

Effectiveness of Cotton Production Technology Information Packages among Farmers in Adamawa State, Nigeria

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Abstract – Cotton production has the potential to contribute significantly to the GDP of Nigeria, production is carried out on 0.6 to 0.8 million hectares in north eastern Nigeria, this is challenged by poor quality seeds, diseases and insect pests'. Socio-economic characteristics and institutional variables of out growers, awareness and effectiveness of cotton production technology were investigated in southern Adamawa state. A multistage sampling technique was adopted; Numan, Yola south, Lamurde, Demsa and Guyuk were purposively selected, while 199 cotton outgrowers were randomly selected. Findings indicated that cotton production skewed to the male sex; respondents are fairly educated with considerable experience in cotton production. Out growers' source for seeds from ginneries, awareness and effectiveness rating was high for close season, use of insecticides and farm sanitation, indicating their relevance in cotton production. The study emphasized the need to develop insect resistant varieties, subsidize inputs and develop proper pricing policy for cotton lint.

Keywords – Cotton Out Growers, Ginneries, Extension Packages, Effectiveness.

INTRODUCTION

Before the discovery of crude oil in Nigeria, cotton contributed to the economic development of Nigeria. It is cultivated widely in northern Nigeria, while in the north Eastern Nigeria production is noticed on 0.6 to 0.8 million hectares. Cotton production is in the hands of the out growers, they are small scale producers and resource poor, they cultivated between 1 and 3 hectares under rain fed conditions [1]. The total consumption of cotton of lint in Nigeria is about 80,000MT annually (240,000MT seed cotton). Production in 2003 was 32312.80MT; this was less than half of the total domestic demand in the same year [1]. The deregulation of cotton market by the government led to the cancellation of the Cotton Marketing Boards (CMD), consequently trading price of cotton was determined in the open market. Between 2002 and 2004, cotton lint was traded at N135, 000.00/MT [1]. Cotton production has been life long business among farmers in the north Eastern Nigeria; farmers have organized themselves into associations that cater for production, management and marketing. These associations are community based and are formed by resident farmers or by the ginneries in association with the farmers in the communities. In most cotton growing belt production is characterized by independent and contract growers. Ginneries located in this cotton belt provided incentives to farmers, as well as other specialized services.

Several agronomic and processing activities are involved in cotton production especially fertilization, weeding and management of insect pest and diseases, and processing. This suffice that cotton production is labour intensive. Research have released high yielding (cotton seed and lint) varieties, though susceptible to biotic stress (insect pests and diseases). Consequently farmers have to regularly spray against insect pest throughout the growth cycle; this trend is injurious to farmers' health and constitutes environmental degradation. The extension services in the state have communicated to farmers integrated insect pests' management technologies developed for cotton by research. Several improved varieties (exotic) have been adapted for cultivation in most cotton belts; they are widely cultivated by farmers. Cotton production technologies had been developed by research and are communicated by private and public extension agents to cotton out growers. In the study area private ginneries provides inputs and extension services to farmers' who are registered with the private ginneries; and in turn the farmers will sell their proceeds to the ginneries in a contract agreement. However few farmers who owned their resources sell their proceeds to other buyers. Besides cotton production (lint and seeds) still fall below the national demand, thus encouraging importation of cotton lint and fabricated clothing. Cotton production in southern Adamawa state has been on going for decades. To step up production it is imperative to understand the challenges in production and farmers' characteristics, what are the technologies used by farmers in Adamawa state, and the bottlenecks associated with adoption of cotton production technologies. The objectives of this study are to evaluate demographic, socio-economic, institutional variables of cotton out growers in southern Adamawa state, determine effectiveness of cotton production technology information packages communicated to farmers, and the constraints in production and marketing of cotton.

