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FACTORS INFLUENCING THE ADOPTION OF SOYABEANS PRODUCTION TECHNOLOGIES IN WESTERN ZONE OF BAUCHI STATE, NIGERIA

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ABSTRACT
The study examined the socio-economic determinants of soya beans production technologies adoption in Western Zone of Bauchi State, Nigeria. A combination of purposive and simple random sampling techniques was used to select a total of 194 farmers for the study. Data were collected using a structured questionnaire and analyzed using both descriptive and inferential statistics. The result showed that 48.5% of the respondents fell within the ages of 30-39 years with an average age of 45 years. Most (92.8%) of the farmers were male and majority (71.1%) were married with a mean household size of 10 persons. Furthermore, the result revealed that 38.7% had secondary education with an average farming experience of 20years. The findings further indicate that 47.9% and 63.4 % of the soybean farmers adopted animal drawn ridging technology and planted improved soybean varieties (TGX 1448-2E, TGX 1835-10E and TGX 1485 ID). Among the varieties, TGX 1448-2E was adopted with 48.5% and 51.1% planted their seed around Early June-July. The result also revealed that majority (74.7%) of the respondents sourced their information on improved soyabean production practices through radio, majority (61.9%) had no contact with extension agents while 42.8% had weekly contact. The regression result shows that age was negatively significant (P = 0.001), level of education was positively significant (P< 0.01), sex was positively significant in influencing the adoption of soyabeans technologies. While marital status, household size, land ownership and farm size were not significant. The major constraints to adoption of soyabean technologies by farmers were poor market price (56.7%), inadequate capital (50.5%), and inadequate inputs (48.5%) among others. The study concluded that among the variables included in the model, level of education was the major determinant of soyabean technology adoption in the study area. It is therefore recommended that; education should be encouraged among soyabean farmers in the study area.

Keywords: Adoption, Factors, Influencing, Production, Soyabean, Technologies.

INTRODUCTION
Soyabeans (*Glycine max* **L.**) is a legume that grows in the tropical sub-tropical and temperate climate. Soyabean consumption improved nutrition particularly among the urban, poor and middle-income group. Soya beans products not only have more minerals but, they are considerably cheaper than other sources of high protein such as meat, milk, fish and other protein-rich legumes (International Institute of Tropical Agriculture [IITA], 2003). One of the major goals of Nigerian agricultural development programmes and policies is transition from low productivity subsistence agriculture to a high productivity agro-industrial economy through improved technology adoption. That is, shift from traditional methods of production to new, science-based methods of production which include new technological components and/or even new farming systems (Hassen, 2012). The benefits of soybean over other grain

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legumes such as groundnut and cowpea include lower susceptibility to pests and diseases, better storage quality and larger leaf biomass which translates into soil fertility benefits to subsequent crops (Ugwu and Ugwu, 2010). As an important staple food for its great nutritional value, soyabean importance ranges from its use for milk production, oil processing, livestock feed, medicinal uses, industrial and human consumption. Soyabean is very important in the household nutrition due to its high protein content and affordability. It contributes to the enhancement of sustainable intensification of cropping system by improving soil fertility through nitrogen fixation, permitting a longer duration of ground cover in the cropping sequence, providing a useful crop residue for animal feed. The Federal ministry of Agriculture and Rural Development reported that Nigeria is the second largest producer of soya beans after Zimbabwe. Surprisingly, Nigeria is a protein deficient country (Federal Ministry of Agriculture and Rural Development [FMARD], 2010).

The agronomic practices recommended for soya beans production in Nigeria to include the following site selection, land preparation, planting time, spacing and seed rate, fertilizer application, weed control, pest and disease control, harvesting and storage (Dugje *et al.*, 2006). Adoption of agricultural technologies can be seen as a decision to apply innovation/new technology, method, practices by a farmer and continue to use it. Rate of adoption is the relative speed with which an innovation is adopted by members of a social system (Hassen *et al.*, 2014). The objective of the study was to: describe the socio-economic characteristics of the soyabean farmers; identify the sources of information used by the respondents; and determine the factors influencing the adoption of soyabean production technologies.

