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APPLICATION OF TECHNOLOGICAL INNOVATION IN PROMOTING THE ADOPTION OF N_2AFRICA COWPEA VARIETIES FOR INCOME GENERATION IN BORNO STATE, NIGERIA

[1]Abdullahi, A., [1]Mustapha, A. and [2]Jajua, M.
[1]Department of Agricultural Economics and Extension,
Bayero University, Kano, Nigeria
[2]International Institute for Tropical Agriculture, (IITA),
Kano Sub-station, Nigeria.
Corresponding Authors' E-mail: hummaz14@yahoo.com **Tel.:** +2348032287220

ABSTRACT
The study investigated the use of technological innovation in promoting the adoption of N_2Africa cowpea varieties for income generation in Borno State, Nigeria. A multi-stage sampling procedure was used for the study, with a purposive selection of three (3) Local Government Areas (LGAs) namely; Biu, Hawul and Kwayakusar. The data was obtained from 244 respondents. Descriptive statistics were used to describe the socio-economic characteristics and inferential statistics namely; adoption score, probit regression model and profitability model were also used. The results revealed that males dominated the farming population in the study area. The highest adoption score of the technological innovation was IT89KD-288 (60%) and the lowest was UAM09-1046-6-1 (48%); and spacing had the least score across the improved cowpea varieties. The probit result revealed that three (3) variables (sex, age and extension contact) significantly ($P\leq0.077$*, $P\leq0.065$* and $P\leq0.002$***) influenced the adoption of UAM09-1046-6-1, whereas, (education and household size) significantly (0.027** and 0.011**) influenced the adoption of IT99K-573-2-1 improved cowpea varieties. There was profitability in the production of the improved varieties, which led to generation of income among the cowpea farmers. It was recommended that farmers should be linked with good input dealers to enable them have fertilizer at affordable prices, increase in extension services on influencing more farmers to produce UAM09-104606-1 due to its high yield.

Keywords: Adoption, Cowpea, Income, Innovation, Technological, Varieties.

INTRODUCTION
Cowpea is a global crop of African origin as found by Davies *et al.* (2005. The authors argued that cowpea is an ancient crop whose cultivation began in Africa between 5000 and 6000 years ago. The crop is now widely grown across continents of the world. Cowpea production in the world estimates to about 2.27 million tons of which Nigeria is said to account for about 37.44% (Food and Agriculture Organization [FAO], 2002; Adaji *et al.*, 2007; and Agbogidi, 2010).

Millions of relatively poor people in less developed countries of the tropics are believed to have the cowpea as a major source of livelihood (FAO, 2002). The crop is thus a big player in the Nigerian gross domestic product (GDP) in terms of national economic development. This can be seen from the fact that Nigeria is ranked as a world leading producer of cowpea with a production index of 1.69 million tons global output (Langyintuo, 2005). Northern Nigeria has the savannah type of vegetation and light rainfall suitable for cowpea production. Recent efforts to add value to farmers of this crop show a significant improvement of an increase of some 44.1% in planted areas and increase in yield of 41% over the period of 1961–1995 (Kamara,

2006). Indeed, this improvement registers a great contribution to the economy of citizens of those communities that look up to cowpea farming for their livelihood.

