) identify the constraints to the adoption of recommended cotton production practices in the study area.

1.4 Justification of the Study

Cotton occupies a key position in Nigeria's economy, judging by its critical role in employment and provision of raw materials for industrial development. The underdevelopment of this agricultural raw material is indeed worrisome (Parvin, 2005; ICAC, 2010). The supply of cotton lint to textile industries in Nigeria is less than 100,000 tons per annum whereas the demand is over 115000 tons per annum. Thus, the textile mill are therefore, forced to import over 15,000 tons of cotton in order to cover the shortfall in local supply (RMRPC, 2007; ICAC, 2010). The need to diversify our exports also implies that the production of a crop such as cotton with ready overseas markets must be increased. The result of this study would, therefore, be useful to policy makers, rural developers, national and international organizations to transform the rural sectors. The study is also expected to provide a useful framework for assessing small-holder cotton farmers' practice of adoption behavior by extension workers. Research institutes in general and IAR in particular, will find the results of this study useful for evaluating whether farmers are getting the benefit of cotton production practices developed by them and to assess the challenges of their practices. The farmers will also use it to improve their cotton production and income level. In this regard, the study of the factors that influence the adoption of recommended practices for cotton production by farmers is considered necessary towards boosting the cultivation of this all-important crop in Nigeria.

1. 5 Hypotheses of the Study

The following null hypotheses were tested:

i. The farmers' socio-economic characteristics have no significant influence on adoption of recommended cotton production practices.

ii. Institutional factors have no significant influence on adoption of recommended cotton production practices

iii. The RCPPs attributes have no significant influence on adoption of recommended cotton production practices.

Chapter 2

REVIEW OF RELEVANT LITERATURE

2.1 Socio-Economic Determinants of Adoption of Agricultural Recommended Practices

Extension contact is the frequency of the visits of the extension agent to the farmer and vice versa. Odoemenem and Obinne (2010) found a positive contribution of extension contact to adoption of agricultural technologies. This is because constant meeting between the extension personnel and the farmers would enlighten the latter and create awareness for the potential gains of improved agricultural innovation. Farmers' age is concerned with how old the farmers had been from birth to the time of investigation. Adeniji (2007) found that younger farmers adopted agricultural innovation more readily than the older ones. This is because young farmers tend to be more flexible in their decision, adopt new ideas more readily because of anticipated longer life-span within which the investment in new technology will pay off. Hence, the expectation is that many young farmers will be adopters while the older farmers will be non-adopters.

Similarly, Adegbenga and Babaleye (2009); Odeomenem and Obinne (2010) and Idris *et al.* (2007) found low level of adoption among older farmers and that was because they got built-up ideas and practices, over time and found it difficult to change. But today, more and more of our aged farmers have come to accept the use of insecticide on cowpea production to obtain higher yield. What is important here is that old or young age alone does not determine acceptability of technology. An old farmer who has built-up ideas and beliefs over the years and has not been exposed to extension agents will be less willing to acceptability of technology compared to an aged farmer who is literate and exposed to urban life or exposed to extension agents. However, Ekong (2005) stated that studies have shown that there is no association between age and adoption behaviour of farmers. Agbamu *et al*. (1996) revealed that age of a farmer does not contribute to adoption of new improved maize variety; improved practices of groundnut, and new varieties of cassava and maize respectively.

Agbamu and Orhorhoro (2007) found that educational level significantly influenced the adoption of recommended practices. Level of education is the number of years an individual farmer actually spent in formal school (Akpoko, 2001). For instance, if a farmer attended primary school and completed secondary school, the number of years taken for the two levels of schooling will be summed up. Agbamu and Orhorhoro (2007) found that when farmers spend more years in formal school, they become more proficient in reading and writing. Therefore, the adoption index is expected to be positively related to the level of formal education. Formal education enables the farmers to obtain useful information from bulletins, agricultural newsletters and other sources. Formal education usually aids farmers and leads them to accept new farm technologies more readily to enhance their income than those farmers without a formal education. Williams in Agbamu (2006) argued that the notion that the average Nigerian farmer is conservative and resists change is no longer tenable. He maintained that the Nigerian farmer is responsive to change provided it paid him and did not conflict with his value system. Odoemenem and Obinna (2010) found that education had a very significant impact on the farmer's cash value. The low level of education of the farmers is inimical to the adoption of innovations. Idris *et al.* (2007) revealed that level of education was positively related to adoption of recommended practices. They maintained that the more knowledgeable the individual, the more favourable attitude he/she had towards recommended technologies. Studies have shown that the more the farmers advance in their level of education, the more they tend to understand the importance, intricacies and need for adopting new improved farm practices such as recommended cotton production practices.

Akpoko (2001) also found that household size contributes positively to adoption of recommended practices. Household size is the total number of individual (wives, children or grand children and extended family members) that live with and feed from the household. The adoption index may be either household size depending on the magnitude, age structure and available farm labour among members. Adesina and Baidu-Forson (2009) revealed that farmers adopt agricultural innovations because they have more mouths to feed. And the family serves as labour source for agricultural production.

Atala (1980) and Ekong (2005) found size of farmland to be positively and significantly related to adoption of innovation. .Land ownership structure is an important factor that can affect the adoption of a new technology. The importance of land in agricultural and food production cannot be overemphasized. To this effect, farming cannot take place without land (Ekong, 2005). He also maintained that farmers can be indifferent in adopting new technologies if the land tenure system does not allow personal ownership of land to execute the technology. Tenureship of land is also related to the size of land owned by a farmer. Studies have shown that in America, size of farm is always positively related to the adoption of new practices by the farmers. According to Rogers and Svenning (1969) and Lawrence *et al.* (1999) one major factor of excellence in farming in Colombia is the farm-size, whether measured in land or labour input. Their report showed a positive correlation of farm-size with adoption.

In Nigeria, Ekong (2005) and Ajayi and Ogunlela (2006) reported that land acquisition in most cases is through inheritance, allocation and gifts, sales, pledges, lease, purchase and loans. He pointed out that the pressure on land as a result of increasing population which can lead to individual ownership of land and fragmentation of farmland. Sources of information on improved technology play a vital role in adoption of any recommended practice by the farmers. Ogunbameru (2001) had identified the sources of information to farmers to include extension workers, fellow farmers, neighbours and mediated information sources. The primary goals of these informants are to create awareness by diffusing among potential adopters useful and practical information on the innovation, and encourage its application. Ekong (2005) also affirmed that such technical information are very useful during the trial stage of adoption process and are capable of leading to adoption of agricultural innovations.

Amount of credit available to the farmers will lead to adoption of modern technology. Agbamu *et al*. (1996) reported that credit is a vital element to agricultural transformation. It contributes to the farmers' social welfare, enhances production, and helps in capital formation and sustainability of income. They also identified problems emanating from unavailability of credit to include, low productivities, inability to adopt recommended practices, poor marketing and distribution arrangement.

The greater the participation of a farmer in social activities outside his household or locality and the more his interaction with other adopters, the earlier his adoption will tend to be. Interaction among human beings is the basis of social change (Ekong, 2005). Studies have shown that Nigerian farmers belong to a number of formal and informal organizations. A positive correlation exists between Nigerian farmers' level of participation in community life and adoption of agricultural innovations (Salawu, 2007; Ahmadu, 2009). He also posited that farmers' organizations are usually made up of different categories of adopters. As innovators and early adopters interact with late majority and others, it would influence the outlook of other categories of adopters and some of them may become favourably receptive to extension advice which they hitherto rejected or for which they had shown indifference. Similarly, *Agbamu et al.* (1996) revealed that social group meetings made significant contribution to adoption. People sometimes desire to change or feel a need for it. Where a farmer is favourably disposed towards change and innovation, adoption is more likely to occur. In some cases, according to Ekong (2005) people, who have lived for very long time under a particular condition and have perfectly adjusted to it, may find it very difficult to change. Therefore, such people are not prone to change for, as the saying goes, 'old habits die hard'.

On the other hand, certain farmers have the urge or drive to aspire high and belong to higher social strata. Those farmers' intrinsic motivation could jolt them to attempt the adoption of several innovations in a bid to improve their agricultural production. Obeta (1991) reported that the motivation to secure resources to attain high socio-economic goal to be an important psychological variable in adoption process. Farmers that are readily prone to change and have the urge to aspire high are more likely to adopt innovations than those who want to maintain the status quo (Ekong, 2005).

2.2 Rate of Adoption of Recommended Practices by Farmers

Ekong (2005) found that the rate of adoption of improved rice variety (F-44) in 2004-2006 was 11 percent. Agbamu (2006) also found the rate of adoption of improved maize variety in 2004-2005 was 52 percent. Similarly, Ephrain (2002) found the highest rate (43%) of adoption of cassava production innovations in 2001, was the use of late planting period. Rate of adoption, according to Rogers (1995) is the relative speed with which an innovation is adopted by members of a social system. It is generally measured as the ratio of adopters of a new idea for a specified time period multiplied by 100. Rogers (1995) found that the rate of adoption is influenced by the farmers perception of the attribute of the innovations. Result of adoption research can be used by extension organizations to accelerate the rate of adoption of innovations or to change the adoption process in such a way that certain categories of farmers adopt innovations more rapidly (Van and Hawkins, 1996). Hence it may be necessary to develop different extension messages for different categories of farmers. Van and Hawkins (1996) found that adoption rate clearly showed the adoption behaviour of farmers in the given area. Some farmers adopt immediately the practice is introduced while others adopt at different times later. Yusuf (2009) found rate of adoption of improved groundnut oil processing technologies by rural women in Kaduna State to be relatively higher, because the technologies were easy to operate and it improved their income. High rate of adoption means the technologies were exceptionally useful, appropriate to the respondents in the study area.

The rate of adoption of recommended practices is the percentage of the farmers that adopt a particular recommended practice. It also shows how many components of the recommended practice which majority of the farmers in a given area adopt (Ogunbameru, 2001). It is a presumption that farmers will adopt any improved and proven agricultural technology. This is not true because the new innovation must meet the following conditions before farmers can adopt it:

i. The new recommended practice does not increase farmers' risks. Farmers generally avert risks whenever possible. Therefore, the lesser the risk involved in the practice, the greater its adoption by farmers.

ii. The new practice does not depart radically from the current practices of the farmers. Consequently, the new practice must be easily learned and understood by the farmers.

iii. The potential gains, that is, the cost-benefit from the adoption of the improved practice must exceed the added costs.

iv. All the needed input and associated service involved with the new practice must be readily obtained and affordable by the farmers.

v. The new practice must conform to the norms, values, and cultures of the farmers.

vi. There must be ready market for the produce obtained by the farmers after adopting the new practice.

vii. The new practice must address the farmers felt need (Ogunbameru, 2001).

In extension communication, farmers who responded to campaigns and adopted the cultivation of an improved maize variety were rewarded with higher yield and increased income. This will make the same farmers and others in their neighbourhood to be receptive to adoption of agricultural innovations which may be brought before them in the future (Agbamu, 2006).