MATERIALS AND METHODS

The Study Area

Bauchi State is located in the north eastern part of the country, it lies approximately between latitude 9^0 30' and 12^0 30' north of the equator and 11^0 50' and 8^0 42' east of the Greenwich meridian. The state was created in 1976, and presently occupies a total land area of 549,260 square kilometers, representing about 5.3% of the Nigerian total land mass. The state shares boundaries with seven states, namely; Kano and Jigawa in the north, Yobe, Taraba and Gombe in the east and with Plateau and Kaduna states to the west (BSADP, 2015). Bauchi State, based on agricultural development programme, is divided into three agricultural zones which include Northern, western and Central. The Western Zone is made up of seven local government Areas, namely; Alkaleri, Bauchi, Bogoro, Dass, Tafawa Balewa, Toro and Kirfi. The zone has the population of 2,497,782 people, representing 53.41 percent of the population in the state. The State is characterized by two distinct vegetation zones which include, Northern Guinea Savannah and Sudan Savannah. The zone experience both wet and dry seasons with temperatures ranging between 15^0C – 29.7^0C in January to 23^0C – 32.4^0C in June, with an average annual relative humidity of 40.1 percent. It is also characterized by an average annual rainfall of 85.6mm (CPP, 2019). The main occupation of the people in the area is crop farming and livestock rearing. Crop farming is ranked highest and this enhanced the designation of the area as agrarian Zone and include groundnut, maize soyabeans rice etc. (BSADP, 2015).

Sampling Techniques and Sample Size

A multi-stage sampling technique was employed in the selection of the respondents for this study. In the first stage, two (2) LGAs (Alkaleri and Bauchi) were purposively selected from Western Agricultural Zone of the State on the basis of high concentration of soyabean farming in the zone. In the second stage, two (2) districts namely; Pali and Duguri were randomly selected from Alkaleri local government, and Galambi and Miri from Bauchi local government, making a total of four (4) districts. In the third stage, three villages were selected

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randomly from Pali district, namely; Gwaram, Guma and Gokaru while Yashi, Mainamaji and Fanti were selected from Duguri district. Also selected were Kangere, Bishi and Tudun Gambo from Galambi district, and Kundum, Durum and Miri from Miri district, making a total of 12 villages. Finally stage the sample size of 20% of soyabean farmers were proportionately and random selected from each of the 12 villages making a total of 200 sample size from the population.

Method of Data Collection

Data for this study were derived through the use of a well-structured questionnaire administered to the respondents with the aid of agricultural extension personnel.

Regression Analysis

Tobit regression was used to examine the effect of socio- economic variables on the adoption of soya beans production technologies. The explicit tobit regression model is expressed as:

$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + u$

where;

Y = is adoption of soybean production technology

a = intercept

b_1 to b_2 = estimated coefficients

u = error term

The independent variables specified as the determinants of technology adoption in this study are as follows:

X_1 = Age (years)

X_2 = Sex (Male = 1 and Female = 0)

X_3 = Marital status (married = 0 single = 1 widow = 2 and divorced 3)

X_4 = Household size

X_5 = Educational level (no formal education = 0, primary education = 1, secondary education = 2, and tertiary education = 3)

X_6 = Farming experience (years)

X_7 = Land ownership (inherited = 0, purchase =1, leasing = 2, gift = 3)

X_8 = Farm size (ha)

X_9 = Access to extension (yes = 1, No = 2)

