Journal of Agriculture and Social Research (JASR) Vol. 11, No. 1, 2011

SOCIO-ECONOMIC DETERMINANTS OF INSECTICIDES USAGE IN COWPEA PRODUCTION IN KADUNA STATE, NIGERIA

[1]ADEOLA,S.S; [1]OMOLEHIN, R.A; [1]BEN AHMED AND [2]ADENIJI, O. B
[1]Department of Agricultural Economics and Rural Sociology,
Ahmadu Bello University, Zaria-Nigeria
[2]Department of Agricultural Economics and Extension Technology,
Federal University of Technology, Minna-Nigeria
Corresponding author's Email: bolajiadeniji@yahoo.com

ABSTRACT
This study investigates the socio-economic determinants of Insecticides use among cowpea farmers in Kaduna State, Nigeria. A multi-stage sampling technique was used to select 150 cowpea farmers who used insecticides in controlling pest in cowpea production in the study area. Information collected includes those of socio-economic characteristics of the famers and the quantity of insecticides they used. A regression model was used to estimate the relationship between farmers' socio-economic characteristics and the insecticides use level. The study showed that family size, farm size level of education and years of farming experience were the major socio-economic determinants of insecticides use level among the cowpea farmers in the studied area. It was recommended that training and efforts to get farmers educated are intensified while strategies that will prevent migration of educated youths away from active areas of farming be put in place.

Key words: Cowpea, farmers, socio-economic, determinant, insecticides,

INTRODUCTION
Cowpea (*Vigna unguiculata* (L) Walp) is an important grain legume (Singh, Ehlers, Sharma and Friere, *2002).* The crop is very unique in that it is a source of food and particularly ver rich in protein, income and fodder. It has high potential to increase income of both farmers and traders, being widely consumed and traded outside the producing localities (Owoade, Alabi, Osikalu, and Odeyemi, 2004).

Insecticides use in cowpea production has remained an important phenomenon because insect pest constitute a major threat to cowpea production (Thomas Jefferson Research Institute, TJRI, 2009). According to IITA (2003), even though efforts are being made to reduce the amount of chemical pesticides (which include insecticides) used in the control of pests through the introduction of Integrated Pest Management, insecticides use in cowpea production has been reported to be on the increase. This is similar to the assertion of Davies (1992) said that "pesticides treatments are likely to remain the most important component of crop protection programmes for the foreseeable future in Agriculture even in the face of new methods of pest management exploiting genetic resistance in plants and Biological control".

Past studies have shown that the socio-economic characteristics of farmers relates with their adoption of technologies and the intensity of adoption. Pesticides use in agriculture is a form of technology which a farmer may or may not adopt. In some cases, a farmer may adopt the complete specifications, a situation which has the tendency to reduce the efficacy of the insecticides. According to Akinola *et al.*,(2007), demographic and socio-economic characteristics of farmers determine whether a farmer will or will not adopt a technology. Similarly, Peter and David (2003) observed in their study of "The Determinant of Sustainable Agriculture Technologies" that the socio-economic characteristic of famers affects adoption.

Although most farmers used insecticides in cowpea production, output in Kaduna State has been found to reduce recently (National Food Reserve Agency (NFRA), 2008). For example, statistics obtained from NFRA shows that yield levels dropped from about 114,000MT in 2006 to about 25,000MT in 2007. The low yield obtained (about 100-300Kg/ha in Nigeria) in most cowpea producing areas of West Africa is largely due to field insect pests which feed on reproductive plant parts causing most economic damage thereby necessitating appropriate control measure (Karungi, Adipala and Ogenga-Latigo, 2000). It suffices to find out therefore how the farmers' socio-economic characteristics affect the level of insecticides used for appropriate policy formulation recommendations. The dual objectives of this study are to describe the socio-economic characteristics of the cowpea famers in the area of study and to determine famers' socio-economic characteristics that influence the insecticides use level.