2.3 Factors Influencing Adoption of Recommended Practices by Farmers

Many researchers have confirmed the role of credit in adoption of recommended practices. Chikwedu *et al*. (1993) found that credit had a positive influence on adoption. This may be due to the fact that improved new technologies do come with some recommendations which require money for their implementations, with limited financial resources associated with Nigerian farmers, access to credit is likely to negatively influence farmer's adoption of improved technologies (Yusuf, 2009). Benjamin (2010) found that credit from informal institutions was the major influencing factor in adoption of recommended cassava technologies. Adesina and Forson (1995); Omonona (2009); Erado *et al*. (2004) discovered that access to credit affects household welfare outcomes through at least two channels: first, it alleviates the capital constraints on agricultural households. Access to credit also reduces the opportunity cost of capital intensive assets relative to family labour, thus encouraging labour – saving technologies and raising labour productivity, a crucial factor for agricultural development, especially in many African countries (Delegado, 1995; Zaller *et al.,* 1997). The second channel, through which access to credit affects household welfare, is by increasing its risk- bearing ability and altering its risk- coping strategy. Polson and Spencer (1990); Baidu-Forson, (1999); Aliou *et al*. (2000) and Benjamin (2010) confirmed that rural farmers are not able to adopt most modern production technologies because they are relatively poor. Therefore, for them to adopt most technologies, they must require subsidy and credit.

Family labour is still an important component of labour for small farmers. Saddiq (2008) revealed that family size greatly influenced the adoption of improved agricultural practices. This is because farmers with larger family size had more responsibility to care for more people. Agbamu (1995) reported a positive relationship between family size and adoption of soil management practices but this relationship was not significant. Ogunfiditimi (1981); Agbamu *et al.* (1996); Ani (2008) and Odoemenem (2010) found that the economic status of the farmers had a positive and significant relationship with adoption of improved practices which portray the fact that the more the farmers are well-off economically (in terms of their ability to purchase necessary input such as insecticides, fertilizers, and labour), the more they are prone to adoption of new practices. If a farmer can try out an innovation without committing too much money, he may adopt it more quickly. For example, new seeds, fertilizers and herbicides can be purchased in small quantities and tried out on a limited scale (Agbamu, 2006). Studies have shown that when other factors are held constant, there is obvious positive relationship between level of income and adoption of agricultural innovations. The higher the income level of a farmer, the lesser he or she will be disposed due to the fear of taking a risk in respect of adopting a given technology.

The finding of Ani *et al.* (2008) which confirmed that farm income made significant contribution to adoption corroborates that of Agbamu *et al.* (1996). The poor economic status of most Nigerian farmers has inhibited the adaptation of most agricultural technologies. An innovation perceived as advantageous may not be adopted because of its cost. It is necessary that for any extension programme to succeed there is need for a thorough understanding of cultural situations within which the farmer is operating, more especially the institutional arrangements in operation at the villages where the bulk of farmers live. The farming activities of most Nigerians are tied to their traditional beliefs and values (Agbamu, 2006). Olawoye (1990) in Agbamu (2006) cited instances in which farmers resist innovations that are not congruent with cultural patterns of the people; for example, asking a Moslem to rear pigs to meet his protein needs would not be adopted. She further gave an example of a constraint posed by social beliefs as seen at a village in Iseyin Local Government Area of Oyo State in Nigeria. A natural pond which had a good stock of fish was located near the village. The people, according to Olawoye, believed that if the fish were removed the water would dry up and they enforced the taboo against fishing. Developing such a fish pond to meet the protein needs of these people would have little success. Ekong (2005) posited that community norms are unwritten laws influencing the behaviour of farmers and others. He described beliefs as knowledge and information a person assumes to be true about the environment while value orientation are general feelings about what is desirable or undesirable. This has to do with the degree to which an innovation is relatively difficult to follow and use. If the recommended practice is relatively easy to follow and visible, it is likely to be more accepted than one that has to undergo a lot of complex processes (Ekong, 2005). He pointed out that certain research findings, which are deemed to improve farm production, may be beyond the understanding of rural farmers even with the interpretation of extension agents. Since many farmers do not possess the education and technical know-how to transform certain innovations into practical reality, they may not adopt them. According to Ani *et al.* (2008) several factors influence the adoption of agricultural technologies. These include, among others, the needs of the farmers, their level of awareness, level of income and education. It is believed that all things being equal;

i. the higher the relative advantage of the technology, the higher or faster the rate of its adoption by farmers;

ii. when a new practice is in agreement with the farmers' beliefs and values, the practice will be highly and speedily adopted;

iii. the less complex the practice, the easier it is for farmers to understand and adopt it;

iv. if the farmers are able to first apply or practice on a small-scale, the more readily will it be adopted in full; and

v. if the result of a practice is visible to the farmers, the more they will be convinced and encouraged to adopt it (Ani *et al.,* 2008).

Idris *et al.* (2008) indicated that higher yield of cassava positively influenced the adoption of cassava technology among farmers. Ani (2004) maintained that farmers accept improved practices because of the high yield involved. This is because, according to him, farmers may be able to produce more and live better. Similarly, Onyibe *et al.* (2003) revealed that high yield potential of the extra-early maize varieties, their early maturing characteristics and compatibility with traditional cropping practice were the major factors responsible for its adoption.

2.4 Constraints to Cotton Production

According to Adeniji (2007) reported that cotton farmers are faced with insect pest infestation and inadequate seed varieties suited to farmers region. Ogunlela (2004) also found that labour intensiveness and the capital investment associated with cotton production render it a disadvantaged crop amongst the competing crops such as cereals and pulses which are also grown by farmers. Similarly, (Adeniji, 2007) found that availability of labour during planting and harvesting time was a major constraint facing cotton farmers. Farmers prefer to plant their food crop first at the expense of labour for planting cotton. This reduces seed cotton yield due to delay planting (Ogunlela, 2004). Adeniji, (2007). Most of the operations involved in cotton production are still being done manually such as harvesting and weeding which appear to be the most labour-intensive. Cotton, unlike other crops, has to be picked many times, which means payment for labour. If not picked in time the quality can be affected because it can change colour due to contamination by foreign particles that may lower the grade in the market. Marketing of cotton is another constraint to the cotton farmers. Many of them suffer in the hands of bad middlemen who often exploit and rob them of benefits of their efforts. The problems are compounded by of lack of intervention by government on matters affecting marketing and pricing of cotton (Chikwendu *et al.,* 1993). Most farmers do not have store, hence they are compelled to sell cotton immediately after harvest and the chances of low price are very high at that time which will make the farmers not to break even, let alone to make a profit from the cotton enterprise (Chikwendu *et al.,* 1993). They also indicated that the farmers experienced delay in payment as a result of being compelled to sell to ginners and merchants on credit. Most often, they were not paid and even when they were paid; it was at times when the money had lost its value.

2.5 Suitability of Cotton Varieties to the Agro-ecological Zones of Nigeria

According to Ogunlela *et al.* (2004) the following are cotton seed varietal characteristics:

a. **SAMCOT- 8**

- Suited to the Eastern cotton growing zone
- Short – medium staple fibre
- Medium maturing and high yielding

b. **SAMCOT- 9**

- Medium maturing
- Medium staple
- Disease resistant
- High yield
- Suited to Northern cotton zone(Zamfara State among others).
- In addition, SAMCOT-12 and SAMCOT- 13 may also be cultivated in the Northern zone with supplementary irrigation.

c. **SAMCOT- 10**

Suited in the eastern cotton growing zones and southern cotton growing zones

- Disease resistant
- Medium staple fibre
- Medium maturing
- Good boll opening.

d. **SAMCOT- 11, 12, and 13**

- Long staple fibre
- Late maturing
- Suited for southern cotton zones
- Potential yield 1200 – 1500kg/ha
- Can be planted in Northern zone with supplementary irrigation (Alabi *et al.,* 2003)

2.6 Theoretical Framework

This study is guided by the social change theory, using the adoption and diffusion perspectives.

2.6.1 Social change theory

Social change has been defined by Ekong (2005) as 'the process by which alteration occurs in the structure and function of a social system'. Social change on the other hand could mean large number of persons engaging in group activities, interactions and relationships when viewed within the context of a social system. Social change may be planned or unplanned. Planned change entails the direct human intervention in the shaping and direction of change towards a defined goal (Salawu, 2007). For example, the Institute for Agricultural Research, Samaru (IAR), developed RCPP for cotton farmers, which is a planned change to bring about improvement in traditional method of cotton production, with the primary purpose of increasing yield and income of cotton farmers.

2.6.2 The adoption – diffusion perspectives

Adoption is the decision to continue full use of an innovation after an individual has passed through certain mental processes. Adoption is the acceptance of continued use of an innovation after individuals or groups had gone through certain mental processes (Agbamu, 2006). There are several models of explaining the adoption process. One of the models is that accepted by the United States of America North Central Rural Sociology Committee of Iowa in 1995 and which recognized the following sequence for explaining the process of innovation adoption. Awareness → Interest → Evaluation → Trial → Adoption (Ogunbameru, 2001). After the first four stages, the fifth stage is the adoption in which a decision is taken on whether to accept agricultural technology or not. Awareness stage is the first stage; here the farmer merely knows about the existence of an innovation but lacks details about it. This is somewhat like seeing something without attaching meaning or importance to it. Before a farmer can adopt a new idea or practice, the individual must first known about it. It is therefore the major task of the extension staff to bring the new idea, practice or technology to the knowledge of the farmer (Ogunbameru, 2001). Interest is the stage that farmers seek more factual information about the idea, practice or technology due to the interest the farmer develops in the idea, technology or practice. The farmer wants to know what the technology is, how it works and also its potential or general merit. He becomes curious about it (Agbamu, 2008).

Evaluation stage: the farmer at this stage, shows marked interest in the idea, practice or technology as it applies to him. He mentally evaluates the applicability of the innovation in the light of the solution to his own problem situation. Farmers evaluate how the information or new practice affects their social, economic and cultural variables (values and conditions). If positive, they go ahead to the next phase. If negative, they stop there. They ask such question as: Can I do it? How can I do it? Is the new practice or technology better than what I am doing or using now? Will it work in my case? What will I get out of it? All these and other questions flood their minds. They then make mental application of the idea. They obtain more information about the idea and decide whether to try it or not. Trial stage is the stage where the farmers have weighed the advantages and the risks involved and if the idea is divisible in small segments, they actually apply the innovation on a small scale under his' own circumstances and managerial competence. Such a trial could be done through the assistance of change agents and sales promoters (Agbamu, 2008) who also confirmed that this stage actually raises the questions: how I can do it? The farmer actually uses the innovation on a trial basis: it involves an experimental use of an innovation on a section of the farmer's plot of land. If the farmer is satisfied with the trial, he may decide to continue the use of that innovation. If the trial provides poor result, he may reject the innovation (Ogunbameru, 2001).