RESULTS AND DISCUSSION

The results in Table 1 show that majority (92.8%) of the respondents were male. This indicate that most of the improved technologies on soyabeans may be more widely adopted by male farmers in the study area. The finding agreed with that of Mbavai (2013), who found that more men were involved in cowpea farming than women in Musawa LGA of Katisna States. The result also reveals that 80% of the respondents fell within the age bracket of 20-39 years. The results are in agreement with that Ibrahim *et al*. (2019) who found in their study that majority of the respondents were within the age bracket of 20-45 years with a mean average of 45.8 years which implies that access to Agricultural Credit Guarantee Scheme is not in the hand of too old people. The farmers are very active and should be highly productive if they have access to adequate credit facilities and inputs at the right time and it is also similar to the finding of Idrisa (2009), who reported 40 years as active age of farmers for farm household in Southern Borno State Nigeria. Table 1 also revealed that majority (71.1%) of the respondents were married. This finding agrees with that of Sabo (2006), who found that majority of the participants in Community-Based Agriculture and Rural Development Programme in Zaria local government Area of Kaduna State were married. It is expected that family labour would

be more available where the household head is married (Amaza *et al*., 2009). The results revealed that majority (62.4%) of the respondents had a household size of 1-10 persons with an average of 16 persons. The result is in agreements with Mignouna *et al*. (2013), who reported an average of nine (9) persons per family.

Table 1 further indicate that majority (66.5%) of the respondents in the study area had farming experience of 11-20 years. This result contradicts the finding of Bello *et al*. (2012) who found that most of the respondents in Jenkwe development area of Nasarawa State, Nigeria had 10 years of farming experience. Table 1 also showed that 82.5% of the soyabean farmers had between 1-3 hectares. It can be said that majority of the respondents were small-scale farmers who cultivate not greater than three hectares of land for soyabean production. This agrees with the findings of Oriole (2009), who reported that most of the soybean farmers in Nigeria were small-scale farmers who cultivate less than 3 hectares of land. As shown in Table 1 most (91.2%) of the respondents had one form of education. This is in line with the findings of Ibrahim *et al.* (2019), who found in their study that majority of the respondents were more educated. Olaleye (2000), who revealed that education is an important characteristic especially in adoption of innovations.

The results further revealed (49.0%) of the respondents acquire their land for soyabean production through inheritance. The result is in agreement with that of Zalkuwi *et al*. (2015) who reported that majority of cowpea farmers inherited their farmland. The implication of majority using inherited land is that, it would lead to fragmentation as a result of sharing among siblings hence reduction in the size of the farmland for agricultural practices. The results also agreed with that Ibrahim *et al.* (2019) who found majority of the respondents inherited their farm land. This indicates that majority of the respondents had access to permanent land for soyabean cultivation since they are owners of the land compared with a tenant that can be ejected at will by the land owner. The result showed that majority (61.9%) of the respondents had no contact with extension agents. Umar *et al*. (2009) opined that high extension contact would increase the adoption of improved soyabean production practices.

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Table 1: Socio-economic characteristics of the respondents

Variables	Frequency	Percentage	Mean
Age (years)			
20-39	126	65	
40-59	30	15	45
60 and above	38	19.6	
Sex			
Male	180	92.8	
Female	14	7.2	
Marital status			
Married	138	71.1	
Single	30	15.5	
Widowed	10	5.2	
Divorced	16	8.2	
Household size			
1-5	56	28.9	
6-10	65	33.5	
11-15	44	22.7	10
16 and above	29	14.9	
Level of education			
Never been to school	17	8.8	
Primary education	49	25.3	
Secondary	75	38.7	
Tertiary education	23	11.9	
Others	30	17.0	
Farming experience			
1-10	57	29.4	
11-20	129	66.5	
21-30	5	2.6	20
31-40	3	1.5	
Farm size			
1-3	160	82.5	
4.6	19	9.8	
7-9	3	1.5	1
10 and above	12	6.2	
Access to extension			
Yes	74	38.1	
No	120	61.9	
Land ownership			
Inherited	95	49.0	
Purchase	40	20.6	
Leasing	53	27.3	
Gift	6	3.1	
Total	**194**	**100**	

Source: Field survey, 2019

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Respondents' Sources of Information

The result in Table 2 revealed that majority (74.7%) of the respondents received information on soybean production technologies adoption through radio. Radio therefore ranked as the most important source of information for the farmers. Extension agents is second widely used source of information as indicated by about 46% of respondents, while 22.2%, 21.6%, and 13.4% of the soybean farmers got to know about improved soybean production practices through, print media, extension agent and mobile phone, respectively. This implies that radio is the major source of information through which information is disseminated to soybean farmers in the study area. This finding is in agreement with that of Job *et al*. (2015) who stated that majority of the respondents acquire information about new innovations through radio. Garba (2006), reported 50.8% and 22.5% of the farmers in Bauchi LGA sourced their information from radio programmes and village extension agents, respectively.