METHODOLOGY

The study was conducted in Kaduna state, Nigeria. The state is in the North Western part of Nigeria and is located between latitudes 10^0 20^1 N to 10^0 33^1 N and longitudes $7^0 45^1$ to 7^0 75^1E (Wikipedia March, 2008). It shares common borders with Abuja in the south-East, and six other states namely; Katsina, Kano, Zamfara in the North, Nassarawa, and Plateau in the North-East and Niger in the North-West. The people of the state are mainly engaged in agricultural production activities with the main crops being Maize, Sorghum, millet, Rice, Cowpea, Ground-nut, Yam and Sugar cane. The National population commission puts the projected population of the state for 2010 at 6,066,562 peoples (NPC, 2006). Kaduna state has a land area of about 46,053Km^2.

A multi-stage sampling technique was employed in selecting the sample size used for this study. In the first stage, three Local Government Areas (Giwa, Kudan and Sabon Gari) were purposively selected from the 23 LGA in the state based on their level of involvement in cowpea production in the state. The level of performance was based on the farmers' output records made available by the Kaduna state Agricultural Development Project. In the second stage, three villages were randomly selected from each of the selected LGA. These villages with the number of famers selected in each include: Zabi (20), Hanwa (15) and Ugwan Nashuka (15) in Sabongari LGA; Giwa (25), Yakawada (15) and Doka (15) in Giwa LGA and Jaja (15), Hanyin Makada (15) and Honkuyi (15) in Kudan LGA. In the final stage, a total of 150 cowpea farmers were randomly and proportionately selected and interviewed for the study from all the three LGAs sampled.

Descriptive and inferential statistics as well as regression analysis were used to analyze the primary data collected from the selected farmers with the aid of well structured questionnaire. The regression function was used to determine the socio-economic determinant of insecticides. The regression is specified as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6) + U \quad \ldots\ldots(1)$$

Where Y is the level of insecticides used measured in litres per hectare, X_1 represents the family size of the farmer measured by the number of dependants in the farmer's household; X_2 represents the sex of the farmer; X_3 is the level of education of the farmer measured in years of schooling; X_4 represents the farm size of the farmers measured in hectares; X_5 represents farming experience measured in years of farmers' involvement in cowpea production using insecticides; X_6 which is farmers' membership of a cooperative indicated by being a member or not and U is the error term of the model specification.

Three functional forms of the regression model were tried to get the function that best explain the relationships between the pesticides use level and these socio-economic variables. The model specifications for the different functional forms used are as follows:

Linear form:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu \qquad (2)$$

Semi-log form:

$$Y = \alpha + \beta_1 logX_1 + \beta_2 logX_2 + \beta_3 logX_3 + \beta_4 logX_4 + \beta_5 logX_5 + \beta_6 logX_6 + \mu \qquad (3)$$

Double log form:

$$logY = \alpha + \beta_1 logX_1 + \beta_2 logX_2 + \beta_3 logX_3 + \beta_4 logX_4 + \beta_5 logX_5 + \beta_6 logX_6 + \mu \qquad (4)$$

Where: $\beta_1 - \beta_6$ are the coefficients of the corresponding variables and these variables are as defined earlier. The null hypothesis tested in this study is that there is no significant relationship between socio-economic variables of farmers and the level of insecticides used.

RESULTS AND DISCUSSION

Socio-Economic characteristics of cowpea farmers using pesticides for cowpea production

Majority of the farmers, about 63% of the sampled were within the active age group of between 31 and 50 years of age. The farmers within the age group 21-30 years and those between 51 and 60 years constituted 20% and 14.5% respectively. The age category with the lowest number of respondents was age group 15-20 years which made up only 0.7% of the respondents. In all, the average age of the respondents was found to be 39.3 years. A study by Udoh and Nyienakuma (2008) on the socioeconomic characteristics and adoption trend of artisanal fishers in Akwa Ibom state shows that farmers within the active age groups are more able to withstand stress and put more time in various farming operations. This will consequently result in an increased output.