Adoption stage: it is the stage when a farmer has approved of an innovation and decided to continue using it. Adoption involves acceptance and repeated use of an innovation since the new practice brought an improvement on farm productivity or is expected to do so or will help to ease a difficult farm operation (Agbamu, 2008). Adegbenga and Babaleye (2009) argued that even when people have accepted an innovation, they remain curious until it has worked for some time and proved reliable. Having established trust in an innovation, there is no likelihood of discontinuance of its use. The implication of their findings to the adoption of recommended practice, there is need for awareness creation about the existence of the recommended practice. It should be one that can be tried on small-scale and which is better than old practice. To ensure that farmers sustain the adoption of an innovation, and not revert to old methods, there is need for occasional reinforcement of promotional campaigns about the good aspects of that innovation. However, it is important to note that, with the emergence of a superior innovation, farmers may discontinue the use of a previous innovation as they constantly seek better ways of doing things (Agbamu, 2008).

Adoption, according to Rogers (1995) and Arokoyo (2005) is the decision to make full use of a technology as the best course of action available. The farmers may decide to use a technology continuously over a time. The time taken for adoption varies with the nature of the technology, the communication of channels used and the characteristics of the social system. Adoption studies have been seen as important tools for measuring and assessing the impact of agricultural technologies (Agbamu and Orhorhoro, 2007).

Diffusion, according to Haralambos and Holborn (2008) is the process by which an innovation is spread among members of the community. Agbamu (2006) defined diffusion as the process by which an innovation is communicated through certain channels over time among members of the social system. According to him, a number of factors interact to influence the diffusion of innovations. These factors include: the innovation itself; the communication channels; the time; and the nature of the social system into which the innovation is being introduced. The classical diffusion- adoption theory is made up of two components:

a. the diffusion process and

b. the adoption or innovative decision process.

According to Odoemenem and Obinne (2010) the distinction made between adoption and diffusion concepts is that, adoption is a concept which refers to the acceptance and continuous use of an idea or practice by single unit of a potential audience; while diffusion, on the other hand, refers to the spread of an idea or practice, through the whole of the potential audience or social system. This theory has assisted this study in understanding and explaining the socio-economic factors influencing adoption of RCPPs among the farmers in the study areas. It has also helped to explain how the RCPPs had spread among the respondents studied.

2.7 The Conceptual Model

A model is a general conception of a phenomenon (Haralambos and Holborn, 2008). The basic assumptions in this study are that farmers' socio-economic characteristics, institutional and technological factors would play a significant role in influencing adoption of recommended cotton production practices to bring about changes in the livelihood of the farmers. This is shown in figure 1, where the independent variables, including socioeconomic characteristics, institutional factors and RCPPs' attributes are expected to have an influence on the dependent variables (adoption). This influence is denoted by the blocked arrows. The expected effect or outcome of this influence is shown by the broken arrows. Thus, the age of the farmer, for instance, is expected to have a negative influence on adoption, since the aged tried to avoid experimentation than the younger ones. This will invariably affect their yield and income negatively and consequently the standard of living.

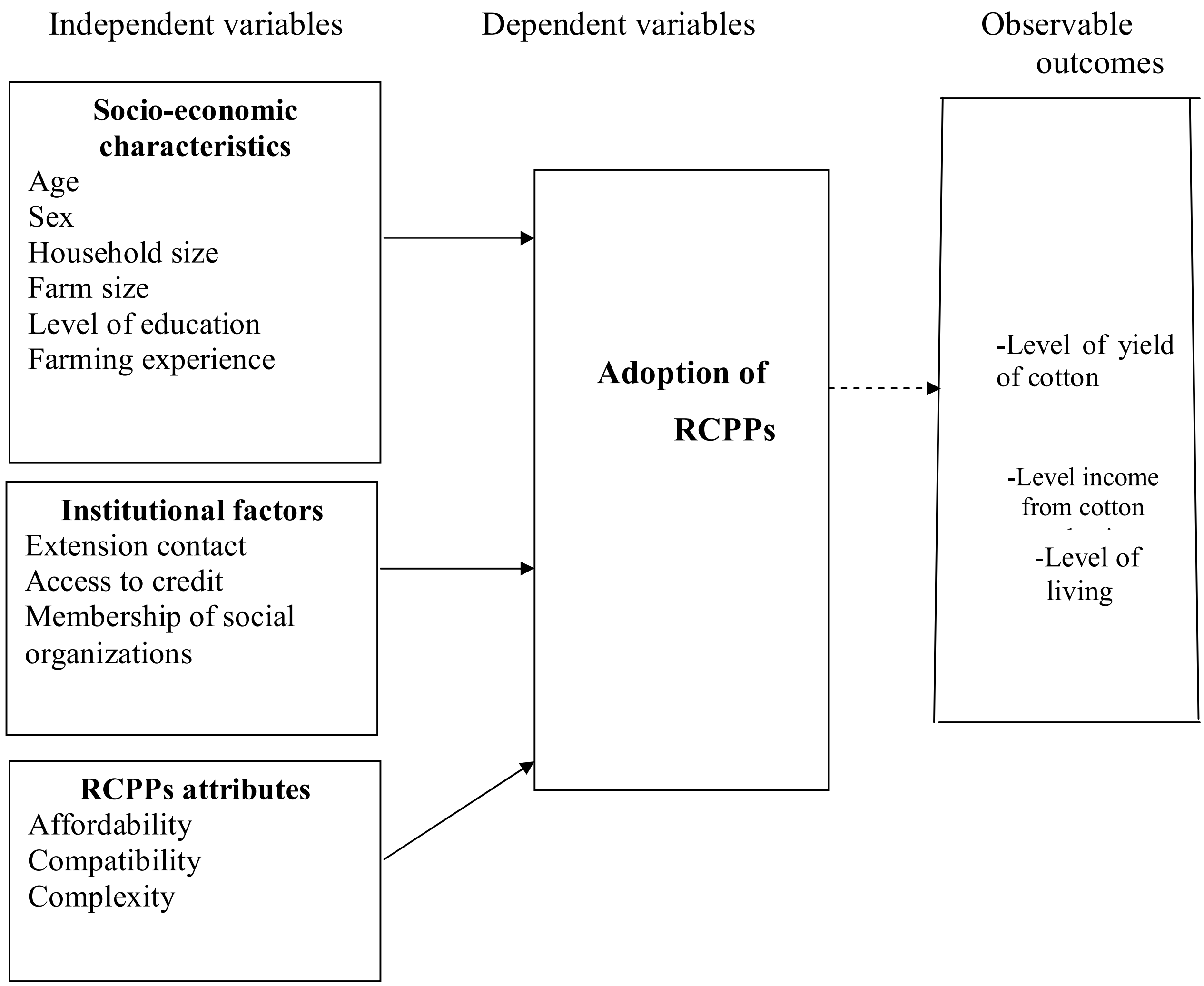

Figure 1: A model showing socio-economic factors influencing adoption of recommended cotton production practices (RCPP)

Chapter 3

METHODOLOGY

3.1 Study Area

The study was conducted in three of the fifteen Local Government Areas (LGAs) with the highest level of cotton production in Zamfara State. The selected LGAs were: Tsafe, Gusau and Bungudu. Zamfara State lies between latitude $10^0 – 13^0$ north of the equator and longitude $4^0 – 7^0$ east of the prime meridian (Figure 2). The State is located in the Sudan Savannah ecological zone of Nigeria, with a population of 3,259,846 (NPC, 2006).The estimated projected population in 2011 was 3,667,326 at time of data collection. Zamfara State shares borders with Sokoto and the Republic of Niger to the north, Katsina and Kaduna States to the East, Niger and Kebbi States in the South (Yakubu, 2005, www.zamfarastate.net, 2010).

The climate is generally characterized by alternating dry and wet seasons. The rains usually commence in May/June and end in September/October. The effective rainy season in the study area is restricted to July to mid September (Yakubu, 2005). The mean annual rainfall ranges between 969 mm and 1,086 mm. Relative humidity varies between 24% in January and rises to 85% in September. The mean annual temperature also varies between 29^0C and 37^0C (www.zamfarastate.net ,2010).

Major occupation in the area is farming, while some are craft men, traders, blacksmiths, hunters, musicians and butchers. The major crops grown include cotton, millet, sorghum, ground nut, maize, cassava, sweet potatoes, pepper, tomatoes and others (Yakubu, 2005).The people in the area are Hausa/Fulani by tribe. They speak Hausa language and practice Islamic religion. Traditionally, marriages between cross and parallel cousins are most preferred in this area (Gbovega, 2000). The housewives are mostly kept in seclusion or purdah during the day. Culturally, Hausa women are hardly involved prominently in agricultural and out door economic pursuits. Hence, cotton production emphasize male rather than female status, while the cow- Fulani women are more involved in economic pursuits. They milk the cattle, process and sell dairy products (NBS, 2010). Special occasions in this area are the birthday of Prophet Muhammad (pbh), annual thirty-days fasting and Edi-el Kabir (Gbovega, 2000).