Table 2: Distribution of respondents according to their source of information (n = 194)

Variables	*Frequency	Percentage	Ranking
Radio	145	74.7	1st
Television	89	45.9	2nd
Print media	43	22.2	3rd
Extension agent	42	21.6	4th
Mobile phone	26	13.4	5th

*Multiple response recorded
Source: Field survey, 2019

Factors Influencing Adoption of Soybean Production Technologies

Table 3 shows the result of ordered logistic regression. The R^2 value was found to be 0.861, implying that the independent variable explained 86% of variation in the adoption of soyabean production technologies. The results revealed that the nine (9) variables included in the regression model age, sex, marital status, household size, level of education, farming experience, land ownership, farm size, and access to extension, were the factors influencing adoption of soyabeans recommended production practices in the study area. Consequently, the interpretation of the logit analysis indicates the following:

Age refers to the total number of years of the soyabean farmer in the study area. The variable had a negative coefficient and was statistically significant (p = 0.001). This negative coefficient indicates negative relationship which implies that as the age of the soya bean farmers increases, their level of adoption decreased. This result is in tandem with Godwin and Aondonenge (2016), who found negative and significant relationship between age and food security in Benue State. While contradicts the finding of Joseph *et al.* (2019), who found no significant relationship between age and adoption of improved cowpea varieties. This implies that food security declines with increase in age. The negative and significant effects of the age of household heads decrease the probability of households being food secure.

Sex was positively signed and statistically significant. Both male and female farmers adopted improved soya beans production technologies. This shows that gender played a positive role in decision making when it comes to adoption of new technologies. The result is in support of Joseph *et al.* (2019), who found that gender had significant influence on the intensity of adoption of improved cowpea varieties in the Sudan Savanna of Northern Nigeria. This finding is not in agreement with that of Mustapha *et al.* (2012), who found no significant relationship in their study on Socio-economic factors affecting adoption of Soya Bean

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production technologies in Takum Local Government Area of Taraba State. This means that the male farmers were more likely to adopt modern agricultural production technologies than their female counterparts. The reason for this is that men are the people who make production decisions in the study area and also control productive resources such as land, labour and capital which are critical for the adoption of new technologies.

Marital status bore a positive coefficient bat not statistically significant. This means that there was a great difference between married farmers and non-married farmers in terms of technology adoption, therefore *a prior* expectation was made. The result is in agreements with that of Sunday (2016), who found no significant relationship between marital status of the respondents and the level of adoption of improved soyabean production technologies in Kogi State. Idrisa *et al*. (2010), described married people to have more responsibilities and hence take whatever they do with higher levels of seriousness. That means, they will be willing to seek information about improved technologies in order to enhance the welfare of their families. This implies that marital status had no effect on the adoption of improved soyabean production practices.

Household size variable is a proxy for the availability of labour to undertake farming activities, and was not statistically significant. This result is in agreement with the finding of Odoemenem and Obine (2010), who presented that household size had a negative relationship with adoption, suggesting that adoption level was lower among large households. However, the result further contradicts the findings of Adeniji *et al.* (2007), who found a positive relationship between household size and adoption of improved agricultural production practices. In adoption studies, increase in household size, increases technology adoption provided the bulk of household members are productive (Balarabe, 2012).

Level of education was positively signed and statistically significant ($P<0.01$). The *a priori* expectation was actually met as it has a positive coefficient, which implied that soya bean farmers with higher educational qualification would adopt improved soya beans production technologies in Bauchi western agricultural zone of the State more than less educated farmers. This finding agrees with that of Tiamiyu *et al*. (2001), who found a positive and significant relationship between literacy and level of adoption of improved soya beans in Niger state, Nigeria. This result is also in agreement with the finding of Zalkuwi *et al*. (2015), that majority of the respondents had one form of formal education or another.