A number of improved varieties have been developed by the International Institute of Tropical Agriculture (IITA), combining diverse plant types with resistance or tolerance to several diseases, insect pests, and parasitic weeds and possessing other good agronomic traits (Chikoye, 2010). The varieties IT89KD-288 and IT89KD-391 which were developed by scientists working at Institute for Agricultural Research (IAR) of Ahmadu Bello University, Zaria in collaboration with International Institute for Tropical Agriculture (11TA) Ibadan, and the Agricultural Development Programs (ADPs) of Borno, Kaduna, Kano, and Katarina States have proven to be superior over the current improved lines being cultivated. They could be used to overcome the challenges faced by cowpea farmers in the country. For instance, IT89KD-288 (SAMPEA-11) is a dual–purpose cowpea variety with large white seeds and a rough seed coat. It has combined resistance to major diseases including Septoria leaf spot, and bacterial blight, as well as 24 nematodes and tolerance for Nigeria's strain of Striga gesnerioides (a parasitic weed that severely lowers yield). It also has a yield advantage of at least 80% over the local varieties (Kamara, 2006). The nematode resistant variety is an equally good variety for sowing with cereals or as a relay crop with maize in the moist and humid savannah zones, and for high grain production in the dry season. Scientists recommend that the variety be planted in mid-July in the Sudan savannah, early to mid-August in the northern guinea savannah, and by the end of August in the southern Guinea savannah. However, if there is certainty of rains up till the end of October, 1T89KD-288 can be planted in September. 1T89KD-391 (now SAMPEA-12) is also a dual-purpose cowpea variety but it has medium to large brown seeds with a rough seed coat. These are preferred seed characteristics for commercial production in northeast Nigeria. 1T89KD-391 is a welcome improvement over SAMPEA 7, Ife brown, IT90K-76 and IT90K-82-2 which are the main improved brown-seeded varieties available. It has been tested extensively in this area and is well accepted by the farmers. It performs well as sole crop and could also be planted as a relay crop with maize in the guinea savannah.

In an effort to mitigate the problems of low crop yield, disease infestation, weed damages and low rainfall season in the agro ecological region of Borno State. IITA has made effort to develop several improved varieties of cereal and legume crops that are high yielding, early maturing, high resistance to drought and able to withstand striga. This was with a view to enhance farmers' productivity and income. Despite the development of a large number of improved cowpea varieties, farmers in northern Nigeria including Borno State have continued to grow predominantly local varieties. Kamara (2006) observed that the limited use of improved varieties in a predominantly cowpea growing region may be due to several factors including lack of information on improved cowpea varieties, non-availability of the seeds, resistance to accepting new varieties and low market values that are unsuitability for the farming system.

The broad objective of the study was to analysis the use of technological innovation in promoting the adoption of N_2Africa improved cowpea varieties in Borno State, Nigeria. The specific objectives were to: describe the socio-economic characteristics of the improved cowpea producers; assess the influence of socio-economic characteristics on improved cowpea varieties; and determine the adoption of N_2Africa cowpea technologies among the farmers.

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MATERIALS AND METHODS

The Study Area

The study was conducted in the southern part of Borno State, Nigeria, where the N_2Africa Borno project promoted the production of improved cowpea among other crops. The State falls within the Savannah zone of Nigeria. It comprises of the Northern Guinea Savannah, Southern Guinea Savannah and Sudan Savannah. The N_2Africa Borno project covers two of these Agro Ecological Zones, i.e., the Northern and Southern Guinea Savannas. The State lies between latitudes $10^0$30N and $14^0$30N and longitude $11^0$30E and $14^0$13E. However, the study area which comprises of three (3) Local Government Areas (LGAs) namely; Biu, Hawul and KwayaKusar lies between latitudes$10^0$30N and $11^0$30N and longitudes $12^0$23E and $13^0$13E. The study area has a total population of 173,830 people with female making up 48% of the population (NPC, 2006). It is expected that the population in 2015 was 224,947 based on annual growth rate of 3.2%. Within the State, the study area is bordered by Damboa, Chibok and Askira-Uba LGAs to the north and Bayo and Shani LGAs to the South. The study area is also bordered by Adamawa State to the south East, Gombe State to the South west and Yobe State to the North West.

Borno State has annual rainfall ranging from 900mm-1200mm which lasts for five months, i.e., June to October (Kamara, 2006). The vegetation consists of tall trees and thick shrubs. The area is very productive in terms of crop and livestock production and is suitable for cowpea production. Majority of the population earn their living mainly from farming is characterized by both crop and livestock-based production systems. Major crops grown include maize, groundnut, sorghum, cowpea, rice and cowpea. However, with increase in population and the consequent pressure from demand for land and other resources, there is high level of poverty and food insecurity especially among the people. Cowpea being a cash crop could enhance the peoples' income and empower them to acquire and own assets.