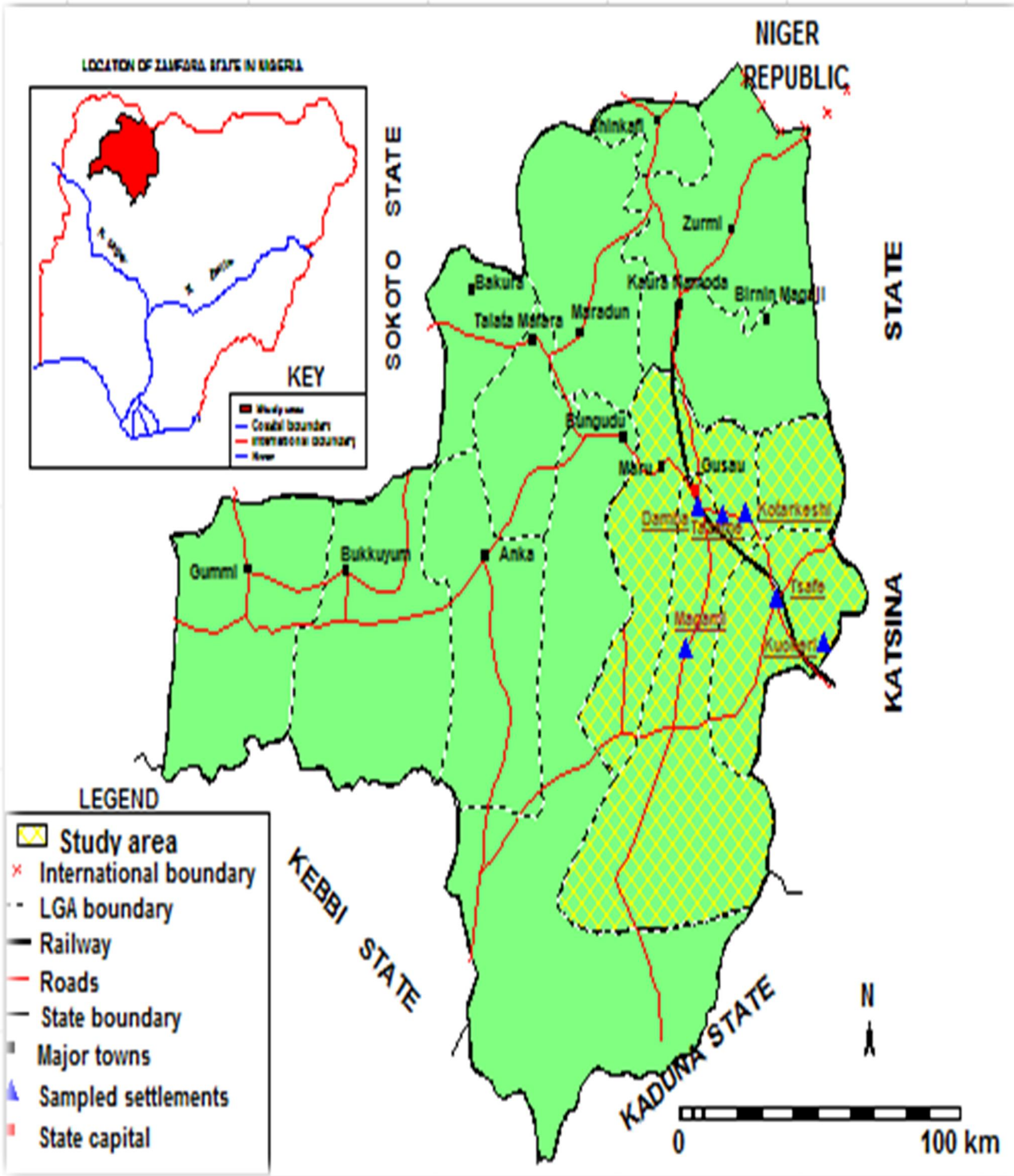

Figure 2: A Map of Zamfara State showing Location of Sampled Villages
Source: Modified from Administrative Map of Zamfara State, 2010.

3.2 Sampling Procedures and Sample Size

Based on a reconnaissance survey carried out on the study area, a two stage sampling procedure was used in this study. In the first stage, three LGAs out of fifteen were purposively selected. Those were Tsafe, Gusau and Bungudu. The criteria used for the purposive selection was based on intensity of cotton production and coverage by IAR Recommended Cotton Production Practices among cotton farmers in the State.

In the second stage, two communities were selected from each of the three selected LGAs. Hence, a total of six communities were chosen for the study. Those were Kucheri and Tsafe from Tsafe LGA; Damba and Magami from Gusau LGA; and Tazame and KwotarKwoshi from Bungudu LGA. The respondents were selected at 14 percent from the sampling frame of those communities and 14 percent was used to get effective representation of the total population. The sampling frame was the list of cotton farmers compiled during the reconnaissance surveyed (Table 1). A total sample size of 146 out of 1042 sample frame was used to elicit farm level data for the analysis.

Table 1: Distribution of sampled respondents in the study area

Name of LGAs/ communities	Registered cotton farmer (sample frame)	14% sample size
Tsafe LGA	143	20
i. Kucheri	214	30
ii. Tsafe		
Gusau LGA	150	21
i. Damba	157	22
ii. Magami		
	171	24
Bundugu LGA	207	29
i. Tazame		
ii. Kwotarkwoshi		
	1042	**146**
Total		

3.3 Data Collection

Both primary and secondary data were used for this study. In September, 2011, primary data were collected by administering a pre-tested structured questionnaire to the respondents with the help of well trained enumerators. One hundred and forty-six copies of a questionnaire were administered in six communities but two of the administered questionnaires were invalid. Primary data collected include the; socio-economic characteristics of the farmers, such as age, sex, marital status, family size, farm size, level of education and farming experience; rate of adoption of ten RCPPs; output and cost of cotton per kg; institutional variables such as extension contact, amount of credit and membership of social organisations; attributes of RCPPs: affordability, compatibility and complexity and finally, the constraints facing the RCPPs were collected. The secondary data were obtained from existing literature relevant to the study. Those from the Zamfara state ADP, IAR farming system research programme, IAR annual cropping scheme meeting, bulletins, proceedings, pamphlets, text books, journals, CBN annual reports and statement of account.

Analytical Techniques

Descriptive statistics such as frequencies, percentages and mean were employed to achieve socio-economic characteristics and institutional factors of cotton farmers; rate of adoption of recommended cotton production practices; yield performance of cotton and income of the farmers under recommended cotton production practices; and constraints to the adoption of recommended cotton production practices,while multiple regression was used to achieve socio-economic factors influencing adoption of recommended cotton production practices, Regression model is the situation in which dependent variable (y) is predicated from two or more independent variables. It is used to determine the contributions of independent variables to the dependent variables. This is why regression model was used in this study to determine the factors (independent variables) influencing adoption (dependent variable) of recommended cotton production practices. The multiple regression model is explicitly specified as:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \ldots\ b_{13}X_{13} + u$ ……………………………………..(1)

Where:

Y	=	Adoption of recommended cotton production practices (total number of recommended cotton production practices adopted).
X_1	=	Age (in years)
X_2	=	Sex (male=1, female=0)
X_3	=	Utilization (Man-days)
X_4	=	Farm size (hectares)
X_5	=	Educational level (number of years in formal schooling)
X_6	=	Farming experience (number of years in cotton production)
X_7	=	Household size (number of people in the household)
X_8	=	Extension contact (number of visits in 2010)
X_9	=	Access to credit (amount in naira)
X_{10}	=	Membership of social organisation (years of membership)
X_{11}	=	Affordability (A = agreed = 3, UD = Undecided = 2, and D = Disagreed = 1)
X_{12}	=	Compatibility (A = agreed = 3, UD = Undecided = 2, and D = Disagreed = 1)
X_{13}	=	Complexity (A = agreed = 3, UD = Undecided = 2, and D = Disagreed = 1)
a	=	constant
b_1–b_{13}	=	Regression coefficients
U	=	Error term

The significant level used was 5% level of probability for this analysis. However, it is important to note that whatever is significant at 1% e level of probability is also significant at 5% level probability.

3.5 Measurement of Variables

3.5.1 Independent variables

i. **Age:** This is the number of years a person has lived. This was measured in terms of actual age of the respondent at the time of this study.

ii. **Farm size:** This is the size of farm cultivated by the respondents. This was measured in hectares.

iii. **Level of education:** This is the number of years a respondent has spent schooling. This was measured in terms of the total number of years of schooling.

iv. **Farming experience:** It is the length of time the respondent has been in cotton farming. This variable was measured in years according to the number of years of each respondent in cotton farming.

v. **Household size:** This is the number of persons living under the care of the respondent at the time of the study. The total number of people in the respondent's household was his score.

vi. **Extension contact:** This is the frequency of visits by extension agents to the farmer and verse-versa. It was measured by the number of visits to or received by the respondent in the year 2010.

vii. **Access to credit:** This is the access to sources of credit by cotton farmers for the purpose of cotton production. This was measured in Naira amount of credit obtained.

viii. **Membership of social organisations:** This is the number of years the respondents spent in social organisations. This was measured in total number of years the respondent spent in social organisations.

ix. **Affordability:** This is the extent to which the RCPP is affordable by the respondent. This was measured in this study by the use of a 3-point scale :(A=agreed=3, UD=Undecided=2, and D= Disagreed=1). There were ten recommended practices (RP) in this study, and each RP was scored on a 3 point scale and was converted to percentage to serve as proxy to adoption.

x. **Compatibility:** This is the degree to which a new practice is perceived to meet the need and existing values of the respondent. This was measured using a 3–point scale: (A=agreed=3, UD=Undecided=2, and D=Disagreed =1) and converted to percentage to serve as proxy to adoption.

xi. **Complexity**: This is the degree to which a recommended cotton production practice is relatively difficult to understand or use. This was measured by using a 3-point scale: (A= agreed=3, UD=Undecided =2, and D=Disagreed=1) and was converted to percentage to serve as proxy to adoption.

3.5.2 Dependent Variables (Adoption of RCPPs)

Ten recommended cotton production practices were studied. An adopter is a farmer who uses any of the RCPP on a continuous and relatively large scale basis. A farmer who reported that he/she used a particular recommended practice on a continuous basis. It is only upon an indication of satisfactory (2/3) explanation of the scale of usage that he was credited as an adopter. This was facilitated by describing in the questionnaire, how each recommendation is expected to be used, so that the interviewers could check to ensure the validity of the recorded information. The adoption score for each farmer was calculated by summing up the number of practices he reported being adopted.

3.5.3 Outcomes

Cotton yield: This is the total quantity (output) of cotton harvested or picked by the farmers measured in kilogrammes, divided by the total hectarages in 2010.

Cotton farm income: This is the amount of money realised from the sales of cotton in 2010 by the farmer within the season of the study. This was measured in Naira (₦)

Level of living: The level of material comfort enjoyed by farmers as a result of adopting recommended cotton production practices. According to Ekong (2005) level of living is generally used to describe the quantity and quality of goods and services actually consumed by an individual and his/her family members and also the possession of material things. Studies have also shown that level of living is the sustainable access to resources to meet basic needs such as adequate access to food, portable drinking water, health facilities, educational opportunities, housing, time for individual participation and social interaction. Level of living is measured by ownership of material things such as buses/pickups, motorcycles, bicycles, grinding machines, farm equipment and livestock possession purchased with money from an adopted technology and converted into monetary value to serve as an index for level of living for an individual respondent.

Chapter 4

RESULTS AND DISCUSSION

4.1 Farmers' Socioeconomic Characteristics, Institutional Factors and Technological Variables.

4.1.1 Farmers' socio-economic characteristics

Objective one of the study was to describe the socio-economic and institutional characteristics of cotton farmers in the study area. Table 2 shows the distribution of respondents according to their ages. About 45%, 35% and 15% of the respondents fall within the age ranges of 41–50, 31-40 and 21-30 years, respectively. Their mean age of 40 years shows that most of the respondents are relatively middle aged, which could be regarded as active and productive age group and so have the energy to cope with the regours of cotton production and also willing to experiment with newly introduced production practices. This agrees with the findings of Ahmadu (2009) which indicated that farmers' ages influence adoption of recommended fish farming in several ways.

Household's size response on this variable indicates that 40% and 34% of the respondents had 38-48 and 49-59 numbers of people in their family. This implies that the respondents had large household size which could be use as source of labour for cotton production. This is in line with Adeniji (2007) who found that cotton production was labour-intensive and the household size is positively related to the adoption of cotton production in Katsina State. Result also shows the distribution of respondents by gender. The findings revealed that in all the six studied communities, majority (97%) were males with remaining 3 percent females engaged in cotton production. The domination of male in cotton production in the study area could be attributed to the fact that males have access to the land and other resources. It could also be due to the culture of the respondents in the study area and this suggest that males carried more load than their female counter-parts, who were kept in-door for child rearing and careering of homes.

