SOCIO-ECONOMIC FACTORS INFLUENCING THE ADOPTION OF *STRIGA HERMONTHICA* – TOLERANT MAIZE VARIETIES AMONG FARMERS IN PANDA DEVELOPMENT AREA OF KARU LOCAL GOVERNMENT AREA, NASARAWA STATE.

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ABSTRACT
The study was designed to analyse the socio-economic factors influencing the adoption of Striga-tolerant maize varieties among farmers. Data were analysed using descriptive statistics, multiple regression model and the student t-test. The results of the study indicated that education, household size, credit facilities, extension contact and cost of Striga- tolerant seed maize varieties had significant influence on adoption. The results further indicated significant differences between the yields, income of the participants and that of the non-participants, thus resulting in the likelihood differences in their standards of living. The study concluded by suggesting a number of measures that would enhance farmers' response to new technologies.

Key words: Striga, maize varieties, adoption, socio-economics.

INTRODUCTION

Agriculture has occupied a central position in the economy of Nigeria, particularly during the pre-independence and the post independence era. Agricultural production in Nigeria entails both crops and livestock sectors. Unlike any other investment, its activities is exposed to a wide variety of risks and uncertainties ranging from input supply, price, agricultural yield, post-harvest losses and product prices and vagaries of nature such as drought, pests and disease outbreak and fire.

Onucheyo, (2005) reported that agriculture is the largest employer of labour in Nigeria. And that it is the source of income for majority of the population and also major source of raw materials to the nation's industrial sector. Majority of the farmers in the rural areas are resource poor, illiterate and are faced with problems of non-availability of farm inputs and infrastructure. In addition, problems associated with pests and disease outbreak, drought and fire are some of the constraints farmers are confronted, while their quota to agricultural development is yet to make any significant impact to the national economy.

In Nigeria and most developing countries, about 75% of the population live in rural areas and depend mainly on agriculture for their livelihood. The income and standards of living are severally very low in the rural settings. These incidences of low incomes and standards of living are probably brought about by poor agricultural productivity. Utilization of improved agricultural technologies could provide avenue for improved quality of life of the farming communities. It should be understood that a small scale farmer depends on his or her efficiency in the utilization of basic production resources available to him or her and yet makes significant and important contribution to the national economy. Conscious of the above, various government regimes in Nigeria have implemented several strategies, approaches and programmes aimed at disseminating improved agricultural packages or technologies to farmers. Despite all efforts by the various government regimes in the country to revive the nation's agricultural production, today, Nigeria is not only importing food to feed the increasing Nigerians and raw materials for her industries, but the situation has degenerated into food crisis, a condition in which only a few can afford quality food. One of the reasons responsible for the ugly situation is the menace of weed plant parasites such as *Striga*.

Striga is a parasitic weed preying upon cereal crops resulting in economic losses that causes food insecurity and rural stagnation. For decades, Africa's small scale farmers were powerless to control this menacing plant parasite, but recent technological breakthroughs are now available to reverse this situation. *Striga* tolerant maize varieties are examples of the breakthroughs, thus the need to study the effects of these technologies among farmers in Panda Development Area of Karu Local Government Area, Nasarawa State, Nigeria.

Striga, which is endemic in the West and Central African Savannah, causes serious devastation to maize, especially on the fields of resource-poor farmers. Lagoke *et al*, (2003) reported that up to 95% of the Savanna farms surveyed

in Nigeria in 1988 and 1989 were infested with *Striga*. Crop loss due to *Striga* in Africa has been associated with three *Striga* species, namely, S. *asiatic*, S. *hermonthica* and S. *aspera* (IITA, 2001). Lagoke *et al*, (2001) asserted that even under good management conditions, about 70% reductions in yield was observed in the susceptible hybrid maize, 8338-1. Several hybrids and open-pollinated synthetic and composite varieties of maize that exhibit horizontal resistance to S. *asiatic*, S. *hermonthica* and S. *aspera* as well as maize streak virus with adaptation to low land attitudes have been developed and evaluated at various locations in Nigeria (Kim *et al*., 1997). Many of such varieties that exhibited low to no damage reaction to parasitic weed infection due to *Striga* was further enhanced by the application of adequate fertilizer, especially legumes have also been reported to increase the efficiency of land use through improved soil productivity and reduction of *Striga hermonthica.*

