

EFFECTIVENESS OF FARMER FIELD SCHOOL ON THE PRODUCTIVITY OF CASSAVA FARMERS IN CALABAR AGRICULTURAL ZONE, CROSS RIVER STATE, NIGERIA

Ayi¹, N. A. and Undiandeye², U. C.

¹Department of Agricultural Economics and Extension, Cross River University of Technology, Cross River State, Nigeria.

²Department of Agricultural Extension and Rural Sociology, University of Calabar, Calabar, Nigeria.

ABSTRACT: *The goal of this research was to assess the effectiveness of Farmer Field School on the productivity of cassava farmers in Calabar agricultural zone, Cross River State, Nigeria. The specific objectives were to describe the socio-economic characteristics of respondents; determine the perceived effectiveness of FFS as an extension approach; and assess the perceived effectiveness of FFS on farmers' productivity one hypothesis, "there is no significant difference between yield and income of participants before and after participation in FFS" was formulated to serve as a guide for the research. Multi-stage and purposive sampling procedures were used to select 320 respondents for the study. However, on retrieval, 318 questionnaires were realized. Primary and secondary data were the main sources of information for the study. Structured questionnaire, validated and tested for reliability was used for data collection. Descriptive statistics such as mean, frequency and percentages, were used to analyze the objectives. Paired t-test was used to analyze the hypothesis. The result revealed that majority (64.5%) of the respondents were men, 39.3 percent were between the age bracket of 31-40 years, 86.5 percent were married, with a mean household size of 6 persons. The result further showed that FFS was positively perceived to be an effective extension approach ($\bar{x}=2.83$); helping farmers gather useful information to improve their farming ($\bar{x}=2.84$), among others. The result also showed that FFS was perceived to be effective in increasing the output and income of farmers after participation. Paired t-test revealed average yield of 69.90kg and 146.96kg, as well as average income of ₦35,773.58 and ₦75,411.95, before and after FFS. The difference was significant at 0.01 alpha level. FFS should be scaled up to cover all the Local Government Areas in the State and Country at large. It was also recommended that FFS should be used by extension service providers as effective training approach to avail participants with hands-on knowledge about their enterprises.*

KEY WORDS: farmer field school, effectiveness, extension, approach

INTRODUCTION

Agricultural extension is one of the most important tools used globally to increase production and overcome food security problems. Through this, food supply is increased and demand pull inflation reduced. The changing nature of agricultural technologies demands that more tools be created to make farmers aware of such changes (Muhammad, Li, Jia, Sidra, Yasir, Mazhar and Shah, 2014). In Nigeria and other developing countries, attempts have been made to change from conventional approach to participatory extension approaches/systems (Ajayi and Okafor, 2006). This is mainly due to the criticism of previous agricultural extension approaches. Participatory approaches that have been tried in Nigeria include Farming System Research (FSR), Small Plot Adoption Technique (SPAT), among others.

As Dinpanah, Mirdamadi, Badragheh, Sinaki and Aboeye (2010) asserted, the FFS is one of the most successful delivery methods ever devised. This strategy has superseded earlier agricultural extension initiatives, in which it was required of farmers to follow broad guidance issued by specialists from outside the community (Manoj and Vijayaragavan, 2014). Furthermore Farmers' passion, self-confidence, and insecticide use have all decreased as a result of Farmer Field School (Roling, 1995). This study specifically assessed the perception of cassava farmers of the "National Programme for Food Security (NPFS)". NPFS began in Nigeria with the Federal Ministry of Agriculture serving as the top management committee, in collaboration with the Agricultural Development Program (ADP) authorities serving as the supervisory body at the state level and implementation agency (Onuoha, Onugu and Edoaga, 2018; Dennis, 2018). The initiative was designed to run for five years, from 2008 to 2013, and it included three sites in the Calabar Agricultural Zone: Biase, Odukpani, and Akpabuyo. This program is noteworthy since it was implemented using the FFS methodology.