Sampling Procedure and Sample Size

The study used a sample size of 244 farmers in the three (3) LGAs (Table 1). Multi-stage sampling procedure was used for this study. The first stage was purposive selection of three (3) LGAs of the Northern Guinea Savannah (NGS) ecological zone. These included Biu, Hawul, and KwayaKusar. They were selected due to security reason of Boko Haram insurgency.

Table 1: Sample Frame and Sample Size Selection Plan

LGA	No of Communities	Names of Communities	Sample Frame	10% of Sampling Frame
Biu	10	Mirnga; Tum; Mainahari; Kigir; Yamarkumi; Filingirgi; Kabura; Dusu; Hema; and Nzukuku.	868	87
Hawul	10	Marama; Kinging; Sakwa; Sakwa; Tabra; Yimirshika; Yawi; Nggabu; Ngwa; and Kinging.	788	79
KwayaKusar	10	KwayaKusar; Gashina; Mithda; Gadam A; Gadam B; Peta;Gayi; Gusi;KurbaJalingo; and Guwal.	780	78
Total	**30**	**30**	**2,436**	**244**

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The selected LGAs were the most secured areas in the State and also among the LGAs that were introduced to the cultivation of improved cowpea technologies by the IITA Project. The second stage in sampling was a random selection of 10 communities from each of the three (3) LGAs. The third stage was a random selection of respondents from a list of cowpea farmers obtained from the BOSADP office in Biu, the State Zone One Headquarters. A fourth stage involved a simple random selection of 10% of adopters of the improved cowpea varieties from each district using balloting technique (Table 1).

Data Collection and Analytical Techniques

The data were collected from the primary sources during the study. It was obtained through the use of structured questionnaires administered to the respondents.

The analytical techniques used in achieving the objectives of study include descriptive statistics (frequency and percentage and mean) and inferential statistics (minimum, maximum standard error, Probit regression model, Adoption Index model and Profitability model). The Probit model was used for showing the factors that influenced the probability of adoption that can take any of the two values (adopted, not adopted). The model used the characteristics of the farmers which was dichotomous or continuous variables to predict the probability of their adoption. The Probit model used was adapted from Ugbabe (2015) specified as:

Y_i = 1, if the farmer grows the improved cowpea varieties, i.e., adopts the technology.
Yi = 0, if the farmer does not grow the improved cowpea varieties introduced by IITA.
If U_i* is the critical or threshold level, at which decision to adopt occurs, then:
Yi = 1 if U_i U_i*
Yi = 0 if $U_i \leq U_i$*

The non-observable underlying utility function which ranks the preference of the ith farmer is expressed as:

$$\sum_{n=1}^{N} BN\ Xni\ ei \quad \ldots(1)$$

where;
X_{ni} = the nth variable of the ith observation.
Bn = the nth parameter to be estimated (I = 1 - - 20).
e_i = error term.

The Equ. 2 can be rewritten as follows:

Ui = BXi …(2)

where;
B = X x 1 vector of the parameters Bn
Xi = N x K matrix of the repressor Xni
The probability Pi for the farmer *i* to adopt or grow improved cowpea varieties is given as:

Pi = P $[Y = 1]$ = P $[Ui >= Ui*]$ = P $[Ui* <= Ui]$
P $[Y = 1]$ = P $[Ui* <= Ui]$F $[Ui]$
P $[Y = 1]$ = 1- F $[Ui]$

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Cowpea Farmers

The results in Table 2 revealed that the mean age of the cowpea farmers was 46 years and that most of them were within the age of 40-49 years. This showed that most of them were within their economically active age and thus should be able to execute their production effectively. It further indicated that they were young and also experienced to take decisions. Ogunbile *et al.* (2002) reported that middle aged farmers are more flexible in making decision, taking risk and adoption of new ideas and technologies than their old counterparts. This agreed

with work of Nafiu *et al.* (2016) that the ages of most of the farmers range between 31-50 years (73%) with the mean age of 30 years.