Distributions of respondents according to marital status: the result revealed that 88% of the respondents were married while only 12 percent of them were single. This could be due to struggle to meet the needs of their families. This is in agreement with Agbamu *et al.* (1996) who found out that married farmers adopted new varieties of maize and cassava more than farmers that are single. The levels of education of the respondents are shown in Table 2. The Table shows that majority (45%) of the respondents had Koranic education, while 18 %, 13% and 12 %, of them had Secondary, adult, Primary, and Tertiary education, respectively. About 12 % of them had no education at all. This finding is in line with the findings of Yusuf (2009) who found that in Kaduna, the highest level of education of the respondents is Islamic education. This could be due to the fact that Koranic education is highly emphasized in the six studied communities of Zamfara State. The implication of this finding is that the respondents were responsive to positive change since 13 percent of them had adult education.

On the variable relating to farming experience, the result shows that 61% of the respondents had been in cotton production for 6–10 years, while 18 % and 17 % of them had been in cotton production for between 11–15 and 16–20 years, with their mean years of farming experience of 11 years. This suggests that the respondents had experience in cotton production and did not have problem in terms of experience in adopting the recommended cotton production practices. This supported the finding of

Sanni (2009) who found that experience in fish farming influenced the adoption of recommended fish practices and led to high economic return.

The finding also shows that majority (69%) of the respondents had a total farm size range of 1.0–3.0 ha, while 22 percent and 8 percent had 3.1–5.0 ha and 5.1–7.0 ha with a mean of 2.8 ha. This implies that cotton production in the study area was engaged by small-scale farmers. This finding is in agreement with that of Olayide *et al.* (1980) and Ojo (2009) who classified farm-size owners of 0.1 hectare to 5.9 hectares as small- scale farmers. The results also reveal that 65% of the respondents used 1.1–2.0 hectares and used a mean of 1.8 ha of farm for their cotton production. This implies that majority of the respondents used nearly all their land for cotton production and are therefore, regarded as adopters because they had used more than 2/3 of their total farm for cotton production.

Table 2: Distribution of the respondents by their socio economic characteristics

*Items	Mean	Frequency	Percentage
Age (years)			
21 – 30		22	15.28
31 – 40		51	35.42
41 – 50	**40**	65	45.14
51 – 60		06	04.17
Household size			
5-15		07	05.00
16-26		12	08.00
27-38		18	13.00
38-48		58	40.00
49-49		49	34.00
Gender			
Male		140	97.00
Female		04	03.00
Marital status			
Married		126	88.00
Single		18	13.00
Education level			
No education		12	08.33
Koranic education		65	45.14
Primary education		15	10.41
Secondary education		26	18.06
Tertiary education		08	05.50
Farming experience (yrs)			
6 – 10		83	61.10
11 – 15		26	18.06
16 – 20		25	17.36
21 – 25	**11**	05	03.47
Total farm size owned(ha)			
1.0 – 3.0		100	69.44
3.1 – 5.0		32	22.22
5.1 – 7.0	**2.8**	12	08.33
Total farm size used for cotton production (ha)			
0.1 – 1.0		34	23.61
1.1 – 2.0		93	64.58
2.1 – 3.0		13	09.03
3.1 – 4 0	**1.8**	14	02.78

*Total number of observation 144

4.1.2 Institutional variables

Level of extension contact of farmers

Table 3 shows that majority (65%) of the respondents had contact with extension agents, while about 35 percent of them had no extension contact at all. Among the respondents that had extension contact, majority (51%) met with extension agent twice in 2010. Similarly, 40 percent of the respondents had only one contact with extension agents. This implies that there is poor extension contacts in the study area compared with ideal numbers of visits (26 numbers of visits per annum). According to T & V extension system an extension agent should meet with farmers at least fortunately. This suggests the reason why adoption of RCPPs is low among cotton farmers. This is in agreement with Yusuf (2009) who found that poor extension contact affected the use of recommended technologies among women in Kaduna state. Similarly, Chery *et al.* (2000) found that the adoption of new technologies is often influenced by the frequency of the farmer's contact with extension agents. The relationship between agricultural extension agent and the farmer could be an important determinant in the adoption and sustenance of improved farm practices such as recommended cotton production practices.

Table 3: Distribution of respondents based on their extension contact and number of visit

Items	Frequency	Percentage
Extension contact		
Yes	94	65.27
No	50	34.72
Total	144	100.00
Number of visits (26 times per year)		
Once	36	40.00
Twice	46	51.11
Thrice	7	7.78
Four times	1	1.11

Credit need

The result shows that the mean credit need of the respondents was ₦69,208, while about half (49%) of them needed the mean credit of ₦81,000. Similarly, 28 percent of the respondents needed the mean credit of ₦60,000. Despite the respondents credit need, Table 4 shows that about 55 percent of them had no access to credit at all for their cotton production. About 45 percent of the respondents that had access to credit received only a mean credit of ₦18, 451. The implication of this finding is that there is a need gap of about ₦50, 747. This shortfall could adversely affect the farmers' productivity

Table 4: Distribution of respondents based on their credit need, accessibility to credit and amount of credit received (n=144)

Items	Mean (₦)	Frequency	Percentage
Credit need of the respondents (₦)			
50,000 -70,000	60,000	40	27.78
71,000 – 91,000	81,000	70	48.61
92,000-112,000	102,000	14	9.22
113 -133,000	123,000	12	8.33
134,000 – 154,000	144,000	8	5.56
Average credit need of the respondents	**69,208**		
Accessibility to credit			
Yes		65	45.14
No		79	54.86
Amount of credit received (n=65) ₦			
10,000 – 20,000	15,000	20	30.77
20,001 – 40,000	30,000	12	18.46
40,001 – 60,000	50,000	20	30.77
60,001 – 80,000	70,000	8	12.31
80,001 – 100,000	90,000	5	7.69
Average credit received	**18,451**		

Membership of social organizations

Table 7 reveals that most of the respondents (73%) were members of social organizations. It was also found that cotton farmers did not spend the same number of years in such social organizations, where more than half (58%) of the respondents spent between 4–6 years in social organizations. It is expected that the respondents with high number of years in social organizations would influence their farming activities positively.

Table 5: Distribution of the respondents based on their membership of social organizations and years of membership in such organizations

Membership of social organization	Frequency	Percentage
Yes	105	72.92
No	39	27.08
Years of membership in social organization		
1 – 3	15	13.89
4 – 6	63	58.33
7 – 9	22	20.37
10 – 12	07	6.48
13 – 15	01	0.92

4.2 Rate of Adoption

The second objective of this study was to determine the rate of adoption of recommended cotton production practices by the farmers. The recommended practices were introduced to the farmers in the study area in 1999. However, the analysis in this study is from the year 2001-2002 to 2009-2010. This is because the responses collected for the years preceding 2001 were not reliable and so were not included in the analysis.

The result in Table 6 shows that in 2001-2002, the use of good seed bed preparation had the highest (30%) rate of adoption. Similarly, recommended spacing, use of SAMCOT-9, thinning, and seed treatment had 28%, 25 %, 23% and 21% rate of adoption, respectively. In 2003-2004, the rate of adoption of the use of good seed bed preparation had increased to 44%, thinning to 38 %, use of SAMCOT-9 to 37 %, recommended spacing to 36% and seed treatment to 30 %. In the first year, 2001-2002 the rate of adoption was low because the farmers were not fully aware of the potential gain of the RCPPs but in 2003-2004, there was an increase in the rate of adoption. The implication for this is that other farmers were motivated by the potential gain of the RCPPs to adopt. However, in 2005-2006, the rate of adoption of the use of seed bed preparation dropped to 30 %, the use of SAMCOT-9 to 28 %, harvesting time to 23 %, seed treatment and recommended spacing to 22 % each. The reduction in the rate of adoption in 2005-2006 is as result of fall in price of cotton in 2003-2004. The low rate of adoption is also due to inadequate and high cost of labour for these farm operations as reported by majority of farmers.

There was general increase in the rate of adoption from 2007-2008 to 2009-2010. In 2007-2008, the use of good seed bed preparation had the highest (36%) rate of adoption, followed by the use of SAMCOT-9 32 %, recommended spacing 31%, seed treatment 28 %, harvesting 27 %, and thinning %. The price of cotton was favourable to the farmers preceding 2005, which increased the farmers' income level and consequently retained them and motivated other farmers to adopt the RCPPs. The same trend was observed in 2009-2010, where good seed preparation and the use of improved seed had the highest rate of adoption of 42 % and 40 %, while the recommended spacing and harvesting time at 50% bolls opened had recorded 38 % and 35 % rate of adoption, respectively.

However, the results show that the following RCPPs had lower rate of adoption. In 2001/2002 – 2009/2010 recommended planting time had recorded 9 percent, 5 percent, 10%, 3 percent and 12 %. Planting cotton on mid-June to first week of July was found not compatible with existing value of cotton farmers. This is why most of the cotton farmers were busy planting their food crops within the recommended time for cotton planting. Similarly, recommended fertilizer rate had 13%, 10%, 16%, 6 percent and 18% rate of adoption throughout the period under study. High cost of fertilizer was responsible for low rate of adoption of fertilizer recommendation and since majority of cotton farmers were small scale, they used organic manure to improve the fertility of their farm. The results show that weed control practice had 10%, 11%, 9 percent, 14 % and 20 % rate of adoption from 2001/2002-2009/2010. Inadequate and high cost of labour at critical weeding period was one of the factors affecting rate of adoption of recommended weed control among cotton farmers. Both unavailability and ineffective of herbicide were also reasons for low rate of adoption of recommended weed control practice.

Table 6: Distribution of respondents according to rate of adoption of recommended cotton production practices

S/No	**Recommended Cotton Production Practices**	**Rate of adoption (%)**				
		2001-2002	2003-2004	2005-2006	2007-2008	2009-2010
1	`Good seed bed preparation	30.06	44.20	30.15	35.84	42.10
2	Use of improved variety	25.20	37.04	28.00	32.16	40.20
3	Seed treatment	20.96	30.24	21.60	28.04	35.64
4	Recommended planting time	8.64	5.23	10.24	3.00	11.92
5	Recommend spacing	27.56	36.16	22.96	31.04	42.16
6	Thinning	23.10	38.32	20.00	25.01	33.48
7	Recommended fertilizer rate	12.96	8.70	15.92	5.76	17.70
8	Timely weed control	9.84	10.60	8.96	14.00	19.88
9	Use of insecticide application	15.88	18.25	11.84	20.01	10.36
10	Harvesting	19.32	28.80	23.72	27.56	35.00

Figure 3 shows rise-and-fall pattern of rate of adoption of RCPPs by the farmers in the study area due to fluctuation of price of cotton. The figure also explains adoption behavior of cotton farmers from 2001/2002 to 2009/2010. In the first year (2001/2002), few numbers of farmers adopt the RCPPs where 30% of them adopted good seed-bed preparation practice as the highest rate of adoption. This suggests that the farmers in this group are innovators/early adopters because they bear risk to experiment the recommended practices. In 2003/2004, the numbers of adopters had increased. About 44% out of 144 cotton farmers adopted good seed-bed preparation being the highest rate of adoption among the ten RCPPs studied, followed by the use of improve seed 37% and use of seed treatment 30% rate of adoption. The highest peak of adoption was discovered in 2003/2004 which suggests that the respondents had received positive extension massage about the potential gain of the RCPPs. The behaviors of farmers suggest that they belong to early majority adopters. However, in 2005/2006 the numbers of adopters were reduced due to poor price of cotton experienced by the respondents in the preceding year.