Table1: Distribution of farmers according to their Socio-Economic characteristics

Socio-Economic characteristics	Frequency	Percentage (%)
Age group (years)		
15-20	1	0.7
21-30	29	20
31-40	47	32.4
41-50	45	31
51-60	21	14.5
≥61	2	1.4
Levels of Education		
No Education	65	44.8
Quoranic Education	23	15.9
Primary Education	21	14.5
Secondary Education	20	13.8
Tertiary Education	16	11
Marital Status		
Single	13	9

Married	121	83.4
Widow	11	7.6
Membership of cooperative		
Yes	91	63
No	54	37
Farm size		
0.1-1	37	25.5
1.1-2	67	46.2
2.1-3	20	13.7
3.1-4	8	5.5
4.1 – 5	6	4.1
> 5	7	4.9
Method of land acquisition		
Inheritance	95	65.5
Rent	3	2
Gift	19	13.1
Purchase	28	19.3
Total	**145**	**100**

The result on Table 1 shows that about 45% of the farmers which constitute a majority had no formal education. Those who had Quoranic education were about 16% of the farmers interviewed. Among farmers with formal education, only 14.5, 13.1 and 11% had primary, secondary and tertiary education respectively. Altogether, about 39% of the respondents had formal education. Illiteracy is believed to have a negative implication on the adoption and efficient insecticides usage. This is in line with the findings of Oluwatayo, Sekunmade and Adesoji,(2008) in their studies on resource use efficiency of maize farmers in rural Nigeria. They affirm in the study that the more educated a farmer is the more the chances that he/she will adopt innovation than the uneducated ones.

Majority (83.4%) of the cowpea farmers were married. The singles were only 9% and those who are widows were found to be 7.6% of the total respondents. This indicates that about 91% of the farmers interviewed in the study area have family responsibilities. The information on family size (which is the total number of people depending on the farmers for their living) further revealed that each of the respondents had an average of 9 dependants but with a maximum number 24. This implies that the farmers have a good source of family labour for farm business, but on the other hand, large family size will increase household consumption expenditure which competes with the money the farmer would have used for production purposes (for example buying insecticides).

Table 1 shows the distribution of the farmers according to their membership of cooperative society. Those who were members of cooperative society constituted about 63% of the respondents with minimum and maximum years of membership of 2 and 15 respectively. The average years of membership of a cooperative society was 7. This shows that farmers have means of interacting with other farmers and that is an avenue through which innovations diffuse among farmers. According to Oboh *et,al* (2008), membership of cooperative is a strong determinants of adoption of cassava varieties in Benue state. Similarly, in 2006, Idi *et.'al* found that membership of cooperative enabled a woman to acquire more land than those who are not members.

Only about 5% of the farmers (as shown in Table 1) have farm sizes greater than 5ha (scattered in different locations). Majority, 95% have farm sizes below 5 ha. This is typical of agrarian communities which normally are dominated by small scale farmers. Among those who have farm sizes less than 5ha, 46.9% have farm sizes of between 1.1 and 2ha. This was

closely followed by those whose farm sizes are between 0.1 and 1ha and 2.1 and 3ha constituting 25.5% and 13.8% of the respondents respectively. Table 5 shows that farm area of between 4.1 and 5ha have the least number of respondents. This shows that majority of the farmers have small farm sizes and will not be able to enjoy economy of scale in production. Similarly, small farm size is an impediment to agricultural mechanization because using farm machineries like tractor will be difficult. Small farm sizes might be as a result of the fact that most of the farmers got their land by inheritance.

Majority of the farmers (65.5%) acquired their land through inheritance. Those who acquired land through purchase and gift were 20% and 13.1% of the respondents respectively. Least on the table is the category of farmers who rented their farm land. They were only 2% of the respondents. With the majority of the respondents acquiring their land by inheritance, the tendency for farm sizes of farmers to dwindle in the future is obvious. Large scale production of cowpea will be difficult because even the farmers with fairly large farm sizes have them scattered in different locations.

