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Research Article

Effect of Farmer Field School Training on the Management of Cocoa Marids (*Saghbergella singularis*) by Famers in Edo State Nigeria

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Abstract: The study assessed the contribution of FFS training to farmers' knowledge of control of cocoa mirids (*Saghbergella singularis*) in Edo State. The specific objectives were to describe the socio-economic characteristics of respondents, identify which control measures FFS has helped farmers to acquire knowledge, ascertain FFS contributory role in improving farmers' knowledge on these control measures and ascertain the percentage of farmers who benefited from FFS training on control of mirids. A multi-stage sampling procedure was used in selecting 68 respondents for the study and descriptive statistics like frequency counts and percentages were used for data analysis. The results of the study showed that FFS has contributed significantly to farmers' knowledge on the control of cocoa mirids. It was therefore recommended that this approach should be used for training farmers in other crops besides cocoa.

Keywords: Cocoa mirids, Edo state, farmer field school

INTRODUCTION

Mirids, also called capsids, belong to the order of insects called hemiptera and the sub-order heteroptera. They are the major insect pests of cocoa in West Africa (David, 2005).

These insect use their needle like mouthparts to pierce the tissues of cocoa trees and suck the sap. During this process they may inject toxic saliva into the plants.

Infestation on cocoa pods results in minor direct losses. However, the holes created on the pods during feeding often make the pods vulnerable to black pod, which often cause more losses than the mirid itself. Moreover, attacks on shoots and young branches reduce the canopy of a tree and the tree becomes susceptible to other pests and diseases (Akinsanmi, 1980; David *et al*., 2006). Young trees can die within a year if the attack is serious and even mature trees can be affected very severely. Losses can be as high as 30% or more if infestation is severe (David, 2005).

In spite of losses caused by mirids, most small holder farmers found it difficult to combat the menace of mirids, especially through pesticide applications. Thus, one of the eight learning topics of FFS curriculum developed by Sustainable Tree Crops Programme (STCP) on cocoa integrated crop and pest management is control of mirids (David *et al*., 2006).

Recently the FFS approach has helped farmers to reduce mirids damage on their farms. The following research questions then arise: has FFS contributed to farmer's knowledge on the control of mirids? How many farmers or what percentage of farmers have benefited from FFS training on control of mirids? In what areas have FFS help farmers in the control of mirids? The aim of this study was therefore to ascertain the extent to which FFS has contributed to farmers' effective control of mirids on their farms. The specific objectives are to:

- Identify the control measures where FFS has helped farmers in Edo State.
- Ascertain the role of FFS in imparting knowledge to farmers on certain control measure of cocoa mirids.
- Ascertain the percentage of FFS farmers who were able to reduces/manage cocoa mirids as a result of FFS training.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

A pest is any animal which causes damage to crops or livestock (Akinsanmi, 1980). Agricultural pests include insects, rodents and birds (Omoruyi *et al*., 1999). Cocoa tree is very prone to a lot of pests

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(insects) and disease attack. Some insect pests can cause younger trees to wither; pests and diseases can destroy 21-30% of total cocoa production. Thus cocoa pests and diseases have very negative effects on annual cocoa production. These pests and diseases reduce both the quantity and quality of cocoa beans (David, 2005), thus presenting a major challenge to cocoa farmers.

Farmer Field Schools (FFSs) were first developed in South East Asia for training rice farmers in Integrated Pest Management (IPM) (NAERLS/ABU, 2008) The broad problem which FFS was designed to address was lack of knowledge among the Asian farmers relating to agro-ecology, particularly the relationship between insect pests and beneficial insects (Gallagher, 2005). The first field schools were established in 1989 (David *et al*., 2006) in central Java, Indonesia, during the pilot phase of the IPM programme in response to a devastating insecticide-induced outbreak of the brown plant hoppers (*Nilaparvata lugens*) on rice. The devastating insecticide induced outbreak of the brown plant hopper was estimated to have destroyed 20,000 ha of rice farms in Java alone (NAERLS/ABU, 2008). The government of Indonesia's response was to launch an emergency training project aimed at providing 120,000 famers with field training on IPM focused mainly on reducing the application of pesticides that were destroying the natural insect predators of the brown plant hoppers (NAERLS/ABU, 2008). Thus a major object of FFS training is to provide an environment in which farmers acquire the knowledge and skills to be able to make sound management decisions and thus improve their problem solving skills.

Although FFS was designed to promote IPM, empowerment is an essential feature from the beginning. The curriculum of FFS was built on the assumption that famers could only implement IPM once they had acquired the ability to carry out their own analysis, make their own decisions and organize their own activities. The empowerment process, rather than the adoption of specific IPM technique is what produces most of the developmental benefits of FFS (Bartlett, 2004). Thus the FFS approach is an effective approach to technical education and capacity building. Farmers generate knowledge that is functional and necessary to improve their production and livelihood potential. It helps to empower the famers because apart from generating knowledge, they are both users of such knowledge as well as the owners (FARM Bulletin, 2003).