Farmer Field School is an informal, "without walls" where farmers debate observations and apply their past experiences in a forum led by trainers, while gaining new ones and applying them to their variant situations. Hence, this research was carried out to assess the perception of cassava farmers on Farmer Field School approach to extension in Calabar agricultural zone. Objectives of the FFSs according to David, Agordorku, Bassanaga, Couloud, Kumi, Okuku and Wandu (2006) are to: "provide an environment in which farmers acquire the knowledge and skills to be able to make sound management decision"; "sharpen farmer's ability to make critical and informed decision that could make their farming activities more profitable and sustainable"; "improve farmer's problem solving abilities"; "show farmers the benefits of working in groups and encourage group activities"; and "empower farmers to become "experts" on their own farms and to become more confident in solving their own problems"

Farmer Field School (FFS) is an institute comprising of farmers (25-30) and extension workers and researchers. The learning environment is agricultural fields, in which extension staff assists farmers in developing analytical and innovative thinking, improving analytical skills, and making superior decisions, which are based on the farmers' own observations combined with scientific knowledge contributed by extension staff and researchers. FFS has proven to be a more successful method of disseminating scientific knowledge and better agricultural practices to farmers. The FFS has the ability to provide farmers with practical information and skills that will help them make better decisions about new technologies in a market-driven agriculture economy (FAO, 2006). According to a participatory training style based on the philosophy of adult, non-formal education, farmers learn by doing, observing, analyzing, exchanging experiences, and making decisions to solve their individual and community problems (Braun and Duveskog, 2008). According to Ebewore (2013a), East Africa's FFS networks support around 2000 Farmer Field Schools and approximately 50,000 people are directly impacted. Farmers' participation in "*identifying problems, selecting, testing, and evaluating various solutions*" has been the key to FFS's success in the region.

Agricultural researchers and extension personnel learn from farmers under the farmer Field School technique, which is reversal learning. It is a well-organized and integrated field school that provides a platform for farmers to self-learn and share. Participants are not the training's object, but they might be able to use their own experiences as the basis for the instruction. Farmers are learning to manage their crops in a more natural way, as in the case of integrated pest management (IPM). Extensionists assist communities attain their defined and perceived goals by acting as catalysts and facilitators (Anandajayasekeram, Puskur, Sindu and Hoekstra, 2008). Braun, Jiggins, Roling, Van and Snijders (2005) lend their voices that Farmer Field Schools are platforms for fostering farmers' integrated decision-making and innovation for long-term agriculture. It is a "*participatory, discovery-based learning and technical knowledge based on non-formal adult education principles that guides a group of people with a common interest who meet on a regular basis*" to study the "how" and "why" of a certain topic (Braun and Duveskog, 2008). The researchers continued that "it is a participative way of developing and disseminating learning technology based on adult learning principles such as experiential learning".

Problem statement

According to Davis, Nkonya and Keto (2010), among others, FFS was discovered to enhance revenue and productivity. In comparison to the control group, global impact studies of FFS demonstrate that FFS graduates who produced cotton used fewer hazardous pesticides and had a 4-14 percent higher output. The FFS strategy to expansion was compared in a research done in the states of Ondo and Edo with other major participatory practices, and empirical evidence confirmed

that the FFS approach to extension is perceived to be more effective than other extension approaches because it has all of the characteristics of participatory extension. (Ebewore, Egho and Enujeke, 2013). According to Ajani and Onwubuya (2010), farmers and administrators of FFS in Edo State, Nigeria, have provided feedback which has proven that this agricultural extension strategy has the potential to significantly increase farm productivity. Majorly, these judgments were made based on facilitators' satisfaction of programme implementation, without considering the perception of the participants. Since its development, the Farmer Field School (FFS) has been portrayed as achieving worldwide reputation as a popular extension and education program.

The intention of the researcher was to find out whether FFS, as adopted and implemented by the National Programme for Food Security (NPFS) is perceived by farmers (participants) as successful or otherwise, by assessing whether or not there were improvements in some of the key areas the programme sought to address. Since literature has widely acclaimed FFS to be a better extension approach, some of the contemplations that came to the researcher's mind were "is FFS approach also effective in the study area?", "can FFS be recommended as a more effective extension delivery approach in the study area?".

Objectives

- i. describe the socio-economic characteristics of respondents
- ii. determine the perceived effectiveness of FFS as an extension approach
- iii. assess the perceived effectiveness of FFS on farmers productivity

Hypothesis:

H₀₁: There is no significant difference between yield and income of participants before and after participation in FFS.