Socio-Economic Determinants of Insecticides Use Level among the Respondents

A regression analysis was carried out to determine the relationship between the socio-economic characteristics of the cowpea farmers and their level of insecticides usage. The insecticides used level was the dependent variable while the socio-economic variables; family size, sex, level of education, farm size, farmer's years of farming experience and membership of cooperative society were the independent variables.

Different functional forms were tried and the form that gave the best result was selected. The selection was based on the value of the R-square, number of significant variables and conformation to the *a priori* expectations. The double log form was found to best explain this relationship based on the aforementioned criteria. The R-square of 38% of the Model indicates that about 38% of the variability in the insecticides use level among the cowpea farmers were determined by the socio-economic characteristics.

Four out of the six socio-economic variables were found to be statistically significant at different levels of probability. The predicted coefficient of family size was negative and significant at 5% level. The negative sign suggests that increase in household size led to decrease in the pesticide use level. A possible explanation could be as number of people in a household increases, household consumption expenditure increase thereby making little money available for purchase of necessary farm input like insecticides and meeting other farm financial obligations. The coefficient of farm size was positive and significant at 5% level. The positive coefficient of the farm size suggests that as farm size increases, more insecticides will be utilized (under the same level of pest pressure) and consequently more output expected *ceteris paribus*.

Table 2: Regression Coefficients from the Socio- economic Characteristics Determinants of Insecticides use Level

Variables	**Linear**	**Semi-log**	**Double- log**
Family size (X_1)	-0.53E-01 ^{NS}	-1.11**	-0.40**
	(0.038)	(0.498)	(0.182)
Sex (X_2)	0.38 ^{NS}	0.69 ^{NS}	0.28 ^{NS}
	(0.052)	(0.488)	(0.178)
Level of Education (X_3)	0.19E-02 ^{NS}	-0.25**	-0.73*
	(0.010)	(0.121)	(0.44E-01)
Farm size (X_4)	0.80E-01***	0.38E-05 ^{NS}	0.24E-05**
	(0.012)	(0.25E-05)	(0.93E06)

Farming Experience (X_5)	0.17-01*	1.30***	0.48***
	(0.010)	(0.221)	(0.80E-01)
Membership of Cooperative society(X_6)	0.60E01 ^{NS}	0.16 ^{NS}	-0.11E-01 ^{NS}
	(0.091)	(0.366)	(0.134)
Constant	0.43*	0.77**	-0.17 ^{NS}
	(0.257)	(0.386)	(0.141)
R^2	0.49	0.35	0.38

*** Significant at 1% level , *Significant at 10% level, ** Significant at 5% level, NS: Not significant and Values of Standard Error are in Parenthesis.

The coefficient of farmers' level of education was significant at 5% level but with a negative sign. This negative sign is not in line with the *aprori* expectation. Education has been found in previous studies to be a predetermining factor in information assimilation and technological adoption among farmers in diverse socio-economic environment (Nasiru *et'al.*, 2006). The negative sign however suggests that as farmers rise higher in their level of education, some tends to have less dedication to agriculture. Better still, others leave the farming villages to cities in search of white collar jobs; the resultant effect of this is a reduction in usage of insecticide technology.

The years of farmers' farming experience has a positive coefficient and significant at 1% level. This implies that the years of farming experience has a direct relationship with the level of insecticides use. Experience generally is expected to increase the use of insecticide in cowpea production. In their study of resource use efficiency of maize farmers in rural Nigeria, Oluwatayo and Adesoji (2008) observed that majority of maize farmers with 21 years of farming experience have a better knowledge of climatic conditions and market situations and were thus more efficient. The hypothesis that there is no significant statistical relationship between socio-economic variable and the insecticides use level was rejected since all variables have coefficients statistically different from zero.