Panda Development Area is in the Guinea Savanna and *Striga* has been identified as a menace to maize production in the region. The Nasarawa Agricultural Development Project (NADP) in the year 2003 in collaboration with the Ministry of Agriculture and Water Resources (M.A.W.R.) came to the aid of farmers in the zone by introducing three *Striga* tolerant varieties of maize to them namely: STRCO, IWD and ACR 94, TZE, COM. 5W under a "*Striga* tolerant Maize Variety Project". Under this project, the NADP provided three varieties of maize to the participated farmers free. The NADP also provided fertilizer and the extension staff, while the Local Government provided logistics support such as mobility, monetary allowances, etc, to the extension staff that participated in the implementation of the project for a period of two years. After the promotional activities of these varieties, farmers are now observed to be adopting the technologies. Hence, the need to assess the effects of the striga project in yield (kg/ha) and income (N/ha) of farmers in the study area.

OBJECTIVES

The main objective of the study was to assess the impact of *Striga* tolerant maize varieties project in Panda Development Area, Nasarawa State.

Specifically the study seek to:

i. describe the socio-economic characteristics of the respondents (participants and non-participants
ii. examine the level of awareness of the three *Striga* maize tolerant varieties in the project area.
iii. examine the level of adoption of the three *Striga* maize tolerant varieties by participants in the project area
iv. identify factors influencing the level of adoption of *Striga* tolerant maize varieties, by the participants in the project.
v. determine the effects of adoption of *Striga* tolerant maize variety on maize yield and farmers income.
vi. identify the constraints to the adoption of *Striga* tolerant maize varieties in the study area.

METHODOLOGY

The study was conducted in Panda Development Area, Nasarawa State. Panda Development Area is made up of seven administrative districts namely, Panda, Gitata, Kare, Kondoro, Tattara, Kube and Akwap. Majority of the inhabitants are peasant farmers. The climate and soil conditions of the area are favourably suitable for growing cereal crops such as maize, guinea corn, rice, etc. Also tuber crops such as yams, cassava, sweet potatoes etc are no exception. Panda Development Area is located within the Southern Guinea Savannah with annual rainfall of about 1,560mm (Karu Local Government Information Handbook 2000).

Data were collected with the aid of a structured questionnaire that was administered to the respondents by trained enumerators to 50 participants and 50 non-participants in the *Striga* project. Therefore, a total of 100 farmers were interviewed for the study. The maize yield (kg/ha) and income (N/ha) data were based on the 2008 cropping season. Therefore the study consists of maize farmers in the study area. Five out of the seven districts in Panda Development Area that participated in the striga project where purposively selected for the study. From each district, ten (10) out of the fifteen (15) maize farmers that participated in the project where randomly selected to give a total of fifty (50) participating farmers for the study. Furthermore, maize farmers not participating in the project where purposively selected from each five (5) districts to give a total of fifty (50) non-participating farmers for the study.

Descriptive statistics such as percentages, frequency distribution and ranking were used to satisfy objectives 1, 2 3 and 6 respectively. The student t-test was used to satisfy object 5. Multiple regression analysis was also used to satisfy objective 4.