The household size gives an indication of the available labour force to be involved in carrying out production activities. In this case most of the farmers used their family members as their sources of labour to reduce the cost of labour. This was because cowpea farming is labour intensive. The results indicated that majority of the cowpea farmers had household sizes ranging from 1-10 persons, which accounted for 74.10%. The minimum household size was 2 and maximum 31. The mean household size was 9.11. The implication is that a large family size can contribute enormously to the labour force as well as improve the level of productivity of farming the improved cowpea varieties in the study area. This was assumed to lead to more production of improved cowpea varieties in the household. Abdul *et al.* (2003) reported that the mean household size in savannah zone of Nigeria was 10. The researcher further stressed that variation in household size may be as a result of polygamous nature of most households involved in cowpea farming in the region.

Reactions from the respondents revealed that almost 92% of the farmers had farming experience of between 8 to 47 years. Only 2% of the cowpea farmers had farming experience of 48 to 67 years. The implication of this result was that well experienced farmers greatly out-numbered the inexperienced ones. This could suggest that regular and continuous farming enabled farmers to notice a change in yield and climatic conditions, and adjust appropriately. They were in position to adapt and adopt the requirements of the improved cowpea production technologies. The findings coincided with the study of Ibrahim (2015) which indicated that continuous and consistent farming makes farmers to realize a change in yield that enables them to adopt production technology. Experience enables cowpea farmers to discover techniques that make the farming produce more yield and good quality product. This will make the farmers adopt improved cowpea varieties especially for economic advantage it brings to their household income. Gbegeh (2013) also reported that because of farmers' experience in farming and knowledge about the importance of improved agricultural production technologies are capable of adopting.

The sex distribution of the household heads was similar across the study area. Although the percentage of the male households was higher than that of females, the difference was not too large. The males were 56.60% of the household while females accounted for 43.40% of the cowpea farming households. This implied that males dominated farming population in the study area. The result is in agreement with the findings of Idrisa (2009) that majority of households were headed by males in a study of farm households in southern part of Borno State. However, it can be seen that this slight difference with their female counterparts and could suggest that more women will be adopting this crop in their agricultural investment. This is because the women can easily realize the economic potential in the farming of this crop. Mbavai *et al.* (2015) reported similar trend in the study of cowpea adoption by farmers in the Sudan Savannah zone of Northern Nigeria, which showed that males dominated farming activities.

The educational background of farmers is said to influence them to use a certain improved technology in agriculture and also equipped them on the type of farm production they are to do. Educational level also determines the opportunities and strategies that are available in order to improve their livelihood. It was found that 31.10% had no formal education. But majority of the farmers in the study area were educated in one way or the other by completing primary, secondary or tertiary education. This to a great extent is an indication that farmers are educated to a certain level in which it may trigger them to use any innovation effectively. The implication of this is that the perception of new ideas by farmers to integrate

into innovations will improve the household strategies and being facilitated by their education. This is in line with what Sullumbe (2004) reported that the level of formal education attained by an individual goes a long way in shaping his personality, attitude to life and adoption of improved practice. Educated people are expected to perform certain jobs and functions with higher efficiency and are more likely to utilize information and new technologies in shorter period of time than uneducated people (Agbamu, 2006).

Table 2: Socio-economic Characteristics of Cowpea Farmers

Class Interval	Frequency	Percentage
Age		
<30	17	6.80
30-39	45	18.40
40-49	72	29.40
50-59	63	26.20
60-69	38	15.10
≥70	9	3.70
Minimum	20	
Maximum	75	
Mean	46.76	
Std. Dev.	11.37	
Household size		
1-10	181	74.1
11-20	52	21.2
21 and above	11	4.4
Minimum	2	
Maximum	31	
Mean	9.11	
Std. Dev.	5.16	
Farming Experience		
8-17	90	36.90
18-27	76	31.10
28-37	59	24.20
38-47	14	5.70
48-57	4	1.60
58-67	1	0.40
Minimum	8	
Maximum	65	
Mean	21.68	
Std. Dev.	10.30	