METHODOLOGY

This study was carried out in Numan, Yola south, Lamure, and Demsa, Guyuk local government areas, this constitute zone 1 of Adamawa State Agricultural Development Project. Cotton is largely grown in the study area, and cotton production is the predominant occupation of farmers in the study area. The study took place during the 2006 and 2008 cropping season. The study area is characterized by a temperature ranged between 25°C and 35°C during the day and between 15°C and 20°C at night,

extreme drought is not prevalent in the cotton belt; however, cotton is drought tolerant. Cotton outgrowers' in the study area are registered with the private ginneries in the cotton belt. For the purpose of this study, a multi stage sampling technique was adopted; Guyuk, Numan, Yola south, Larmurde, and Demsa local government areas were purposively selected due to preponderance of cotton production activities, from each local government area, two districts namely, Savanna/Gyawana and Numan (Numan local Government area), Guyuk and Boshikiri (Guyuk local Government area), Lafia and Lamurde (Lamurde local Government area), Dong and Bali (Demsa local Government area), Yola and Ngurore (Yola local Government area) were selected. A total of two hundred and fifty questionnaires were administered based on population density for each village, one hundred and ninety-nine were summarized for statistical analysis. The respondents (199) interviewed in this study are registered with the extension office in the cotton belt. Farmers were interviewed individually by extension agents to avoid farmers influencing the decision of others, both open and close ended questionnaires were used to source for information for the clientele.

HYPOTHESIS OF THE STUDY

Ho = There are no significant difference in socio-economic, demographic and institutional characteristics of the outgrowers in the cotton belt.

Ho = There are no significant difference in the effectiveness of cotton production technology information packages

DATA ANALYSIS

Data collected from the respondents cover demographic, economic and institutional variables, these variables are age (years), sex, occupation and experience (years) in cotton production, educational attainment, farm size, household size and marital status, experience in cotton production, access to loan and frequency of extension contacts among others. Information on quantity of seed planted/hectare, seed source, land preparation methods, presence an absence of extension agents and extension meeting schedule among other were sought from the farmers. Data collected over years of evaluation were summarized, pooled and subjected to descriptive statistics as mean, frequency and percentages. Awareness of cotton production technology was computed as percentages, while effectiveness was computed on a four point Likert Rating Scale (LRS), as very high (VH) = 4, High (H) =3, Low (L) =2, Very low (VL) =1. The mean score was computed as $4+3+2+1 = 10/4=2.50$. Using the interval score of 0.05, the upper limit cut-off was determined as 2.50 ± 0.05 and the lower limit as $2.55 \pm 0.05=2.45$. On the basis of this, mean score (MS) below 2.45 (i.e. <2.45) were ranked 'low', those between 2.45 and 2.54 were considered 'medium' (i.e. $2.45 \geq MS \leq 2.54$), while the mean score greater than or equal to 2.55 (i.e. $MS \geq 2.55$) were considered 'high'.

RESULTS AND DISCUSSION

The demographic variables investigated among cotton farmers' is highlighted in Table 1, majority of the cotton outgrowers interviewed are male, they accounted for 88%, while female outgrowers accounted for 22% of cotton outgrowers. This implied that cotton production in the study areas is gender sensitive to the males. The preponderance of the males' sex in cotton production could be that cotton is an industrial crop, and thus require a high level of labour in production, management and processing, since most activities are labour intensive. However, there could be a possibility that both men and women are involved production and processing. On the one hand [2] and [3] found that gender significant negatively influence on the rate of adoption of technologies in several development projects. While [4] had reported that gender has significant and positive influence on technology adoption. In another study it was reported that male children influence positively the adoption of new technology [5]. This investigation showed that 49% of the cotton outgrowers are married, while 51% are single, and household size between 4 and 6 individuals was high (55%), followed by household size of between 7 and 10 (31%). The study showed that half of the cotton outgrowers interviewed are illiterate and another half literate. Respondents with quoranic/primary education accounted for 31%, the remainder comprised those who possess secondary school certificate (17%) and those who have completed tertiary education accounted for (3%). This implied that literate farmers are expected to be more efficient in combining resources through knowledge gained from information in literature or other media than non educated farmers. Further they will be better able to process information and search for appropriate technologies to alleviate their production constraints. The belief is that education gives farmers the ability to perceive, interpret and respond to new information much faster than their counterparts without education.

