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Analysis of Adoption of Recommended Cotton Production Practices by Farmers in Some Selected LGAs of Zamfara State, Nigeria

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ABSTRACT
This study determined the adoption of recommended cotton production practices in Zamfara State, Nigeria. A multistage sampling procedure was used in this study. Questionnaire instrument was used to elicit information from 146 cotton farmers. Descriptive statistics and multiple regression were used to analyze the data. Results showed that 45% of the respondents were between the ages of 41 and 50, and majority of the respondents had been in cotton farming for 6–10 years. The result further showed that the mean credit need of the respondents was ₦69, 208 while the respondents had received only a mean credit of ₦18,451. Result also revealed that the use of good seed bed preparation had the highest (36%) rate of adoption, followed by the use of appropriate recommended spacing (31%), seed treatment (28 %), harvesting (27%), and thinning (25%). The results of multiple regression revealed that labour, educational level, farming experience, extension contact, membership of social organization and affordability were significant at 5% level of probability. It was discovered from this study that inadequate and high cost of labour, insufficient fund, storage and marketing problem, recommended planting time were the major constraints faced by the cotton farmers. Based on the findings, it was 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.
Keywords: Adoption, Recommended practices, Cotton production, Zamfara State

INTRODUCTION

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. Report from the International Cotton Advisory Committee (ICAC, 2019) show that in the last 8 years, farmers have received progressively better prices. Cotton is a crop whose products and by-products play vital roles in the socio-economic life of Nigerian farmers. 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 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, 2019).

The bottleneck facing the production of cotton in Zamfara State is the use of traditional practices of growing cotton by the farmers in the area. Traditional practices in this study refer to the farmers' practices of growing cotton such as wide spacing, the use of the same seed year in year out, in 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 Institute for Agricultural Research (IAR) has been working in Gusau (Zamfara state) since 1965, activities targeted at cotton production practices were not stable until 1999 when renewed efforts were reinvigorated again (Idem, 1999). Despite the collaborative effort of IAR and Zamfara State Agricultural Development Project (ZADP) in introducing the RCPPs in 2009 to the farmers in Tsafe, Gusau and Bungudu Local Government Areas of Zamfara State, farmers are getting low yield of cotton and poor quality of lint and seed. Idem (1999), argued that cotton production can be increased substantially either by increasing yield of existing small farms or by expanding the area under cotton cultivation, or both. Increase in yield on existing small farms generally requires the adoption of recommended production practices for the crops. 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.

The 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 weeks after sowing (WAS);
(vii) recommended fertilizer rate (4 bags of NPK. and 2 bags of urea/ha at 2–3 and 7–8 WAS); 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);
(viii) use of insecticides (*cypermethrin* + *diemthoate* 100mL/20L of water at 8–12 WAS. (Gbadegesin *et al.,* 2007).

Objectives of the Study
The broad objective of the study was to examine factors influencing the adoption of recommended cotton production practices by farmers in three selected LGAs of Zamfara State. The specific objectives were to:
(i) describe some characteristics of cotton farmers in the study area;
(ii) determine the level of adoption of recommended cotton production practices by the farmers and
(iii) determine some socio-economic and institutional factors influencing the adoption of cotton production practices by farmers in the study area.

METHODOLOGY
The Study Area
The study was conducted in three of the fifteen Local Government Areas (LGAs) with the highest concentration of cotton producers in Zamfara State. The selected LGAs were: Tsafe, Gusau and Bungudu. Zamfara State lies between latitude 10° – 13° north of the equator and longitude 4° – 7° east of the prime meridian. The State is located in the Sudan Savannah ecological zone of Nigeria, with a population of 3,259,846 (NPC, 2006). The projected population in 2019 was 3,667,326 at the 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).

Sampling Technique and Sample Size

A multistage sampling procedure was adopted for this study. In the first stage, three LGAs (Tsafe, Gusau and Bungudu) out of the fifteen were purposively selected 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 randomly selected from each of the three selected LGAs. The final stage involved proportional selection of respondents from the sampling frame of those communities. The sampling frame was the list of cotton farmers compiled during the reconnaissance survey. A total sample size of 146 out of 1042 sample frame was used to elicit farm level data for the analysis. Primary data were collected by administering 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.

Methods of Data Analysis

Descriptive statistics (frequencies, percentages and mean) was used to achieve objective i and ii and multiple regressions were employed to achieve objective iii.