EMPIRICAL LITERATURE

There are so many studies that have pointed to the increasing benefits of FFS in Nigeria, Africa and different places of the globe. It's difficult to get a worldwide picture on the state of FFSs because they've been implemented by a variety of organizations in over 87 countries. A study titled "Effectiveness Comparison Between the Farmers Field School and the Training & Visit Approaches of Agricultural Extension in Two Districts of Pakistan", by Abdullah, Xia and Ghazanfar (2014), put certain participatory extension features which a successful extension system should possess, as identified by Ajayi and Okafor (2006), before rice farmers in the target area, who had experienced both systems (as focused by the study). They were asked to score the T & V method as well as FFS approach on the following criteria - adult learning principles; extension,

farmers, and researchers working together on an equal footing; bottom-up method; practicing in the field instead of classroom); Mobilization of the community for planning and action; strengthening Problem-solving and management skills of farmers; farmers being self-taught).

Adisa and Adeloye (2012) in their study, “Analysis of Farmer Field School as an Extension Approach to Cocoa Production in Osun State, Nigeria,” found that cocoa farmers who participated in FFS saw that their cocoa management techniques have improved as a result of their involvement, with the exception of a small percentage (0.8%) who saw no improvement in optimal soil selection for cocoa production. Furthermore, disease control (fungicide spraying) showed the greatest improvement (4.02) in cocoa management methods, followed by proper cocoa bean fermentation procedures (4.00), pruning (3.98), sanitary harvesting (3.96), and shade management (3.94) in that order. The mean score for improvements was 66.9, with a standard deviation of 4.1. Being partakers in Farmer Field School, majority of respondents (82.26 percent) reported significant improvements in their cocoa management procedures. This led the authors to conclude thus “*FFS as an extension approach is viable in enhancing cocoa production. Also, since improvement was noticed in the output of participating cocoa farmers, FFS is then recommended for other farm enterprises*”.

“Farmers’ Perceived Effectiveness of Farmers Field School in Anambra State, Nigeria”. This is the title of a research conducted in the South-Eastern part of Nigeria by Anaeto, Asiabaka, Ani, Umunakwe and Ejiogu-Okereke (2017). The focus of the research were to: determine the knowledge of FFS activities by the farmers; determine the level of participation in FFSs by the farmers; and assess the perceived effectiveness of FFSs in knowledge acquisition and transfer. From evidences gathered and analyzed (on a three point Likert scale), results showed that on farmers’ knowledge, farmers were knowledgeable on all the activities of FFS listed. According to the authors, this could be as a result of the participatory nature of FFS that promotes problem-solving and knowledge sharing among the participants. They continued that the knowledge of all the FFS activities listed could be attributed to the inclusion of topics in FFS that suit farmers’ situations. Thus, in their words, *this will stimulate their interest in the activities, thus enhancing their knowledge*. On participation, the authors discovered that the farmers participated in all the FFS activities. However, it was revealed that their participation was more in the identification of needs (61.7%), livestock production (60.0%), development of planting practices (58.3%), identification of improved crop varieties (58.3%) and development of weeding practices (58.3%). Finally, on perceived effect of FFS, results obtained showed that FFSs were adjudged effective by participating farmers in all the activities listed. However, they were more effective in the identification of pests and diseases (\bar{x} =3.0), control of pests and diseases (\bar{x} =2.9), development of weeding practices (\bar{x} =2.9) and identification of preservation methods (\bar{x} =2.8).

Gwary, Muhammad and Mustapha (2015) asserted that many studies have been conducted since FFS was introduced into Nigeria. According to them, of particular note is the studies that were conducted in Ondo, and Cross River States to look into the effects of Farmer Field Schools on Job Performance of cocoa farmers, where the results of the study revealed that Farmer Field Schools had positive impact on cocoa farmers' job performance. According to them, the authors of the studies added that "if properly managed, the approach has the capability of transforming the performance of cocoa farmers thereby increasing the quality of cocoa bean yield and income of cocoa farmers" (Adeogun, 2014), in Gwary *et al.* (2015).

From studies, the socio-economic characteristics of FFS participants differ from one location to another. However, the common denominator that has been observed from these studies is the testimonial of improved socio-economic level after participation. For instance, Obaiah (2004) in a research titled "A study on capacity building of rice growing farmers of Farmer Field Schools (FFS) in Krishna Godavari Zone of Andhra Pradesh", According to the findings, the majority of FFS respondents (52.86%) had a medium socioeconomic position, with the remainder having a high (25.71%) or low (21.43%) socioeconomic status. Untrained farmers fell into the low economic level category 45.71 percent of the time, followed by medium (31.43%) and high (22.86%) socioeconomic status. Also, Dubey, Srivastva, Singh and Sharma (2008) conducted a study on the "Impact of KVK (Krishi Vigyan Kendra) Training Programme on Socio-economic Status and Knowledge of Trainees in Allahabad District," which discovered that the vast majority of on-campus students (43.33%) had medium socio-economic status, after that, low socio-economic status (36%) and only 20.67% had higher socio-economic status, On the other hand, on-campus trainees (43.33%) had higher socio-economic standard.