Result on access to extension contact revealed that majority of the farmers (74.20%) had access to extension services. Only 25.80% of the farmers did not have such access. Thus, most of the farmers had extension contact to offer help on the new technologies needed. The farmers' access to extension agents offered them knowledge and skills for promoting the farming of the improved cowpea varieties. The implication is that contact with extension officers will teach the farmers to adopt practices appropriately for high production that would increase the economic benefits to adopters. The finding disagreed with the work of Mbugua

(2009) who stated that only 3.7% reported that they had received extension advice within the last four years. In line with the findings of this study, various researchers had also noted that contact with extension agents encouraged both adopters and non-adopters to improve farming activities and output (Asfaw, 2011; and Ibrahim, 2015). This is due to the fact that researchers and extension agents available will train and supervise the farmers through the Promoting Sustainable Agriculture in Borno (PROSAB) programme. This also serves as a true means of expanding adoption among cowpea farmers in the region.

Table 2: Socio-economic Characteristics of Cowpea Farmers **Cont'd.**

Variable	Frequency	Percentage
Sex		
Female	106	43.40
Male	138	56.60
Marital Status		
Single	24	9.80
Monogamous	107	43.90
Polygamous married	79	32.40
Widowed	34	13.90
Educational Status		
No formal education	76	31.10
Primary Education	49	20.10
Secondary Education	63	25.90
OND/NCE/Diploma	49	20.10
HND/University	7	2.90
Extension Contact		
No Contact	63	25.80
Had Contact	181	74.20

Factors Influencing Adoption of Improved Cowpea Varieties

Table 3 shows distribution of farmers based on adoption of improved cowpea production technologies. The highest adoption score was 0.81 for planting of IT89KD-288 introduced by IITA. The lowest adoption score was 0.38. It was discovered that among all the improved cowpea varieties introduced in the study area, most of the farmers were not using the recommended spacing. The grand mean adoption score across all the varieties was 0.60. When the scores were considered on individual varieties, the following scores were found; for IT89KD-288; 0.58 for IT99K-573-1-1; 0.52 for IT99K-573-2-1 and 0.48 for UAM09-1064-6-1 meaning that 60%, 58%, 52% and 48% of the various improved cowpea production technology was adopted by the farmers in the study area. It was discovered that UAM09-1064-6-1 was the variety that had the lowest grand mean adoption score. The reason for IT89KD-288 having the highest grand mean adoption score was because the yield was higher than the remaining varieties when intercropped with maize.

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Table 3: Adoption Score of Improved Cowpea Varieties Production Technology (n = 244)

Adoption Stages	**IT89KD-288**				**IT99K-573-1-1**				**IT99K-573-2-1**				**UAM09-1046-6-1**			
	Improve Seed	**Fertilizer Application**	**Spacing**	**Chemical Application**	**Improve Seed**	**Fertilizer Application**	**Spacing**	**Chemical Application**	**Improve Seed**	**Fertilizer Application**	**Spacing**	**Chemical Application**	**Improve Seed**	**Fertilizer Application**	**Spacing**	**Chemical Application**
Awareness	100	100	100	100	100	100	100	100	100	100	100	100	49	100	100	100
Trial	89.3	79	74.2	58	80.2	70	68	59	84.1	76.1	71	49	58.7	52	57	85
Adoption	83	67.9	2.64	73.4	79	66.1	3.68	52	80	85.6	1.47	71.2	68	73.1	0.37	55.6
Total	594	470	277	412	417	489	320	463	494	389	289	347	343	389	311	351
Adoption Score	0.81	0.64	0.38	0.56	0.57	0.67	0.44	0.63	0.67	0.53	0.39	0.47	0.47	0.53	0.42	0.48
Grand Mean Adoption Score	**0.60**				**0.58**				**0.52**				**0.48**			

Further to Table 3 results, the UAM09 1046-6-1 had a high yield too, due to the low percentage of awareness that lead to the low adoption score. This study has a slight difference with Halliru (2015) who reported that 68% of the entire N_2Africa legume technology was adopted by contact farmers in the study area.