Multiple Regression Model

The multiple regressions model is explicitly specified as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \ldots\ b_8X_8 + u$$

Where,

Y	=	Adoption of recommended cotton production practices (number of recommended cotton production practices adopted by a farmer).
X_1	=	Age (Years)
X_2	=	Farm size (Hectares)
X_3	=	Educational level (Years)
X_4	=	Farming experience (number of years in cotton production)
X_5	=	Household size (number of people in the household)
X_6	=	Affordable (yes or no)
X_7	=	Compatible with existing farm practices (yes or no)
X_8	=	Complex in terms of use (yes or no)
a	=	Constant
b_1–b_8	=	Régression coefficients
U	=	Error term

RESULTS AND DISCUSSION

Characteristics of Farmers

Table 1 shows the distribution of respondents according to their age. A majority (45%) of the respondents was within the age range of 41–50 years. This shows that most of the respondents engaged in cotton farming are relatively within the middle age group. Household size response on this variable indicated that 40 percent and 34 percent of the respondents had 38-48 and 49-59 numbers of people in their family (Table 1). This implied that the respondents had large household size which could be used as source of labour for cotton production.

The levels of education of the respondents shows that majority (45%) of the respondents had Koranic education, while 12 percent of them had no formal education at all. On the variable relating to farming experience, finding showed that 61 percent of the respondents have been in cotton production for 6–10 years, while 18 percent and 17 percent of them have been in cotton production for between 11–15 and 16–20 years, respectively. This suggests that the respondents would not have many problems in adopting the recommended cotton production practices. The result also showed that majority (69%) of the respondents had a total farm size with a 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 respectively. This implies that cotton production in the study area was engaged by small-scale farmers. The results from Table 1 also revealed that 65

percent of the respondents used 1.1–2.0 hectares for their cotton production. This implies that majority of the respondents used nearly all their land for cotton production.

Table 1: Socio-Economic Characteristics of Cotton Farmers (N=146)

Items	Frequency	Percentage
Age (Years)		
21 – 30	22	15.28
31 – 40	51	35.42
41 – 50	65	45.14
51 – 60	6	4.17
Household Size		
5-15	7	5.00
16-26	12	8.00
27-38	18	13.00
38-48	58	40.00
49-49	49	34.00
Education Level (Years)		
No education	12	8.33
Adult education	18	12.50
Koranic education	65	45.14
Primary education	15	10.41
Secondary education	26	18.06
Tertiary education	8	5.50
Farming Experience (Years)		
6 – 10	83	61.10
11 – 15	26	18.06
16 – 20	25	17.36
21 – 25	5	3.47
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	9.03
3.1 – 4 0	14	2.78

Level of Adoption of Recommended Cotton Production Practices

The result in figure 1 shows that, the use of good seed bed preparation had the highest (30%) level of adoption. Similarly, thinning, recommended spacing, and seed treatment had 28 percent, 23 percent, and 20 percent level of adoption, respectively. The level of adoption was low because the farmers were not fully aware of the potential gain of the RCPPs. The implication for this is that other farmers were motivated by the potential gain of the RCPPs to adopt. However, the level of adoption of the use of seed bed preparation had dropped down to 30 percent, proper observation of harvesting time was 23 percent, while proper seed treatment was 22 percent each. The low level of adoption could be associated with inadequate and high cost of labour for these farm operations as reported by majority of farmers in Fig 1. The use of good seed bed proper had the highest level of adoption (28%), probably because thinning was expected to give the maximum productivity to the crop due to less competition nutrients and photosynthesis to crop. The implication of this finding is that farmers are likely to adopt many of the recommended practices in certain time and drop some of them in another time. This could be attributed to some factors such as change in price of the cotton, disease and pests' damage and change in government policy.