The coefficient of farming experience was found to be positive and significant ($P = 0.001$) in influencing the decision to adopt improved soya bean production management practices. The variable predicts positive relationship on farmers adoption of improved management practices in the study area. The positive influence is expected because more experienced farmers may have good advantage of acquiring better skills and access to innovative information about improved practices. The finding also implies that knowledge and experiences gained over time from working in an uncertain production environment may help in evaluating the technologies thereby influencing their adoption decision. The finding is supported by Mamudu *et al*. (2012), who found that years of farming experience was positively significant in determining the adoption of modern agricultural technologies by farm household in Ghana. Farming experience has the effects of encouraging farmers to improve their earning capacity, therefore it puts such farmers in a financial advantageous position to have more resources for investment in improved farm practices (Agbamu, 2006).

Land ownership refers to the hectares of farm land owned by the farmer and devoted to soya bean production. The variable was not found to be significant. This presents a serious challenge to policy makers and implementers in promoting the adoption of modern agricultural production technologies. The result is in line with that of Zalkuwe *et al*. (2015) who found that

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majority of the cowpea farmers inherited their land. The implication of the majority using inherited land is that it would lead to fragmentation of the farmland as a result of sharing among siblings, hence reducing the size of the farmland for agricultural practices.

Farm size refers to the size of the farm cultivated by the respondent in hectares. The variable was not significantly related to the dependent variable. This conforms to the *a priori* expectations because ownership of land can be an advantage to innovation adoption. They can easily test the technologies on their farm when there is enough land for them to practice the technology. Land size is one of the indicators of level of economic resources available to farmers (Ajibefun, 2006). The findings contradict Simtowe *et al.* (2012) who discovered a significant relationship between farm size and adoption of improved technologies. This implies that Farmers with large farms are more likely to adopt improved soyabean technologies, unlike those with small farm sizes since having larger farms strengthens farmers capacity to produce more.

Table 3: Socio-economic factors influencing adoption of soyabean production technologies

Explanatory variables	**coefficient**	**Std error**	**Z**	**P>|Z|**
Age (X_1)	-0.0050	0.0180	4.28	0.001***
Sex (X_2)	0.1131	0.0096	3.18	0.003**
Marital status (X_3)	0.4217	0.5120	0.82	0.410^{NS}
House size (X_4)	0.0335	0.0714	0.46	0.647^{NS}
Level of education (X_5)	0.1422	0.08896	3.59	0.002***
Farming experience (X_6)	0.0402	0.0309	4.30	0.001**
Land ownership (X_7)	0.0568	0.1056	0.52	0.601^{NS}
Farm size(X_8)	0.1087	0.0695	1.56	0.118^{NS}
Extension contact (X_9)	0.0130	0.0115	3.13	0.005**
R^2= 0.861				
Pro > Chi^2 = 0.0039				
Chi^2 (9) = 49.60				

Note: *Significant @ p≤0.05, **Significant @ p≤0.01 and ***Significant @ p≤0.001
Source: Field survey, 2019

Extension contact refers to the total number of times a farmer receives training or information on improved soya bean production technologies from the extension personnel in the study area. The variable (Table 3) was found to be positive and significant (P<0.01). This implies that the higher the extension contact by the soya bean farmer, the more they are likely to adopt the technology and vise-versa. The result is in agreement with that of Sunday (2016) who found a positive and significant relationship between extension contact and adoption of Improved Soya bean Production Technologies in Two Local Government Areas of Kogi State. Onu (2006), revealed that farmers who had access to extension adopted alley farming technologies more than farmers who had no access to extension.

CONCLUSION AND RECOMMENDATIONS

The study concluded that, the socio-economic factors that positively affect the adoption of soya beans production technologies were age, sex, marital status, household size, level of education, years' experience in farming, land ownership, farm size, number of bags. Adequate extension personnel, efficient, and reliable power supply should be provided to enhance farmers' knowledge.