Adoption Score of Improved Cowpea Varieties Production Technology

The parameter estimates of the Probit model used to identify the factors influencing farmers' decision to adopt Improved Cowpea Varieties (ICV) are presented in Table 4. The first variety IT89KD-288 had extension contact to be statistically significant on adopting improved cowpea production in the study area. It was observed that extension contact was significant at 10%. Likewise, the results suggested that farmers that had extension services are more likely to adopt improved cowpea variety than their non-adopter counterparts. Marginal effect predicts that if a farmer had extension contact, there is a probability of him or her to adopt by 9%. For the second variety IT99K -573-1-1 education and extension contact was significant at 5% and 10%. Under the marginal effect, it implied that for a farmer to be educated there is a tendency that the farmer will adopt IT99K -573-1-1 at 2% and if there is constant extension contact a farmer will adopt IT99K -573-1-1 at 11%. Third variety IT99K -573-2-1 had sex, education, household size and extension contact were significant at 5% and 10%. For the marginal effect, for every male or female farmer that has a probability to have 11% of adopting IT99K 573-2-1, for marginal effect, any educated farmer, there is a tendency that there will be a probability for the farmer to adopt at 2%, if there is an increase in household size, the marginal effect will be 0.7% of adoption and there will be 14.8% of adopted on the production of IT99K 573-2-1 if more extension services will be rendered. The reason is that for sex it was observed that the males dominated the farming activities in the study area if there is more campaign for females to be involved; there is the probability that will increase the percentage of adoption. That was the case in the study of Altine (2019) on the analysis of the adoption of soybeans among small holder farmers in Kaduna State where Sex was found to be positively related to the adoption of soybean technologies by respondents, revealed the possibility of male farmers adopting new technologies than the female soybean farmers. It was also in line with Mamudu *et al.* (2012) who found that male farmers were more likely to adopt modern agricultural production technologies than their female counterparts. The possible reason was that men are mostly responsible for making production decisions and also control resources such as land, labour and capital which are critical for the adoption of new technologies. Thomson *et al.* (2014) also reported that sex of the household head is important in explaining adoption of improved maize varieties where the adoption was in favour of male households.

For the education it was observed that most of the farmers were educated in one way or the other which result to more likely for the farmers to adopt the improved variety. This study agreed with the findings of Altine (2019) where she found that education had positively influence adoption of N2Africa soybean technologies. Moreover, the findings are in consistent with that of Degu (2012) who found that education has a positive relationship with the adoption of improved potato varieties in eastern Ethiopia.

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Table 4: Factors Influencing Adoption of Improved Cowpea Varieties among Farmers (n = 244)

Variable	**IT89KD-288**				**IT99K-573-1-1**				**IT99K-573-2-1**				**UAM09 1046-6-1**			
	B	**S.E**	**P>[z]**	**M.E**	**B**	**S.E**	**P>[z]**	**M.E**	**B**	**S.E**	**P>[z]**	**M.E**	**B**	**S.E**	**P>[z]**	**M.E**
Sex	-0.190	0.126	0.476	-0.022	-0.049	0.133	0.712	-0.013	-0.278	0.145	0.055**	0.112	-0.260	0.147	0.077*	-0.056
Age	-0.002	0.004	0.575	-0.000	0.003	0.005	0.558	0.001	-0.005	0.006	0.392	-0.001	-0.011	-0.006	0.065*	-0.051
Education	-0.049	0.030	0.111	-0.018	-0.054	0.032	0.087*	-0.017	-0.075	0.035	0.027**	-0.019	-0.037	0.035	0.291	-0.010
Household size	-0.005	0.011	0.637	-0.003	0.006	0.011	0.592	0.001	0.030	0.012	0.011**	0.007	0.016	0.012	0.184	-0.010
Ext. Contact	0.316	0.152	0.038*	0.089	0.435	0.170	0.010**	0.112	0.660	0.211	0.002**	0.148	0.647	0.211	0.002**	0.082
Marital Status	0.072	0.075	0.340	0.021	-0.088	0.082	0.284	-0.030	-0.034	0.088	0.696	-0.009	-0.039	0.090	0.663	0.004
Constant	-0.670	0.400	0.094*		-0.944	0.424	0.026*		-0.924	0.469	0.049*		-0.654	0.471	0.165	
LR chi^2	10.30				11.63				26.61				19.91			
Pseudo R^2	0.014				0.020				0.054				0.041			
Number of Observation	213				209				221				98			