However, linear increase in rate of adoption of RCPPs was observed from 2005/2006 to 2009/2010. The second peak of adoption rate was recorded in 2009/2010 cropping season which explained that farmers had more contacts with extension agents and better price of cotton. Therefore, this study reveals that adoption rate increase with an increase in price of cotton. The farmers in this group belong to late majority adopters because they have taken time to weigh the advantages and disadvantages of RCPPs before adoption. The gradual acceptance has led to an inference that respondents differ in their willingness to accept RCPPs. Logically, the trend of adoption of any sampled cotton farmers could fluctuate between early and late adoption over time depending on the price of cotton. This suggests that if a farmer readily adopted certain components of technology in the past, it does not imply that he will adopt all other components of the technology in future. Therefore, farmers retained the components of the technology found the most relevant to them. This agrees with Agbamu (2006) who argue that farmers who do not adopt a technology might have done so, not because they are conservative, ignorant, poorly educated or not innovative but it might mean that they do not belong to category of client for who the innovation is relevant.

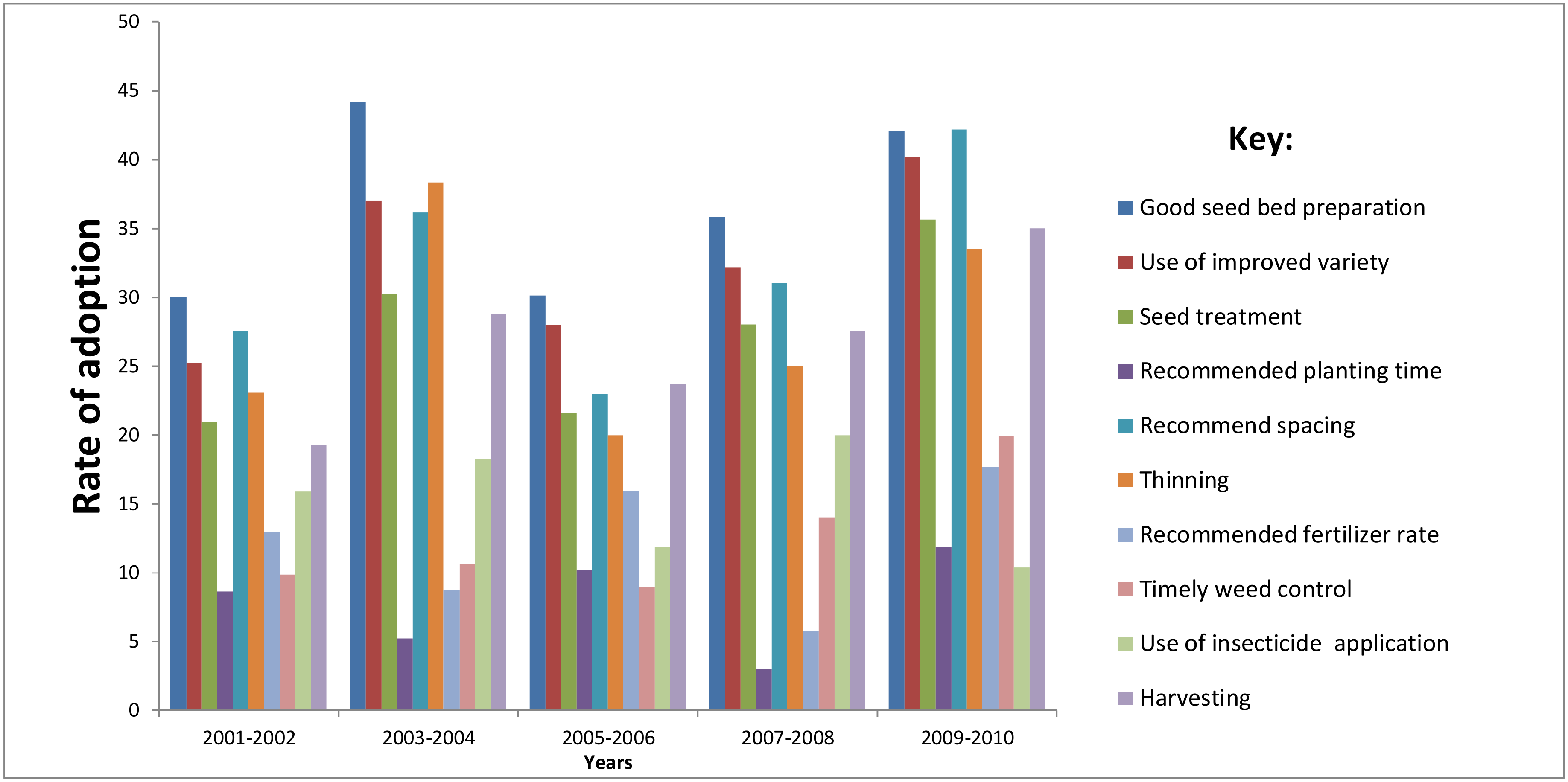

Figure 3: A Graphic Representation of Rate of Adoption of RCPPs

4.3 Yield Performance and income from Cotton production under Recommended Cotton Production Practices.

The third objective of this study was to determine the yield performance of cotton and income of the respondents under recommended cotton production practices in the six communities studied. Findings (Table 7) reveal that majority (66%) of the respondents reported yield range of 2100 – 2500 kg/ha. The results further show that 17 percent of the respondents reported yield range of 2600 – 3000 kg/ha, while 8 percent reported yield range of 1600-2000kg/ha. The result of this finding shows that the respondents had a mean yield of 2300 kg/ha (2.3 ton/ha) which almost doubled the mean yield (1.3 ton/ha) obtained from traditional practices (Ogunlela, 2004).Though the yield obtained from this finding is less than the research potentials mean yield of 3.3 ton/ha (Idem, 1999) it is higher than that of farmers practices (1.3 ton/ha). This implies that the adoption of RCPPs had increased the yield of the respondents.

The results also reveal that 43 percent of the respondents had a mean income of ₦120, 000 while, 21 percent of them had obtained ₦161, 000 from cotton production. Despite the fact that the income generated from the yield of this study is less than expected income from research potentials yield but is higher than income obtained from the yield of farmers practices. This implies that RCPPs had increase the income of the farmers.

Table 7: Distribution of yield performance and income of the respondents

Items Outcome (kg/ha)	Mean yield (kg/ha)	Frequency	Percentage
00 – 1500	1250	8	6.56
1600 – 2000	1800	12	8.33
2100 – 2500	2300	95	65.97
2600 – 3000	2800	24	16.67
3100 – 3500	3300	5	3.47
Income (naira)			
100,000 - 140,000	120,000	62	43.05
140,000 - 181,000	161,000	30	20.83
182,000 - 222,000	20,2000	22	15.28
223,000 - 263,000	243,000	20	13.89
264,000 - 304,000	284,000	10	6.90

4.4 Socio-economic Factors Influencing Adoption of Recommended Cotton Production Practices

The fourth objective of this study was to determine socio-economic factors influencing the adoption of recommended cotton production practices in the study area. This was achieved by testing the hypotheses drawn for this study, through the use of multiple regression model to analyze the socio-economic and institutional variables, as well as the RCPPs' attributes influencing its adoption.

Hypothesis I: The first hypothesis was that the farmers' socio–economic characteristics would not have significant influence at 5% level of probability on adoption of recommended cotton production practices. Socio-economic variables: The result of multiple regression analysis in Table 8 shows that age of the respondents had a negative coefficient (-0.025) and insignificant at 5% level of probability. This implies that age is inversely related to the adoption of RCPPs but with insignificant influence at 5% level of probability.

The sex of the respondents had positive coefficient (1.534) and insignificant at 5% level of probability. This indicates that sex is proportionally related to the adoption of RCPPs but with insignificant influence at 5% level of probability. This finding is in line with Agbamu *et al*. (1996) who found that the sex of the respondents was insignificant at 5% level of probability to the adoption of agricultural technologies. Labour had a negative coefficient (-0.007) but significant influence at 5% level of probability on adoption of RCPPs. This implies that labour is a source of discouragement to the adoption of RCPPs. This agrees with finding of Benjamin (2010) who discovered that farmers resist agricultural technologies that required high labour use. The positive coefficient (0.010) of the farm size of the respondents shows that farm- size positively influenced the adoption of the RCPPs. This implies that farmers with larger farm- size adopt RCPPs more readily than those farmers with smaller farm-size. This finding supported the findings of Ekong (2005) and Ahmadu (2009) they found that the size of farm land to be positively and significantly influenced the adoption of an innovation at 5% level of probability.

Table 8 also reveals a positive coefficient (.0227) of educational level of the respondents, which significantly influenced the adoption of RCPPs at 5 percent level of probability. This implies that the higher the educational level of the respondents the higher the adoption of RCPPs. This finding is in line with Agbamu and Orhorhoro (2007) who found that educational level positively and significantly influences the adoption of recommended practices at 5% level of probability.

In a similar trend, the farming experience had a positive coefficient (1.972) which significantly influences the adoption of RCPPs at 5 percent level of probability. This implies that farmers with high farming experience adopt RCPPs more than inexperience farmers. This finding concurred with Odoemenem and Obinne (2010) who found that farming experience had positively and significantly influenced the adoption of agricultural technologies at 5% level of probability. The result further showed a positive coefficient (0.006) of household size of the respondents but insignificant at 5% level of probability. This implies that the household size was not an important factor to consider in adoption of the adoption of RCPPs.

Hypothesis II: The second hypothesis was that institutional factors have no significant influence on adoption of RCPPs at 5% level of probability. Table 8 shows the regression coefficient (0.369) of the respondents' level of extension contact was found to be significant at 5 percent level of probability and positively contributes to the adoption of RCPPs. This implies the higher the number or frequency of visits of extension agents to farmers the higher the level of adoption of RCPPs. This finding is in agreement with Idris *et al*. (2007) who found a positive contribution of extension contact to adoption.

Table 8 also reveals that the amount of credit received by the respondents had a positive but insignificant coefficient (1.084) at 5% level of probability. This indicates that even though credit has a positive influence on adoption, it is not a significant factor to consider in the adoption of RCPPs at 5% level of probability.

In a similar trend, the regression coefficient (0.234) of the respondents' membership of social organization was found to contribute positively and significantly to adoption of RCPPs at 5% level of probability. This implies that membership of a social organization was important in inducing farmers to adopt the RCPPs. This finding is in line with Salawu(2007) who found that social organizations are made up of different categories of adopters. As innovators and early adopters interact with late majority and others, it would influence the outlook of other categories to adopt. It also concurred with finding of Benjamin (2010) who found that social organizations serve as fora through which members could exchange ideas, learn new farm practices and have access to information.