CONCLUSION AND RECOMMENDATIONS

The study has shown that family size of a farm household, the education level attained by the household head, farm size and the length of years of experience of the household head are the factors influencing farmers' decision to use insecticides for the control of pest in cowpea farms in Kaduna State. Based on the findings of this study, the following recommendations are made:

Farmers should be encouraged to increase their farm holdings. In line with this, community leaders should be enlightened on the advantages of bigger farms so that better ways of land acquisition than inheritance can be explored. Bigger farm sizes will enhance farm mechanization and farmers will enjoy economy of scale. Regular training on safe handling and application of insecticides should be organized for farmers for effective insecticides usage in cowpea production. Finally, farmers should be encouraged to participate in adult education while strategies should be put in place that can discourage migration of educated youths out of the rural areas where farming is very active as this will encourage them participate in farming with the use of improve technologies since educated people easily adopt improved technologies which enhances increase in productivity.

REFERENCES

Akinola, A.A., Arega, D.A., Adeyemo, R., Sanogo, D., Olanrewaju, A.S., Nwoke,C., Nzuguheba, G., and Diels, J.: Determinants of Adoption and Intensity of use of Balanced Nutrition Management Systems Technologies in the Northern Guinea Savannah of Nigeria. *AAAE Conference proceedings (2007) Pg 111-118.*

David, S and David, Z (2000) The Agricultural Innovation Process: Resaerch and Technology Adoption in a changing Agricultural sector (Hand book of Agricultural Economics)

International Institute for Tropical Agriculture (IITA), (2003). New solutions for cowpea in Africa. Pesticides news No.61 , pp. 12-13.

Karungi, J.,E.Adipala, M.W.Ogenga-Latigo, S. Kyamanywa, N. oyobo and L.E.N. Jakai, 2000. Pest management in cowpea. Integrating planting times, plant density and insecticides application for management of cowpea field insect pests in Eastern Ugnada. *Crop protect,19:237-245*

National Food Reserve Agency (NFRA), (2008). Report of the 2007 Agricultural Production Survey (ASP) Federal Ministry of Agriculture and water Resources.

Oboh, V. U., Aye, G.C. and Hyande, A. (2006). Socio-economic Determinats of Farmers' Adoption of Improved Cassava varieties in Oju Local Government Area of Benue state. *Proceedings of 20th Annual National conference of Farm Management Association of Nigeria*. Pp .478- 482

Oluwatayo, I.B., Sekumade, A.B, and Adesoji, S.A. (2008). Resource Use Efficiency of Maize in Rural Nigeria: Evidence from Ekiti State. *World Journal of Agricultural Sciences* 4(1):91-99

Owolade, O.F., B.S. Alabi. Y.O.K Osikalu and O.O Odeyemi, (2004). On farm evaluation of some plant extacts as bio-fungicides and bio insecticides on cowpea in south-west Nigeria. *Food and Agric. Enviro*; 2:237-240

Peter, A and David R.L (2003): The determinants of Adoption of Sustainable Agriculture Technologies: Evidence from the Hillsides of Honduras. *Proceedings of the 25th International Conference of Agricultural Economists (IAAE) 16-22 August, 2003. Durban, South Africa. Pg: 693-699*

Singh, B.B, J.D Ehlers, B. Sharma and F.R Freire Filho (2002). Recent progress in cowpea Breeding. In: Fatokun, C.A, Tarwali, S.A, Singh, B.B., Kormawa, P.M., Tamo,M (Eds), Challenges and opportunity for enhancing sustainable cowpea production. Proceedings of world cowpea conference III held at IITA, Ibadan, Nigeria.

Thomas Jefferson Agricultural Institute. (2009). A versatile legume for Hot, Dry conditions. www.jefersoninstitute.org . Retrieved 7th May, 2009.

Udoh, A.J. and Nyienakuma, M.G.(2008). Examining Socio-economic Characteristics and Adoption Trends of Artisanal Fishers of Akwa Ibom State in West Africa.*J.Agri.Soc.Sci*, 4:141-46

www.wikipedia.com March 8th, 2008.