Cotton out growers having farming experience of between 6 and 9 years accounted for 53% of the respondents. Those that have had between 1 and 5 years and 22 years experience and above summarized 25 % and 22 % respectively. The high proportion of experienced farmers is expected to influence positively willingness to adopt cotton technology information for increased productivity. A comparison of farmers' educational attainment and experience (in years) implied that half of the farmers are literate and experienced, and the other half illiterate and experienced. There is a possibility that the former group will be able to perform over above average, and the latter group will perform below average. High proportion of the experienced farmers as found in this study is consistent with those reported by [6] in cowpea. In addition, experienced farmers are better placed to acquire needed skills and technologies compared with inexperienced ones. In another study [7] that the number of years in farming influences adoption of new technologies. It is possible that the number of years of working in the farm develops technical know how which

is useful on adoption. Findings indicated that 76% are the respondents are fulltime production, while those who combined cotton production with other businesses and those involved in cotton farming (as part time) and are employed accounted for 8 and 12 % respectively. In terms of farm size, most of the cotton outgrowers cultivated between 3 and 6 hectares, and are classified as small scale farmers. Our results mirrored those reported by [8], they indicated that farmers in the northern savanna zone of Nigeria cultivate relatively larger hectares of land (for sorghum and cowpea) than their counterparts in south eastern Nigeria, with an average of about 1.5 hectares. Farm size is a factor that is often argued as important in affecting effectiveness and adoption decisions. It is frequently argued that large farms are more likely to adopt an improved technology (especially improved varieties) compared with those with small farms, as they can afford to devote part of their fields (sometimes the less productive parts) to try out improved technology. In some studies farm size has been found to have positive correlation with adoption [9] and negatively correlation with adoption of technologies [10]. The study indicated that cotton farmers' source for seeds from ginneries located within cotton belt. Widely known ginneries in the study area are; AFCOTT, OLAM, WACOT and open market. As shown in Figure 1, AFCOT company is reliable source of seeds to farmers. Two popular cotton varieties cultivated by farmers are Samaru77 and Benin; these varieties are well adapted to prevailing pedo climatic conditions, high yielding though susceptible to insect pests and diseases. The study noted that high dependence of farmers on the ginneries for quality seeds, however farmers saved seeds is less practiced. The practice among the ginneries is that the cost of seeds is deducted from the total sales after harvest. The proportion of cotton farmers who used tractor or Ox drawn plough and harrows are moderate, this trend is associated with high cost of hiring tractors and diesel. Similarly respondents who practiced mechanized land preparation might have used tractor drawn plough and harrow; this predisposes the farmers to adopt ox drawn technology. The study indicated that 92% of the respondents acknowledged the presence of extension agent employed by the private ginneries in the cotton belt compared to those employed by the government. The frequency extension contact showed that meetings scheduled fortnightly were high compared to other periods (Figure 2). It was evident that most of the cotton farmers hired their farmlands, while farmers' who used family land summarized 5% of cotton farmers interviewed (Figure 3). Two cotton associations (Afcott out growers association and Cotton farmers club) are popular in the cotton belt. High number of cotton farmers registered with cotton farmers club compared to Afcott out growers association (Figure 4). Awareness of cotton production technologies was high and ranged from 89% to 100% (Figure 5), high percentages recorded for awareness of cotton technology information is traceable to the importance and relevance of these technologies in cotton production, these technologies are complementary, if any of these technique was left out, cotton yield (seed and lint)

will be very low, its negative impact could be felt by neighboring farmers and may last over production years. Technology information as close season and timely spraying of insecticides recorded awareness of 100 and 99% respectively awareness level. A high rate of awareness may stimulate effectiveness and adoption of these technologies by the clientele. The effectiveness rating of cotton production technology information packages ranged between 3.28 and 4.39 (Table 2). Close season recorded high mean score (4.00), which confirm the effectiveness of this technology among the respondents. This was followed by farm sanitation (4.00), use of insecticides (3.89), improved varieties (3.82). This trend might be traced to the fact these technologies are very important determinant of cotton yield and for insect pests' and disease management. Other technologies as spacing, improved seeds, fertilizer application, weed management, farm sanitation and processing recorded a mean score above 3.00, and this showed their relevance in cotton production. These production technology information are effective. The use of fertilizer, farm sanitation, and close season recorded extremely high mean score indicating their effectiveness and may be associated with adoption of these technologies. Most of the respondents indicated that the application of fertilizers, farm sanitation, application of insecticides and close seasons could reduce the preponderance of insect pests and diseases. However, the cost involved in administering control is prohibitive. Thus preventive measures are emphasized by extension services. Cotton production is constrained by insect pests.' and diseases, high cost of labour and inputs (seeds, fertilizer agrochemical), they showed high mean score in excess of 3.84 (Table 3). In addition low price, adulteration and poor soil fertility showed prominence. Over production was least severe among variables investigated, and this implied that cotton ginneries in the study are able to purchase almost all the cotton lint and seed. The implication of this result is that there is need to develop and adapt varieties that are resistant to insect pests and diseases, alongside fashion out complementary technologies that could assist in reducing high cost of pest management, labour processing and proper pricing to stimulate increased production.