Hypothesis III: The regression coefficient (0.062) of the affordability of RCPPs to the respondents was found to contribute positively and significantly to adoption of RCPPs at 5% level of probability. This implies that the lower the cost of the RCPPs to the farmers the higher its adoption. This finding is in line with Ojo (2009) who found a positive contribution of technology affordability to adoption of recommended cassava production practices. The result also shows the negative and insignificant coefficient (-0.500) at 5% level of probability of the complexity of the RCPPs to the respondents. This implies that complexity is inversely related to the adoption. This finding concurred with that of Ani *et al*.(2008) who found that farmers easily understand and adopt the less complex recommended practices.

It was hypothesized that the respondents' socio-economic characteristics, institutional factors and RCPPs' attributes will have no significant influence on adoption of RCPPs. The result of multiple regression analysis reveals that labour was negatively significant at 5% level of probability, while education, farming experience, extension contact, membership of social organization and affordability were positively significant at 5 percent level of probability. The result also shows the contribution of each independent variable to the adoption of RCPPs with an R^2 value (0.58), which implies that all the variables together, explained about 58 percent of the variability in adoption of RCPPs in the study area. The null hypothesis was rejected and the alternative hypothesis accepted; that is the respondents' socio-economic characteristics, institutional factors and RCPPs' attributes have significant influence on adoption of RCPPs at 5% level of probability.

Table 8: Multiple regress results of socio-economic factors influencing adoption of recommended cotton production practices

Variables	Coefficient	Standard error	T-value
Age	-0.025	0.034	-0.735
Sex	1.534	1.093	1.403
Labour	-0.007	0.002	-3.500***
Farmer size	0.010	0.051	0.196
Education	0.227	0.101	2.247**
Farming experience	1.972	0.752	2.622**
Household size	0.006	0.051	0.118
Extension contact	0.369	0.192	1.922**
Amount of credit	1.084	0.971	1.116
Membership of social organization	0.234	0.064	3.656***
Affordability	0.062	0.028	2.214**
Compatibility	0.005	0.068	0.074
Complexity	-0.050	0.073	0.685

*** Significant at 1% level of probability

** Significant at 5% level of probability (significant level chosen)

R = 0.76

$R^2 = 0.58$

4.5 Constraints to Adoption of Recommended Cotton Production Practices

The fifth objective of this study was to identify the constraints to the adoption of recommended cotton production practices in the study area. Some of the major constraints faced by the respondents (Table 9) were inadequate and high cost of labour. This was ranked first (33%). These constraints could be a serious barrier to adoption of recommended cotton production practices. This is because all the respondents were small scale farmers (Table 2) with majority not having access to credit facilities (Table 6). Storage and marketing problem was ranked third (14%). Inadequate recommended seed and agrochemical was ranked fourth (12%). The respondents reported that recommended planting time of mid-June–1st week of July was competing with food crop for their attention and this was ranked fifth (8%). Small and scarcity of farm holdings, inadequate credit facilities and high interest rate on loan, were ranked sixth, seventh and eighth, respectively.

Table 9: Distribution of respondents according to constraints faced in adoption of recommended cotton production practices

Constraints	Frequency	Mean rating	Rank
Inadequate and high cost of labour	80	32.65	1
Insufficient fund	40	16.33	2
Storage and marketing problem	35	14.29	3
Inadequate recommended seed and agrochemical	29	11.84	4
Planting time competing with food crop for farmers attention	20	8.16	5
Small and scarcity of farm holdings	18	7.34	6
Inadequate credit facilities	15	6.12	7
High interest rate on loan	8	5.27	8

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This study was designed to determine the socio-economic factors influencing the adoption of recommended cotton production practices by farmers in Zamfara State, Nigeria. A multi-stage sampling procedure was used in this study. Random sampling was used to select six communities from the study area. These communities were Kucheri, Tsafe, Damba, Magami, Tazame and Kwotarkwoshi. The sample size was 144 respondents which were randomly selected and the data were collected from the farmers in September, 2011 from 2010 cropping season. Descriptive statistics and multiple regressions were used to analyze the data.

The first objective of the study was to describe the socio-economic and institutional characteristics of cotton farmers. The socio-economic characteristics: Table 2 shows that 45 percent, 35 percent and 15 percent of the respondents were between age of 41-50 years, 31-40 years and 21 – 30 years respectively. About 40 percent, 34 percent and 13 percent of the respondents had 38 - 48, 49 -59 and 27-38 numbers of people in their household respectively. The result shows that 97 percent of the respondents were male, while 88 percent of them were married. About 45 percent of the respondents had Koranic education, while 18 percent had secondary education. Similarly, 61 percent of the respondents had 6 - 10 years farming experience, while 18 percent and 17 percent had been in cotton farming for 11-15 and 16-20 years respectively. About 55 percent of the respondents have no access to credit while 45 percent had access to credit. The mean credit need of the respondents was ₦69,208, they received only a mean credit of ₦18,451 (Table 4).There is a need gap of about ₦ 50,747.

The second objective of the study was to determine the rate of adoption of recommended cotton production practices which were introduced to the farmers in the study area. Table 6 shows that the use of good seed bed preparation (15cm high) has the highest rate of adoption from 2001/2002-2009/2010, then followed by the use of improved seed (SAMCOT-9), thinning 2 plants per stand, spacing of 45 x 90cm, seed treatment , and harvesting at 50 percent split boll open. This means 6 out of the ten RCPPs have the highest rate of adoption.

The third objective of the study was to determine the yield performance and income of the respondents from cotton production under recommended practices. The result on table 7 reveals that majority (66%) of the respondents obtained an average yield of 2300kg/ha. About 43 percent of the respondents obtained ₦120, 000 from cotton production, while 21 percent of them realized ₦ 161,000 from cotton production. The fourth objective of the study was to determine the socio-economic factors influencing the adoption of recommended cotton production practices. The result of multiple regression analysis shows the influence of socio-economic variables: education level (0.227), farming experience (1.972), and labour (0.007) had a significant contribution to adoption of RCPPs. The result shows the influence of institution variables: extension contact (0.369) and membership socio-organization (0.234) significantly contribute to adoption of RCPPs. In a similar trend, Table 8 shows the influence of RCPPs' attributes: affordability (0.062) significantly contributes to adoption of RCPPs.

The fifth objective of the study was to identify the constraints to adoption of cotton recommended production practice. Table 9 shows the ranking of the constraints faced by the respondents in adopting the RCPPs. Inadequate and high cost of labour (1), insufficient fund (2), storage and marketing problem (3), inadequate recommended seed and agrochemical(4), the recommended planting time (5), small and scarcity of farm holding(6), inadequate credit facilities(7) and high interest rate on loan(8).

5.2 Conclusion

The general objective of this study was to determine socio-economic factors influencing the adoption of RCPPs by farmers. The socio-economic characteristics of the respondents were found to influence the adoption of the RCPPs in the study area. The result of this finding reveals that nearly half (45%) of the cotton farmers were not literate and this can affect the dissemination of information (printed materials) on any recommended practices to the cotton farmers. It was discovered in this study that, there was poor extension contact and the implication for this is that, there was no awareness creation for the potential gains of RCPPs among the respondents in the study area.

This finding supported the general alternative hypothesis of this study that certain personal characteristic, institutional factors and RCPPs' attributes significantly contribute to the adoption of RCPPs. This implies that labour, level of education, farming experience, household size, membership of social organizations and affordability were important factors to consider in the adoption of RCPPs in the study area. This suggests that any extension strategy for cotton farmers, aimed at high level of innovation adoption should critically consider the roles of these factors. The result also shows the contribution of each independent variable to the adoption of RCPPs with an R^2 value (0.58), which implies that all the variables together, explained about 58 percent of the variability in adoption of RCPPs in the study area.

This study found that, the use of good seed bed preparation, improved variety, thinning to 2 plants per stand, spacing of 45x90cm, seed treatment and harvesting at 50 percent split boll had the highest rate of adoption across the study period. This implies that the farmers were more comfortable with the six RCPPs out the ten studied. There was a positive indication that recommended practices, which are appropriate and easy to practice, would have high rate of adoption. Certainly, farmers will not adopt new practices which will not meet their needs.

It was discovered in this study that, about 66 percent of respondents obtained 2300 kg/ha. The implication for this is that the RCPPs had increased the yield of cotton more than traditional practices and this suggests that if marketing problem is not adequately addressed there could be the problem of cotton glut in the study area, if the farmers appropriately adopt the RCPPs. Consequently this could affect their income generation.

The study has revealed that adoption of RCPPs had increased the income of the respondents and consequently has a positive effect on the respondents' level of living. The implication of this finding is that, if the respondents appropriately adopt the RCPPS would likely have more money to take care of their family needs, which is an indication of family improvement in their level of living.

Cotton farmers encountered inadequate and high cost of labour constraints. This suggests the cotton farmers' inability to expand their current level of cotton production. Insufficient fund was another constraint faced by cotton farmers in the study area. This implies that the respondents did not have enough money to purchase inputs such as improved seed, fertilizer and insecticides for high yield. Similarly, the study also discovered that storage and marketing problem facing the cotton farmers. This implies that farmers sell their cotton early at very low price due to the lack of storage facilities. It was discovered from this study that, inadequate recommended seed was also a major constraint faced by the cotton farmers. This implies that the cotton foundation seed produced by seed production unit of IAR and certified seed produced by Zamfara state ADPs were not meeting the demand of the respondents. This suggests the reason why some of the respondents were not using the recommended seed.

5.3 Recommendations

Based on the findings of the study, the following recommendations are proffered to enhance the adoption of recommended cotton production practices and cotton production in the study area:

i. It was found that education was one of the important factors in adoption of RCPPs and majority of the farmers were not literate. It is therefore. Recommended that adult education should be organized so that the dissemination of information especially printed materials on any recommended practice would be successful. In addition, the research institutes and ADPs should organize a pre-season training to farmers.

ii. It was found that membership of social organizations was one the factors significant at 5% level of probability in adoption of RCPPs. Therefore, it is recommended that farmers should be encouraged by the ADPs and NGOs to form co-operative groups for land, input, credit, labour and marketing of cotton. This is to ensure maximum benefit of large – scale production of recommended production practices.

iii. It was found that many cotton farmers had no access to credit and those that had access were faced with high interest rate. Therefore, the agricultural banks should provide credit facilities to farmers at the right time and at low interest rate to ensure high economic return. Additionally, the farmers can organize themselves into credit relieving society to take care of their financial needs for those that require credit facilities to augment their personal saving.

iv. There were limited extension services in the study area. It is therefore, recommended that more extension agents should be recruited to improve their work in terms of coverage in the studied area.

v. It was found that planting time had lower rate of adoption because it was not appropriate to the farmers; therefore the IAR researchers should develop variety that is early maturing than SAMCOT-9 which can be planted later than SAMCOT-9 to avoid competing with farmers' time for food crop production.

vi. Some farmers did not plant the recommended seed variety because of unavailability. The IAR and Zamfara state ADP should ensure the supply of the recommended seed to the farmers on timely basis and at affordable price.

vii. It was discovered that the yield obtained from this study was higher than farmers, practices. Therefore, it is recommended that farmers should adopt more components of the RCPPs for higher yield and income from cotton production.