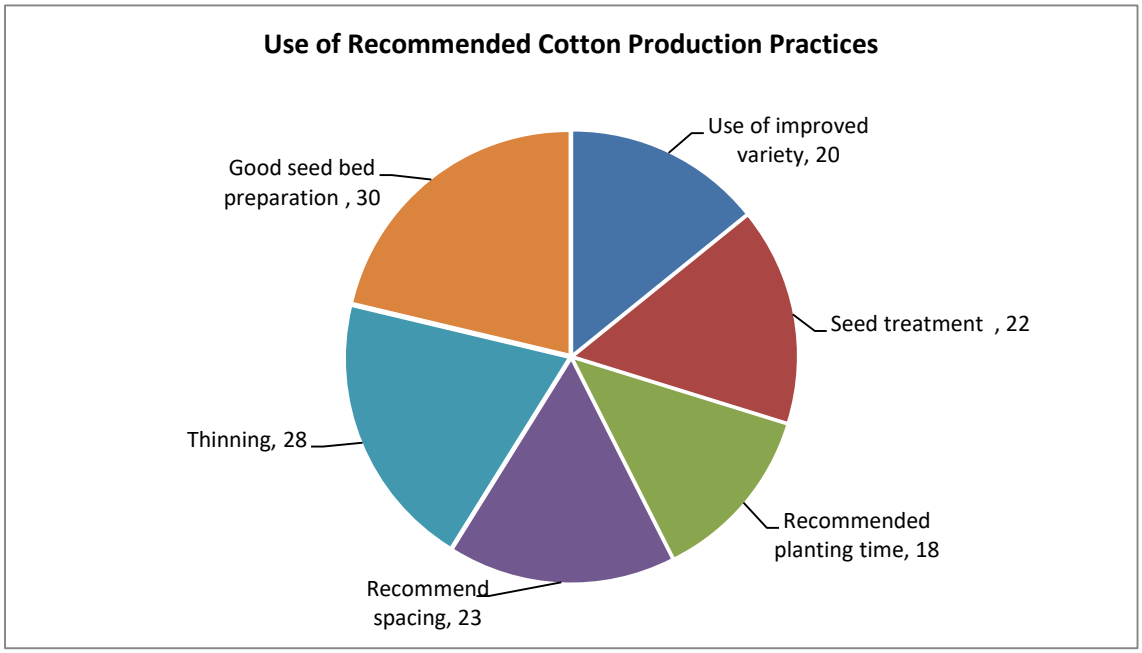


Figure 1: A Graphic Representation of level of Adoption of RCP

Factors Influencing Adoption of Recommended Cotton Production Practices

The multiple regression analysis was used to analyze the factors influencing adoption of RCPPs as presented in Table 2. The result of multiple regression analysis in Table 2 shows that age of the respondents had a negative coefficient (-0.025) and insignificant. This implies that age contributes to the adoption of RCPPs. This finding is in line with Adeniji (2007), who found that younger farmers adopted agricultural innovations more readily than the older ones. The positive coefficient (0.010) of the farm size of the respondents shows that farm size positively influenced the adoption of the RCPPs. This finding supported the findings of Ekong (2010); Yakubu (2009), they found that the size of farm land to be positively and significantly influence the adoption of an innovation. The result on Table 2 also shows a positive coefficient (.0227) of educational level of the respondents, which significantly contribute to adoption of RCPPs at 5 percent level of probability. This finding is in line with Akpoko (2001); Agbamu and Orhorhoro (2007), they found that educational level significantly influence the adoption of recommended practices. 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. The result further showed a positive coefficient (0.006) of household size of the respondents, which implies that the household size had positively, influence the adoption of RCPPs. This finding corroborates with Adesina and Baidu-Forson (2009), who found that household size, had a positive contribution to the adoption of recommended practices. It was hypothesized that the respondents' socio-economic and technological attributes will have no influence on adoption of RCPPs. The result of multiple regression analysis 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. Since the socio-economic variables and the three RCPPs' attributes significantly influence adoption of RCPPs, the null hypothesis was rejected and the alternative hypothesis accepted; that is the respondents' socio-economic characteristics, have influence on adoption of RCPPs.

Table 2: Multiple Regression Results of Socio-Economic Factors Influencing Adoption of Recommended Cotton Production Practices

Variables	Coefficient	Standard error	T-value
Age	-0.025	0.034	-0.800
Farm size	0.010	0.051	0.203
Education	0.227	0.101	2.233**
Farming experience	1.972	0.752	2.621**
Household size	0.006	0.051	0.120
Extension contact	0.369	0.192	1.925**
Membership of social organization	0.234	0.064	3.636***
Affordability	0.062	0.028	2.244**
Compatibility	0.005	0.068	0.739
Complexity	-0.050	0.073	0.058

*** Significant at 1% level of probability; **Significant at 5% level of probability; $R^2 = 0.58$

Conclusion and Recommendations

This finding supported the general alternative hypothesis of this study that certain personal characteristic and RCPPs' attributes significantly contribute to the adoption of RCPPs. This implies that some of these variables 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 adoption should critically consider the roles of these factors. Most especially, that education was an important factor 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. Finding of this study reveals that rate of adoption of timely weed control and recommended planting time was very low.

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