REFERENCES

Adeniji, A. A., Voh, J. P. Atala, T. K. and Ogungbile. A. O. (2007). Adoption of improved cotton production technologies in Katsina State, Nigeria. *Journal of Applied Science,* **3**(7): 39 – 42.

Agbamu, J. U. (2006). *Essentials of Agricultural Communication in Nigeria*. Lagos: Malthouse Press Limited, 11B Gorela Street, off Adeola Odeku Victoria Island, Lagos.

Ajibefun, I. A. (2006). *Linking socio-economic and policy variables to technical efficiency of traditional Agricultural production: Empirical evidence from Nigeria.* Paper presented at International Association of Agricultural Economists' Conference, Gold Coast, Australia.

Amaza, P. S. and Tashikalma, A. K. (2009). Technical Efficiency in Groundnut Production in Adamawa State, Nigeria. *Journal of Arid Agriculture*, **1**(13): 67- 90.

Balarabe, I. Y. (2012). *Raifed lowland rice production: alternative for food security and income enhancement in Sokoto State, Nigeria.* A PhD thesis Department of Agricultural Economics and Extension Usmanu Danfodiyo University, Sokoto, p .231

Bello, M., Daudu, S., Galadima, O. E., Anzaku, T. K. A. and Abubakar, A. A. (2012). Factors influencing adoption of crop-based technologies in Jenkwe Development Area of Nasarawa State, Nigeria. *Global. Advance. Research. Journal. Agric. Sci*., **1**(8): 250-256.

Crop production programme (2019). *A.T.B.U Meteorological Center Bauchi. Crop* production Programme. Monthly summary Weather Report for the year 2011.

Dugje, I. Y., Omoigue, L. O., Ekeleme, F., BrandyoPadahyay, R. J., Kumar, P. R. and Kamara, A. Y. (2006). *Farmers guide to soya bean production in Northern Nigeria*. International Institute of Tropical Agriculture, Ibadan, Nigeria, Pp.1-16.

FMARD (2010). *Annual Report on Legumes Production.* Federal Ministry of Agriculture and Rural Development. Pp. 11-21.

Garba, A. (2006). *Analysis of factors influencing adoption of SG, 2000 maize production technology in Bauchi state, Nigeria.* Unpublished M.Sc. thesis, Department of Agricultural Economics and Extension Abubakar Tafawa Balewa University Bauchi, Nigeria.

Godwin, A. A. and Aondonenge (2016). Analysis of factors affecting food security in rural and urban farming households of Benue state, Nigeria. *International Journal of Food and Agricultural Economics*, **4**(1: 55-68.

Hassen, B., Bezabeh, E., Belay, K. and Jema, H. (2012). Determinants of chemical fertilizer technology adoption in north eastern highlands of Ethiopia: The double hurdle approach. *Journal of Research Economics and International Finance*, **1**(2):

Ibrahim, M. T., Idrisa, Y. L., Garba, A. and Murtala, N. (2012). Analysis of Socio- Economic Characteristics of Agricultural Credit Guarantee Scheme (ACGS) Credit Beneficiaries in Bauchi State, Nigeria. *Direct Research Journal of Agriculture and Food Science (DRJAFS)*, **7** (7): 158 –165.

Idrisa, Y. L. Ogunbameru, B. O. and Amaza, P. S. (2010). Economic and Technological characteristics on Soybean seeds technology Adoption in southern Borno State, Nigeria. *Agro-science Journal of Tropical Agriculture, Food, Environment and Extension*, **9**(3): 209 - 214.

Idrisa, Y. L. (2009). "*Analysis of Determinant of Soya Bean Production Technology Adoption by Farmers in Southern Borno, Nigeria."* PhD thesis submitted to the Department of Agricultural Economics & Extension Services, University of Maiduguri, Nigeria. Pp. 116.

International Institute of Tropical Agriculture [IITA] (2003). *Soybeans for good health.* In: How to grow and use soybeans in Nigeria. Ibadan.

Job, N. N., Halima, S. and Busayo, V. (2015). Socio-economic factors affecting adoption of innovations by cocoa farmers in Ondo State, Nigeria. *European Journal of Business, Economics and Accountancy*, **3**(2): 2056-601.