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Table 1: Demographic economic and institutional variables of cotton outgrowers in southern Adamawa state (n=199)

Variable	Frequency	Percentage (%)
Sex		
Male	176	88
Female	23	18
Status		
Single	105	51
Married	98	49

Farm size (hectares)		
2	23	11
3-6	120	60
7-10	34	17
11-14	12	6
15>	10	5
House hold size		
1-3	17	9
4-6	110	55
7-10	62	31
11-15	10	5
Educational level		
No formal education	99	50
Primary/Quoranic education	62	31
Secondary education	35	17
Tertiary education	3	2
Primary occupation		
Farming	103	76
Civil servant and farming	12	8
Business and cotton farming	17	12
Others	5	4
Experience in years		
1-5	48	25
6-10	105	53
11>	71	22
Plough methods		
Ox-drawn	89	45
Tractor	93	47
Manual ploughing	9	5
Zero tillage	5	4
Presence of extension agent		
Yes	182	92
No	17	9

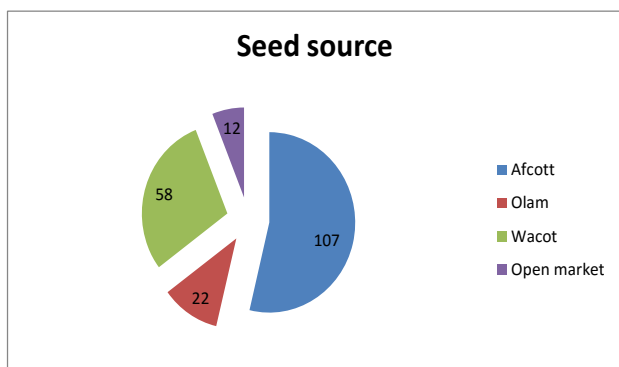


Figure 1

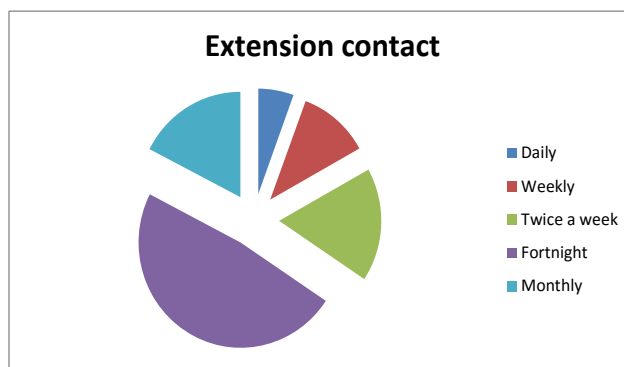


Figure 2

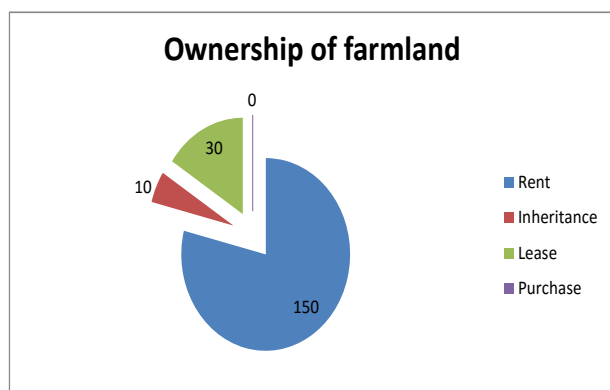


Figure 3

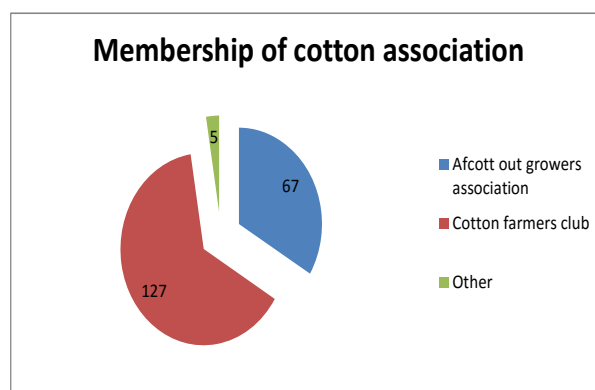


Figure 4

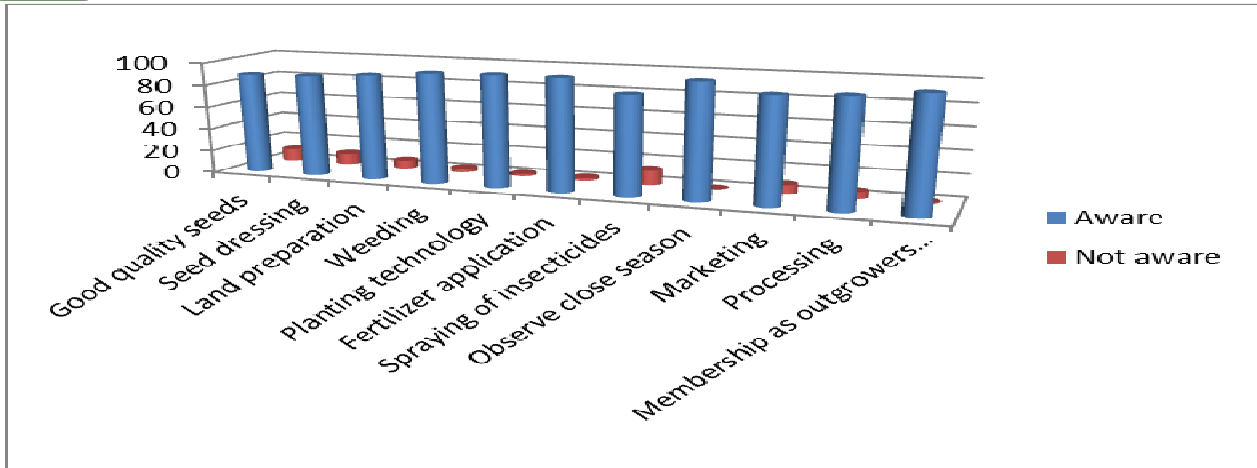


Fig.5. Awareness of cotton production technology information among cotton out growers in Adamawa state, Nigeria.