The multiple regression model was presented as follows:

$Y = a + b_1X_1+b_2 X_2+ b_3X_3 + b_4 X_4 + b_5 X_5 +6_b X_6+ U$

Y= Total farm size put into the cultivation of *Striga* tolerant maize varieties by participants (hectares)
X_1= Level of the education of the respondents (years)
X_2= Age of the respondents (Years).
X_3= Household size of the respondents (actual number).
X_4= Amount of Credit received (₦)
X_5= Extension contact (total number of visits in 2008)
X_6= Cost of *Striga* tolerant maize seed (₦)
a= Consant term
b_1-b_6= Regression coefficients
U= Stochastic Error term
The student t-test was represented as follows:

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{S_1}{n_1} + \frac{S_2}{n_2}}}$$

$\overline{X_1}$ = Mean yield/income of maize for participants
$\overline{X_2}$ = Mean yield/income of maize for (Non- participants)
$\overline{S_1}$ = Standard deviation of yield/income of maize for participants
S_2 = Standard deviation of yield/income of maize for Non-participants)
n_1 = No. of participants
n_2 = No. of non-participants

RESULTS AND DISCUSSION

The socio-economic characteristics of the respondents are presented on Table 1. Majority of the respondents were males. This can be attributed to the fact that men always have right to land as a productive resource than women. Quisumbing (1994) reported that there has been a great disparity between women and men in the size of landholdings. That the mode of women participation in agricultural production varies with the land-owning status of households. The study further revealed that 80% of the respondents that participated in the *Striga*-tolerant maize varieties project were married, while about 86% of the non-participants were married. The study further revealed that majority of the participants and non-participants were between the ages of 35 – 45 years respectively, indicating that youths and matured adults are actively involved in agricultural activities. However, majority of the participants (90%) and non-participants (84%) had primary education and above. This implies that the participants would be able to comprehend extension guides and understand written messages on innovation. Similarly, the non-participants would have had the same experience if allowed to participate in a related project.

The results of the study also showed that land as a productive resource was not a constraint. This is because majority of the respondents could cultivate as much as 1–9 hectares, both participants received between N5000–N20000 to support their farming activities. Both categories of respondent had contact with extension agents however; the frequency of extension contacts was higher for the non-participant compared to the participants. All the two categories of participants are members of Cooperative Societies. Cooperative participation was higher among the participants (70%), compared to the non-participants (62%).

Table 1: Socio economic characteristics of respondents

S/N	Characteristics	Frequency	Percentage	Frequency	Percentage
1.	**Gender**	**Participants**	**%**	**Non-Participants**	**%**
	Male	32	64	33	66
	Female	18	36	17	34
	Total	**50**	**100**	**50**	**100**
2.	**Marital Status**				
	Married	40	80	43	86
	Single	10	20	7	14
	Total	**50**	**100**	**50**	**100**
3.	**Educational level**				
	Non-formal education	5	10	8	16
	Primary education	24	48	26	52
	Secondary	21	42	16	32
	Total	**50**	**100**	**50**	**100**
4.	**Age**				
	15 – 25	9	18	11	22
	6 – 35	18	36	16	32
	36 – 45	12	24	14	28
	46 – 55	8	16	7	14
	Above	3	6	2	4
	Total	**50**	**100**	**50**	**100**
5.	**Family Size**				
	1 – 5	28	56	31	62
	6 – 10	17	34	15	30
	11 – 15	5	10	4	8
	Above	0	0	0	0
	Total	**50**	**100**	**50**	**100**
6.	**Farm Size (hect.)**				
	1 – 3	18	36	21	42
	4 – 6	19	38	17	34
	7 – 9	12	24	11	22
	> 9	1	2	1	2
	Total	**50**	**100**	**50**	**100**
7.	**Credit Received (₦)**				
	5,000 – 10,000	15	30	20	40
	11,000 – 20,000	25	50	23	46
	21,000 – 30,000	8	16	6	12
	31,000 – 40,000	2	4	1	2
	Total	**50**	**100**	**50**	**100**
8.	**Extension Contact**				
	1 – 2	13	26	15	30
	3 – 4	29	48	30	60
	5 – 6	8	16	5	10
	Total	**50**	**100**	**50**	**100**
9.	**Membership Cooperative**				
	1	10	20	18	36
	2	35	70	31	62
	3	5	10	1	2
	Above	0	0	0	0
	Total	**50**	**100**	**50**	**100**