Joseph, J. M., Muhammad, B. S., Tahirou A., Oyakhilimen. O. and Amadu, Y. K. (2019). Factors influencing the adoption of improved cowpea varieties in the Sudan Savannas of Northern Nigeria *Academic Journal of Agricultural Extension and Rural Development.*, **11**(11): 200-207.

Mamudu, A. A., Guo, E. and Dadzie, S. K. (2012). Adoption of modern agricultural production technologies by farm households in Ghana: What factors influence their decision? *Journal of biology, agriculture and healthcare,* **2** (3): 34-68.

Mbavai, J. J. (2013). *An assessment of the effectiveness of the Sudan Savanna Taskforce project in adoption and diffusion of improved cowpea varieties in selected communities in Musawa Local Government Area of Katsina State.* An M. Ed unpublished thesis submitted to the Department of Adult Education and Community Services, Faculty of Education, Bayero University Kano. 97Pp.

Mignouna, B. D., Abdoulaye, T., Kamara, A. and Oluoch, M. (2013). Baseline study of smallholder farmers in Striga-infested maize and cowpea growing areas of northern Nigeria. *International Institute for Tropical Agriculture,* Ibadan, Nigeria. Pp. 60.

Mustapha, S. B., Makita, A. A., Zongoma, B. A. and Iwan, A. S. (2012): "Socio-economic Factors Affecting Adoption of Soya Bean Production Technologies in Takum Local Government Area of Taraba State, Nigeria". *Asian Journal Agriculture and Rural Development,* **2**(2): 271-276.

Odoemenem, I. U. and Obine, C. P. O. (2010). Assessing the factors influencing the utilization and adoption of improved cereals crop production technologies by Small-scale farmers in Nigeria. *India Journal of Science and Technology,* **3** (1): 874-946.

Olaleye, R. (2000). *Effectiveness of Development Intervention for Economic Empowerment of rural women in Ondo State.* Unpublished Ph.D Thesis, Development of Agricultural Extension and Rural Development, University of Ibadan.

Onu P. O. (2006). Socio-economic Factors Influencing Farmers Adoption of Alley Farming Technology under Intensified Agriculture in Imo State, Nigeria. *The Philippine Agricultural Scientist,* **89**(2): 45-52.

Oriole, E. C. (2009). "A framework for food security and poverty reduction in Nigeria". *European Journal of Social Sciences,* **8**(1): 37-43.

Sabo, E. (2006). Participatory Assessments of the Impact of Women in Agricultural Extension Programme in Borno State. Nigeria. *Journal of Tropical Agriculture. **44**(2): 52 – 56.*

Simtowe, F., Kassie, M., Asfaw, S., Shiferaw, B., Monyo, E. and Siambi, M., (2012). "Welfare Soya beans under fully open-air [CO_2] elevation. *Global Change Biology,* **11**(10): *1856-1865.*

Sunday, O. (2016). *Factors influencing adoption of improved soyabean production technologies among farmers in two local government areas of Kogi State, Nigeria.* Unpublished M.Sc. Thesis submitted to the school of postgraduate studies Ahmadu Bello University, Zaria, in partial fulfillment of the requirements for the award of Master of Science in agricultural extension and rural Sociology.

Tiamiyu, S. A., Idowu, A. A. and Misari, S. N. (2001) "Determinants of soya beans adoption in Niger State, Nigeria". *Nigerian Agricultural Journal*, 32: 152 -161.

Ugwu, D. S. and Ugwu, H. C. (2010). *Soybean production, processing and marketing in Nigeria.*

Umar, S. I., Ndanitsa, M. A. and Olaleye, S. R. (2009). Adoption of improved rice production technologies among youth farmers in Gbako Local Government Area, Niger State, *Journal of agricultural Extension*, **13**(1): 95-101.

Zalkuwi, J, Udhav P. S., Amita, M. and Asabe, (2015). *Cost and Return Analysis of Local Chicken Marketing in Mubi North Local Government Area of Adamawa State, Nigeria.*