*** Significant at 1%, ** 5%, and * 10%; β = Coefficient, S.E = Standard Error, and M.E = Marginal effect

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Further to Table 4, large households are more likely to adopt improved cowpea varieties than the small ones. This means that large families have more workforce than the small ones. Also, it should be noted that large families have many mouths to feed, which explains the use of improved seeds to increase production. This is in line with Shuaib *et al*. (2017) which revealed that having large household size is a source of pride and a compelling force to produce more output by the household head in the farms. The minimum (9%) respondents had a household size of 1-3. Large family size is an indicator for availability of labor, since the main source of labour in most African communities are from immediate family.

Extension contact had a vital influence on the farmers to adoption because farmers were being enlightened on advantages that it has. Extension contact was found to be significant at 1%. Access to extensions services creates the platform for acquisition of relevant information that promotes technology adoption. Mamudu *et al.* (2012) found access to extension services to be positively related to the adoption of modern agricultural production technologies and was found to be significant at 10% level. This means that farming households are more likely to adopt modern agricultural production technologies if they have access to extension services. The UAM09 1046 -6-1was significant at 5% and10%, respectively, with socio-economic factors such as sex, age and extension contact that influenced the adoption of the variety. For the sex, males had more production than the females and if there is an increase in the population the marginal effect will be at 6%.

Age has direct relationship with experience especially in rural farming communities and it means that the more experience a farmer is in this area, the higher the probability of adopting improved cowpea production, this implies that the marginal effect will be at 5%. This is in agreement with the findings of Wakawa *et al*. (2015) in their study on impact of soybean technology adoption on income of farming households in Borno and Kaduna States, Nigeria. Their study revealed that the Soybean farmers comprised relatively young and active farmers between the ages of 30 and 40 years and they are likely to be more productive, have higher degree of risk aversion and can participate in new agricultural projects. In another development, UAM09 1046-6-1 was the variety that had the highest yield (811.17kg/ha) and profit ₦176569.21, followed by IT99K-573-2-1 733.12kg/ha with profit of ₦166800.13/ha, IT99K-1-1 had 715.32kg/ha with a profit of ₦167666.69/ha and IT89KD-288 had 679.45kg/ha with a profit of ₦130340.97/ha.

CONCLUSION AND RECOMMENDATIONS

It was concluded that the grand mean score among the varieties were high except the UAM09 1046-6-1 that had low score because of the awareness been low for the variety. The factors that influence the adoption of improved cowpea production were, sex, age, education household size and extension contact. From the findings of this study, the following recommendations were made:

1. The measures to the problem of low adoption of recommended practices, is not possible without understanding the possible causes. A number of factors could be attributed to this in terms of adopting the recommended practices in the study area such as spacing.
2. There is need to have an increase in extension services focused on influencing more participation in improved cowpea farming and practices for satisfactory output. This will expand adoption of the improved cowpea varieties and also create more economic benefits for the communities.

3. A massive publicity was recommended to enlighten community members on the profitability of improved cowpea production. This should be focused on engaging the unemployed youths to become gainfully employed in cowpea farming and its associated trade. This step will help in alleviating poverty and unemployment among the youths in the zone. More importantly, it will promote economic prosperity and human resource empowerment in the region and Borno State at large by Borno State Agricultural Development Programme (BOSADP).

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