Ebewore (2013a) researched on "participatory nature of Farmer Field School extension approach as compared with other approaches in Edo and Ondo States, Nigeria". Farmers' ages range from 31 to 70 years old, according to the data. According to the research, no farmer in the studied area was under the age of 31. This finding is close to the findings of Lwala, Elepu and Hyuha (2016), who researched on "effect of FFS on adoption of improved cotton production technologies in eastern Uganda" and found out that 73% of participants were between the ages of 30 and 60. Deshmukh, Wadkar and Khodke (2013) carried out a research in two *taluks* of Parbhani district of Maharashtra on 'Impact of Farmers' Schools on knowledge level of cotton growers regarding improved cultivation practices'. This study revealed that 46.00 percent of FFS farmers had secondary school education, 23.00 percent of FFS farmers had higher secondary school category, followed by 13.00 and 11.00 percent farmers had college and primary education category respectively. Seven percent of FFS farmers belonged to illiterate category. This correlates positively with the findings of Anaeto, Asiabaka, Ani, Umunakwe and Ejiogu-Okereke (2017), who observed that majority (86.7%) got either a formal education or a non-formal education.

In a study by Bunyatta, Onyango, Nyando and Kibett (2015), on “impact of soil and crop management FFS on farming systems and productivity among smallholders in North Rift, Kenya”, the mean maize income of students in FFS before and after they took part in FFS was compared using a paired t-test to see if there was a significant difference. The findings show that after participating in the FFS, farmers' income in connection to maize output increased (53038.89 ± 3455.04), and this was much larger than the pre-participation income (27380.56 ± 1791.90).

In Kiboga district of Uganda, research was conducted to find out “the contribution of FFS in facilitating smallholder farmers' adaptation to drought” (David *et al.*, 2017). Farmers' ability to apply drought adaptation responses was discovered to be encouraged by their knowledge level, experience, and farm management abilities. These were witnessed by Farmer Field School participants who, in response to the severity of the drought, practiced what they preached: bottle irrigation (FFS=50%; non-FFS =16%), delayed planting (FFS=14%; non-FFS =0%), mulching (FFS=14%; non-FFS =21%), growing of vegetables (FFS=8%; non-FFS =0%), early planting (FFS=1%; non-FFS =16%), planting of shade trees (FFS=1%; non-FFS =0%), food preservation (FFS=1%; non-FFS =0%) and water harvesting (FFS=1%; non-FFS =0%). As a result, the authors concluded that “In crop production, the FFS members largely responded to drought by early/delayed planting, carrying out micro-irrigation, growing of vegetables, rainwater harvesting and application of organic manure; while in livestock production, they fetched water, sold livestock, grew hay, hired shelter for livestock protection and collected feeds. These divergent options were incomparable to those applied by the non-FFS members”.

METHODOLOGY

Study area

This research was carried out in Calabar agricultural zone of Cross River State. The zone comprises of Akamkpa, Akpabuyo, Bakassi, Biase, Calabar South, Calabar Municipality, and Odukpani. Calabar Metropolis is made up of the local government areas of Calabar South and Calabar Municipality. It is the state capital and the seat of the senatorial district in the south. The study area is bordered by the North by Abi, Yakurr, Obubra, Ikom and Etung, East by the Republic of Cameroon, West by Abia and Akwa Ibom States, and by the South by the Atlantic Ocean. It is located between 40 28' and 60 55' north latitude and 70 50' and 90 28' east longitude of the Greenwich meridian. It covers 406 square kilometers and has a variety of retail shops of various sizes and capacities (www.crossriverstate.gov.ng; Ohen and Abang, 2011; Wikipedia, 2019).

Sampling

Participated in the National Programme for Food Security (NPFS) made up the sampling frame of this study. This study used a multi-stage sampling technique. In the first stage, three agricultural blocks were chosen purposively, which include Biase, Odukpani and Akpabuyo. This was so because from information gathered from the Cross River Agricultural Development Programme (CRADP), the aforementioned programme took place in these three Blocks in the Calabar agro-ecological zone. At the second stage, four villages from each Block were also purposively selected, summing up to 12 villages. Again, the programme of concern was held in these villages. In the third stage, one beneficiary group (Cassava farmers) was purposively chosen for this research. The sum total of these beneficiary groups in the respective villages gave a sample size of 320, as shown in Table 1.