Source: Field Survey 2009

Table 2: Level of awareness and adoption of *Striga* tolerant maize varieties (All Respondents)

S/N	Response	Frequency	Percentage (%)
1	**Awareness**		
	Yes	97	97
	No	3	3
	Total	**100**	**100**
2.	**Varieties adopted (participants only)**		
	IWD	47	94
	STRCO	50	100
	ARC, 94 TZE COM 5W	49	98

Source: Field Survey 2009 **Multiple responses.**

Table 3: Distribution of respondents by reasons for adoption of STRCO (Participants only)

Reasons	Frequency	Percentages (%)	Ranking
High tolerance	32	64	5th
Early maturity	27	54	7th
High yield	40	80	3rd
Very palatable	48	96	1st
Long storage ability	43	86	2nd
Quick drying ability	29	58	6th
High demand	33	66	4th

Multiple response.

Source: Field Survey 2009

The result in Table 2 revealed that majority of respondents (97%) interviewed was aware of the different *Striga* tolerant maize varieties. The level of adoption for all the three varieties was more than 90%. However, STRCO was adopted by all the participants.

The data on Table 3 revealed that only the participants adopted the *Striga* tolerant maize varieties and had various reasons for preference of one variety over the other. The main reasons for adopting the varieties were palatability, long storage ability and high yield.

In Table 4, the result obtained from the regression analysis indicated that five (5) of the independent variables were significantly related to the adoption of *Striga*-tolerant maize varieties. The variables are Educational level (P=0.10), Household size (P=0.05), credit facilities (P=0.05), Extension contact (P=0.10), and cost of *Striga* seed (P=0.01).The implication is that an increase in any of the variables is likely to increase the level of adoption of striga tolerant maize seed in the study area.

From Table 5, the results revealed that there were positive impacts of the project on the yield of maize (kg), and income (N) and standard of living of the participants. The results of the t-test indicated that yields and income of the participants were significantly higher than that of non-participants implying that the promotion of the adoption of striga tolerant maize variety will not

Table 4: Regression result showing the factors influencing the adoption of *striga* resistance maize varieties.

Variable	Regression Coefficient	Standard Error	T-Value
1 Constant	-0.187	0.901	-0.208
Education (X_1)	5.578 E – 02	0.029	1.998*
Age (X_2)	1.451 E – 02	0.027	0.614 NS
Household (X_3)	0.104	0.047	2.210**
Credit facilities (X_4)	4.827 – 05	0.001	2.845***
Extension contact (X_5)	0.297	0.147	2.020*
Cost of Striga tolerant maize seed(X_6)	-0.57	0.111	-5.140***

Source: Field Survey 2009

R^2 = 0.80 F – Ratio = 35.675*** *** = Significant at 1%

** = Significant at 5% * = Significant at 10% NS = Not significant

Table 5: t-test result showing impact of adoption on the yield and income.

Variables	t-test
Yield (kg/ha)	7.598***
Income (₦/ha)	7.776***

Source: Field Survey 2009 *** = Significant at 1%

only enhance maize production in the study area, but will also increase in maize yield and subsequent income of farmers.

The impacts of adopting the striga tolerant maize varieties was determined by comparing the mean maize yield (kg/ha) and income (N/ha) of participants and non-participants. The result of the regression is presented in Table 5. The study concluded by advocating a number of policy implications as follows

(i) There is urgent need by NADP to scale out striga control project in other striga infested Local Government Areas in the state

(ii) Policies that will ensure the availability of quality striga tolerant maize varieties to farmers should be put in place by relevant authorities, such as National Agricultural Seed Council and Private Seed Companies.

(iii) There is need to improve extension delivery and agricultural credit availability to farmers and this can go along way in promoting the adoption of striga tolerant maize variety in the study area.

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