Major pests of cocoa include mirids (capsids); stem borers, termites, aphids and rodents (squirrel and rats) Mirids are the number one insect pests of cocoa in West Africa (David *et al*., 2006). Mirids have been controlled in several ways. Use of resistant varieties, biological control and chemical control using various insecticides have been tested and proven effective and economical. Integrated Pest Management has also been used to control pests of cocoa.

The merit of Integrated Pest Management (IPM) for cocoa is not only the reduction in the use of chemicals, but also provides an economic incentive to growers by the increase in quality and yield of cocoa production. Therefore farmers need to know the conditions of their crops and the pests on the farm so that they can determine the best action to take.

Several other options for controlling pest which are available to the cocoa farmer include pruning (removal of chupons regularly) Complete Frequent and Regular Harvesting (CFRH) maintenance of a complete canopy, maintenance of a healthy and balanced eco-system and rational use of insecticides (David, 2005).

METHODOLOGY

The study was conducted between April and July, 2010 in Edo State, Nigeria. Edo State was created on August, 27, 1991. Until then Edo State and Delta State formed what was formerly Bendel State. The population of the entire State is approximately four million (National Population Commission, 2006).

Edo State has a land mass of 19,749 km^2 and lies between latitudes 05° 44 ^{1}N and 07° 34 ^{1}N and longitude 05° 4 ^{1}E and 06° E. Edo State is low lying except towards the North axis where the Northern and Esan plateaus range from 183 m of the Kukuruku hills to 672 m of the Somorika hills. Edo state is so located that it forms the nucleus of the Niger Delta region. It is bordered by Kogi state to the North and Delta State to the East and South, Ekiti and Ondo states to the west. The climate is typically with two distinct seasons-the wet (rainy) and the dry seasons. The wet season lasts from April to November and the dry season December to March.

The population of the study comprises of all registered cocoa farmers that have been involved in FFS (FFS graduates). This constitutes the sampling frame or working population. The lists or names of these famers were obtained from the STCP office and the ADP office in the state.

A multi-stage sampling procedure was employed in selecting the respondents of the study. Edo State is divided into three agro-ecological zones, namely Edo North, Edo Central and Edo South. Edo North was purposively selected became most famers in this zone have been exposed to FFS training and other agricultural extension approaches compared with famers from the other two agricultural zones. Out of this agro-ecological zone three local government areas were purposively selected on the basis of the concentration of FFS training in these areas. Owan East, Owan West and Akoko Edo local government areas were selected. Finally, farmers were randomly selected from the list of famers obtained from

Table 1: Procedure of sample size selection

Agricultural zone	Selected agricultural zone	Selected LGAs	Registered FFS farmers	Expected sample size	Actual sample size
Edo north	Edo north	Owan west	321	32	39
Edo central		Owan west	226	23	21
Edo south		Akoko Edo	168	17	17
Total			718	72	68

Sustainable Tree Crops Programme (STCP) and ministry of Agriculture Offices. Ten percent of the farmers were selected in each of the local government areas. A total of 68 FFS farmers were selected. See Table 1 for the procedure of sample size selection.

Structured questionnaire was develop and used for data collection. The questionnaire specifically focused on the socio-economic characteristics of the respondents and sought information from the farmers on FFS contributions to their knowledge of pest management.

The various control measures of cocoa mirids were obtained from the Sustainable Tree Crops Program (STCP) office in Benin City. The respondents were then categorized into three groups based on the contribution of FFS to their knowledge of the control practices. If the practice is already familiar (i.e., the respondent had knowledge of it) with the respondent, he belongs to group A; if FFS substantially improve the knowledge of the famer on the practice, he belongs to group B; if the practice is new to the famer he belong to group C.

RESULTS AND DISCUSSION

Table 2 shows the socio economics characteristics of respondents in the study area.

Age of farmers ranged from 31-70 years. No farmer in the study area was below 31 years. This indicates that youth in the area are not actively involved in cocoa farming. Therefore cocoa production is an activity carried out mainly by adults. Ogungbile *et al*. (2002) and Oloruntoba (2000) asserted that farmers in this range of age are always active and this can lead to positive effect on cocoa production. Majority of the respondents were males (about 78.6%). This may not be unconnected with the perennial nature of tree crops such as cocoa and oil palm which often leads to permanent holding on land which traditionally are owned by men. Solomon (2008) also reported this type of result for oil palm. The result of marital status of cocoa farmers in the study area shows that majority of the respondents were married (74.4%). This may be an indication that marital status is an important factor in cocoa farming. According to Dikito-Watchtmeister (2001), marital status is a crucial factor in shaping social rural participation and acceptance. Farmers need a large family to reduce the cost of farm labor and maintain a relatively stable life style in the rural area