5.4 Suggestions for Further Research

This study has attempted to provide some base line information on some of the factors that influence adoption of recommended cotton production practices in the study area. However, it is desirable and therefore suggested that the following areas be probed for further research.

i. Comparative studies should be conducted to find out the difference in yields between the recommended cotton production practices and traditional practices in the study area.

ii. It is also suggested that future study should consider income of the respondents before and after adoption of the recommended cotton production practices in the study area.

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APPENDIX: QUESTIONNAIRE FOR COTTON FARMERS

Department of Agricultural Economics and Rural Sociology,
Ahmadu Bello University, Zaria.

Dear Sir/Madam,

I am a postgraduate student of Ahmadu Bello University, Zaria, currently working on the following topic: **"Socio-economic Factors Influencing Adoption of Recommended Cotton Production Practices by Farmers in Zamfara State, Nigeria".**

Kindly answer the following research questions in respect to this work. Your responses will be treated with confidentiality.

Yours Sincerely,

NUHU MUHAMMAD SADDIQ

SECTION A: Background Information

1. Name of respondent:………………………………………………...
2. Name of village:……………………………………………………..
3. Name of L.G.A:……………………………………………………..

SECTION B: Socio-Economics Characteristics of the Farmer

4. Age:……………years
5. Sex: Male ( ) Female ( )
6. Marital Status: Married ( ) single ( )

Indicate your household size:

7. How many wives do you have?....................
8. How many children do you have? ……………
9. Beside your wife/wives and children, are there some people living with you? Yes ( ) No ( )

10. If yes, how many of them?.....................

11. Educational Qualification of Head of Household:
   a. No formal education. ( )
   b. Adult education. ( )
   c. Koranic education. ( )

d. Primary education:…………….years
e. Secondary education:…………years
f. Tertiary education:..………….years
12. How long have you been in cotton farming?.............. years
13. Do you belong to any social organizations? Yes ( ) No ( ).
14. If yes, for how long have you been?............... years.

SECTION C: Rate of Adoption of Recommended Cotton Production Practices

15. Which of these recommended cotton production practices have you adopted on large –scale (2/3) and on a continuous basis?

		Do you use any		If Yes, indicate the year of first use
S/No	**Recommended Cotton Production Practices**	Yes	No	
i.	Good seed bed preparation = 15cm high.			
ii.	Use of improved and suitable variety = SAMCOT – 9.			
iii.	Seed treatment = a sachet of apron plus/10kg of cotton seed.			
iv.	Recommended planting time = Mid – June – 1st week of July.			
v.	Recommended spacing 45 x 90cm.			
vi.	Thinning = two plants/stand at 3 weeks after sowing (WAS).			
vii.	Recommended Fertilizer rate: 4 bags of N.K.P and 2bags of urea/ha at 2-3, 7-8 WAS.			
viii.	Timely used control = hoe weeding at 2-3, 5-8 and remolding at 8-10 WAS or application of pre-emergence herbicide: pendimenthalin 400ml per 20L of water at 0 – 1 – day after sowing and remoulding at 8 – 10 WAS.			
ix.	Use of insecticide application cypermethrin + dimethoate 100ML/20L of water at 8-12 WAS.			
x.	Harvesting = picking at 50% split bolls.			

16. State reasons for using the recommended cotton production practices you have indicated above:
a. ……………………………………………………………………
b. ……………………………………………………………………
c. ……………………………………………………………………

17. State reasons for not using the recommended cotton production practices you have indicated above:

a. ………………………………………………………………………

b. ………………………………………………………………………

c. ………………………………………………………………………

18. Do you wish to continue using the listed recommended cotton production practices you have indicated above? Yes ( ) No ( )

19. If yes give reasons. …………………………………………………
………………………………………………………………………
………………………………..…………………………………………..
………………………………………………………………………..

20. If No, give reasons. …………………………………………………
………………………………………………………………………
………………………………………………………………………
………………………………………………………………………

From questions 21-23, please tick from the following list using:

A	=	agreed	=	3
UD	=	undecided	=	2
D	=	Disagreed	=	1

21. The following RCPP is expensive to use (Affordability)

S/No	Recommended Cotton Production Practices	A	UD	D
i.	Good seed bed preparation = 15cm high.			
ii.	Use of improved and suitable variety = SAMCOT – 9.			
iii.	Seed treatment = a sachet of apron plus/10kg of cotton seed.			
iv.	Recommended planting time = Mid – June – 1st week of July.			
v.	Recommended spacing 45 x 90cm.			
vi.	Thinning = two plants/stand at 3 weeks after sowing (WAS).			
vii.	Recommended Fertilizer rate: 4 bags of N.K.P and 2bags of urea/ha at 2-3, 7-8 WAS.			
viii.	Timely used control = hoe weeding at 2-3, 5-8 and remolding at 8-10 WAS or application of pre-emergence herbicide: pendimenthalin 400ml per 20L of water at 0 – 1 – day after sowing and remoulding at 8 – 10 WAS.			
ix.	Use of insecticide application cypermethrin + dimethoate 100ML/20L of water at 8-12 WAS.			
x.	Harvesting = picking at 50% split bolls.			

22. The following RCPP meets my need and existing values. (Compatibility)

S/No	Recommended Cotton Production Practices	A	UD	D
i.	Good seed bed preparation = 15cm high.			
ii.	Use of improved and suitable variety = SAMCOT – 9.			
iii.	Seed treatment = a sachet of apron plus/10kg of cotton seed.			
iv.	Recommended planting time = Mid – June – 1st week of July.			
v.	Recommended spacing 45 x 90cm.			
vi.	Thinning = two plants/stand at 3 WAS.			
vii.	Recommended Fertilizer rate: 4 bags of N.K.P and 2bags of urea/ha at 2-3, 7-8 WAS.			
viii.	Timely used control = hoe weeding at 2-3, 5-8 and remolding at 8-10 WAS or application of pre-emergence herbicide: pendimenthalin 400ml per 20L of water at 0 – 1 – day after sowing and remoulding at 8 – 10 WAS.			
ix.	Use of insecticide application cypermethrin + dimethoate 100ML/20L of water at 8-12 WAS.			
x.	Harvesting = picking at 50% split bolls.			

23. The following RCPP is difficult to use: (Complexity)

S/No	Recommended Cotton Production Practices	A	UD	D
i.	Good seed bed preparation = 15cm high.			
ii.	Use of improved and suitable variety = SAMCOT – 9.			
iii.	Seed treatment = a sachet of apron plus/10kg of cotton seed.			
iv.	Recommended planting time = Mid – June – 1st week of July.			
v.	Recommended spacing 45 x 90cm.			
vi.	Thinning = two plants/stand at 3 WAS.			
vii.	Recommended Fertilizer rate: 4 bags of N.K.P and 2bags of urea/ha at 2-3, 7-8 WAS.			
viii.	Timely used control = hoe weeding at 2-3, 5-8 and remolding at 8-10 WAS or application of pre-emergence herbicide: pendimenthalin 400ml per 20L of water at 0 – 1 – day after sowing and remoulding at 8 – 10 WAS.			
ix.	Use of insecticide application cypermethrin + dimethoate 100ML/20L of water at 8-12 WAS.			
x.	Harvesting = picking at 50% split bolls.			

SECTION D: Output and Cost of Production of Cotton by the Farmer

24. How many hectares (safiya) did you use for farming purpose in 2010?
…………………………. ha.

25. What size of your farms did you use for cotton production in 2010 growing season?.................................... ha.

26. What was the estimated quantity (Jute bag) of cotton you harvested in 2010 growing season? ……………………………. Jute bag (35kg)?

27. Did you have available labour for cotton production activities in 2010? Yes ( ) No ( )

28. Did you use hired labour for cotton production activities in 2010? Yes ( ) No ( )

29. If yes how many people did you use for the following operations?

Operations for cotton production	Male: 18yrs and above	Female: 18yrs and above	Male: 12-17yrs	Female: 12-17yrs
Land clearing				

Ridging				
Planting				
Weeding				
Fertilizer application				
Remoulding				
Spraying of insecticides				
Harvesting				
Total				

30. Did you use family labour for your cotton production in 2010?
Yes ( ) No ( )

31. If yes, how many people from your family did you use for the following cotton production operation in 2010?

Operations for cotton production	**Male: 18yrs and above**	**Female: 18yrs and above**	**Male: 12-17yrs**	**Female: 12-17yrs**
Land clearing				
Ridging				
Planting				
Weeding				
Fertilizer application				
Remoulding				
Spraying of insecticides				
Harvesting				
Total				

32. How much did you pay/ 5 hrs (man-day) in 2010 for the following categories of people?

a. Male: 18 years and above ……………………..₦

b. Female:18 years and above …………………..₦

c. Male: 12 – 17years …………………………... .₦

d. Female: 12 – 17 years………………………...₦

33. What was the price in Naira of per jute bag of cotton in 2010 growing seasons?.........................₦

34. From the following, indicate the ones you acquired/did with the money from 2010 cotton production?

S/No	Item	Quantity	Current market value if to be sold ₦	Total value ₦
i.	Buses			
ii.	Pick ups			
iii.	Motor cycles			
iv.	Bicycles			
v.	Grinding machines			
vi.	Cattles			
vii.	Sheep			
viii.	Goats			
ix.	Zinc roofed house			
x.	Others (specify)			

35. Is there any difference in your output as a result of adoption of recommended cotton production practices?

Yes ( ) No ( )

36. If yes, how? Decrease ( ) Increase ( )

37. If increase, how did the increase in cotton output affect your income? Please tick (√) as applicable to you).

a. Very high ( ) b. High ( ) c. Average ( )

d. Low ( ) e. Very low ( )

38. How has the increase in cotton output affected your standard of living?

a. Very high ( ) b. High ( ) c. Average ( )

d. Low ( ) e. Very low ( )

SECTION E: Institutional Variables and Attribute of Recommended Cotton Production Practices

39. Have you had any visit by extension agents in 2010?
Yes ( ) No ( )

40. If yes, how many times were you visited by the extension agents with information on cotton production during the 2010 farming seasons?................Times

41. Are satisfied with the visit? Yes ( ) No ( ).

42. If yes, give reasons.

____

43. If no, give reasons.

____

44. Do you have access to credit? Yes ( ) No ( ).

45. If Yes, state sources and amount of credit received in 2010.

S/NO	Sources	Amount ₦

46. If No, how do you finance your cotton farm? ____________________

____

47. Did you return the credit after harvesting your cotton?
Yes ( ) No ( )

48. If No, please give reasons for not returning the credit.

____
____
____
____

SECTION F: Constraints to the Adoption of Recommended Cotton Production Practices

49. Apart from compatibility, complexity and adaptability problem, what are other problems facing you in the adoption of recommended cotton production practices in your area?

____
____
____
____

50. What suggestion will you give that will help to accelerate the process of using RCPP in this area? ____________________________________

____
____
____

Thank you very much.