Table 2: Effectiveness rating of cotton production technology among cotton farmers in Adamawa state, Nigeria (n=199)

Technology	Very effective	Effective	ineffective	Very ineffective	Mean score
Close season	199 (4.00)	0	0	0	4.00
Spacing	140 (2.81)	39(0.57)	20(0.20)	0	3.58
Improved variety	186(3.74)	13(0.19)	0	0	3.93
Fertilizer application	160(3.22)	39(1.17)	0	0	4.39
Use of insecticides	190(3.82)	9(0.13)	0	0	3.95
Weed management	170(3.42)	29(0.43)	0	0	3.87
Farm sanitation	189(4.00)	10(0.15)	0	0	4.15
Processing	120(2.41)	36(0.54)	23(0.23)	20(0.10)	3.28

Table 3: Effectiveness rating of production constraints in cotton production (n=199)

Variable	Very severe	Severe	Less severe	Not severe	Mean score	Rank
High cost of inputs (seeds, fertilizer, agrochemicals)	166 (3.34)	33 (0.50)	0(0.00)	0 (0.00)	3.84	3
High cost of labour	189 (3.78)	11(0.17)	0 (0.00)	0 (0.00)	3.95	2
Problems of pests and diseases	200 (4.00)	0 (0.00)	0 (0.00)	0 (0.00)	4.00	1
Low soil fertility	76 (1.57)	32 (0.48)	91 (1.37)	0 (0.00)	3.42	
Transportation	100 (2.01)	54 (0.82)	44 (0.44)	0 (0.00)	3.27	
Price	156 (3.13)	43 (0.64)	0 (0.00)	0 (0.00)	3.77	4
Storage	66 (1.46)	88 (1.47)	26 (0.29)	0 (0.00)	3.22	
Over production	48 (0.96)	72(1.08)	79 (0.79)	0 (0.00)	2.83	
Adulteration	110 (2.21)	68 (1.03)	21(0.21)	0 (0.00)	3.45	5