Table 2: Socio economic characteristics of respondents

Variables	Frequency	(%)
Age (years)		
21-30	Nil	0.0
31-40	9	13.2
41-50	15	22.1
51-60	24	35.3
Above 60	20	29.4
Mean	51.6	
Actual range	31-70	
Gender		
Male	57	83.8
Female	11	16.2
Marital status		
Never married	6	8.8
Married	49	72.1
Divorce	2	2.9
Separated	4	5.9
Widow/widower	7	10.3
Educational level		
No formal education	8	11.8
Primary education	25	36.8
Secondary education	20	29.4
OND/NCE	9	13.2
HND/first degree	6	8.8
Post graduate	0	0.0
Farming experience (years)		
Less than 11	4	5.9
11-20	15	22.1
21-30	20	29.4
31-40	14	20.1
More than 40	15	22.1
Farm size (hectare)		
5 and below	55	80.9
6-10	13	19.1
More than 10	0	0.0
Household size		
1-5	30	44.1
6-10	34	50.0
More than 10	4	5.9
Mean	5.8	
Actual range	1-12	

Survey data (2010)

especially for tree crop like cocoa. The result shows that 88.2% of FFS farmers have one form of formal education or the other. This shows that majority of the respondents were literate. Njoku (1991) observed that formal education has a positive influence on adoption of innovation. Majority of the farmers have a lot of experience in farming. Only about 6.2% of the FFS farmers had farming experiences less than 11 years. Ogungbile *et al*. (2002) indicated that length of time of farming business can be linked to the age of farmers, access to capital and experience in farming may explain the tendency to adopt innovations and new technology. Thus, majority of the respondents will be willing to participate in FFS training on cocoa. Farm size refers to

Table 3: Contributions of FFS to farmers' knowledge control measures of mirids

		FFS contribution		
	Type of control measure of mirid	A	B	C
1	Cultural control			
	• Maintenance of complete canopy	-	3 (4.4)	65 (95.6)
	• Removal of chupons regularly	-	2 (2.9)	66 (97.1)
	• Maintenance of a healthy and balanced ecosystem	-	-	68 (100)
	• Rational pesticide use	12 (17.6)	38 (55.9)	18 (26.5)
2	Chemical control			
	• Use of chemicals (pesticides)	20 (29.4)	22 (32.4)	26 (36.2)
	• Botanical pesticide (e.g., neem)	-	-	68 (100%)
3	Biological control			
	• Use of natural enemy (weaver ants)	3 (4.4)	1 (1.5)	64 (94.16)
4	Integrated crop pest management practices	1 (1.5)	2 (2.9)	65 (95.6)

Survey data (2010); A: Already known; B: FFS substantially improve knowledge on control method; C: Control method new to famers; Figures in parenthesis are percentages

the total land area (in Hectares) that the farmers cultivated. According to Alamu and Rahman (2002) farmers with more resources including land are more likely to take advantage of a new technology. Farm size in the study area was rather small for FFS farmers, majority of the farmers having farm sizes of between >0-5 ha as shown in Table 2. Fragmentation due to land tenure systems, nearness to farms and resource endowment of farmers may be responsible. The finding agrees with that of Onemolease (2005) who observed that the average farm size was 1.2 ha in Edo State; Also, Okulola and Adekunle (2000) asserted that 53% of Nigerian farmers have less than 4 ha of land. The implication of this finding is that majority of the cocoa farmers operate small holdings. The household sizes for both FFS farmers and Non FFS farmers were large. Majority of the farmers have between 1-10 household members. Ogungbile *et al*. (2002) reported that the adoption index may be either positively or negatively related to the household size depending on the nature of the age structure and the amount of labor contributed among members. Banmeke (2003) further asserted that household size is an important index in any rural development intervention which can affect the outcome of such intervention.

From Table 3 it was obvious that FFS contributed considerably to the respondent's knowledge on the control of mirids in the study area. For example, 65 (95.6%) famers were exposed for the first time to maintenance of close canopy as a cultural way of controlling mirids; 66 (97.1%), 68 (100%), 68 (100%) and 64 (94.1%) respectively learnt for the first time practices of removal of chupons regularly, maintenance of a healthy and balanced ecosystem, use of botanical pesticides like neem and use of natural enemy in controlling mirids. Moreover, although, 12 (17.6%) and 20 (29%) of the FFS farmers were already exposed to rational use of pesticides and use of pesticide respectively, FFS training nevertheless, contributed substantially in improving the knowledge of 3.8 (55.9%) and 22 (32.4%) famers respectively on these practices of controlling minds. The practices of rational use of pesticides and use of pesticide were actually new to 18 (26.5%) and 26 (38.2%) farmers respectively.

CONCLUSION AND RECOMMENDATIONS

From the results of the study it was obvious that FFS had contributed significantly to the knowledge level of farmers on the control of cocoa mirids. Based on the findings, the following recommendations are suggested:

- Other cocoa farmers in the study areas should be exposed to FFS training.
- The FFS training is currently for cocoa farmers in the study area. It is necessary to extend FFS training to other crops. If these recommendations are effected, FFS training will reduce the menace of not only pest infestation but also assist the farmers in making reasonable returns from their investment.

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