Table 1: Sampling Procedure and Sample Size.

Blocks	Villages/FFS Sites	Population of Farmers in the villages	Number of farmers in FFS	Number of Questionnaires Distributed	Number of Questionnaires Returned
Biase	Ogbem	550	28	28	28
	Abini	630	30	30	29
	Ibogo	620	26	26	26
	Akpet Central	850	30	30	30
	Oduyama	570	26	26	26
Odukpani	Esuk Odot	510	26	26	26
	Ndot Nwong	780	28	28	28
	Akpab	950	26	26	26
Akpabuyo	Okoyong				
	Atimbo West	2,220	25	25	25
	Ikot Nnakanda	1,350	25	25	24
	Ikot Ene	2,400	25	25	25
	Ikot Eyo	2,500	25	25	25
Total	12	13,930	320	320	318

Source: CRADP, 2021

Data collection and analysis

A set of questionnaire was used as the instrument for primary data collection. The questionnaire consisted of closed and open ended questions on the socioeconomic characteristics of respondents and various effectiveness variables. These questionnaire were structured to elicit specific responses for qualitative and quantitative analysis. The data were sorted, cleaned and descriptive statistics such as tables, percentages and frequency distribution were employed for analysis, with the aid of SPSS version 23.

The hypothesis, stated in the null form as “There is no significant difference between yield and income of participants before and after participation in FFS” was tested using paired t-test.

The paired t-test was mathematically specified as:

$$t = \frac{\frac{\sum D}{N}}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{N}}{(N-1)N}}}$$

Where:

$\sum D$ = sum of the differences

$\sum D^2$ = sum of the squared differences

$(\sum D)^2$ = sum of the differences squared

N = number of observations

RESULTS

Socio-economic Characteristics

Table 2: Distribution of respondents based on their socio-economic characteristics

Characteristics	Frequency	Percentage (%)
Age		
20-30	35	11.0
31-40	125	39.3
41-50	77	24.2
51-60	47	14.8
61 and above	34	10.6
Total	318	100.0
Mean	43.86	
Sex		
Male	205	64.5

Female	113	35.5
Total	318	100.0
Marital status		
Married	275	86.5
Single	30	9.4
Widow	8	2.6
Widower	3	0.9
Divorced	2	0.6
Total	318	100.0
Household size		
1-5	150	47.2
6-10	141	44.3
11-15	25	7.9
16 and above	2	0.6
Total	318	100.0
Mean	5.87	
Educational qualification		
FSLC	139	43.7
SSCE	126	39.6
NCE	29	9.1
B.Sc./BA	21	6.6
M.Sc./MA	3	0.9
Total	318	100.0

Source: Field survey, 2021.

Table 2 presents the distribution of the respondents in accordance with their socio-economic characteristics. From the Table, 39.3 percent of the cassava farmers were in the age range of 31-40 years, with average age of 43.86 years, indicating that many of the participants were of working age. This is similar to the findings of David (2009), who found that FFS participants had mean age of 44.75 years.

The results showed that most (64.5%) of the participants were male. The result implies that farming is largely a male-dominated occupation in the study area and could be due to gender roles and responsibilities that limits the activities of women to mostly agro-processing. This finding is in tandem with the findings of Aliyu (2016), who carried out a similar study on “economic evaluation of the national program for food security in three selected States of North-West Nigeria”. Also, majority (86.5%) of the respondents were married, about 47.2 percent of them had household size of between 1 to 5 persons, with a mean of approximately 6. The reason for this number could be because of family labour needed for farm activities. This is similar to the observations of Elemi, Angba, Ajah, Agube and Idiku (2015), who carried out a study on Special Programme for Food Security and realized that most of the participants were married. Contrary to the findings of this study, Elemi, Angba, *et al* (2015) observed that most of the participants had household size of between 6-10 persons.

All of the farmers had received some type of education. Table 2 showed that 43.7 percent of them had only basic (FSLC) education. However, 39.6 percent and 9.1 percent of them had SSCE and NCE respectively. This result tallies with that of Ebewore (2013a), who opined that 88.2 percent of FFS farmers some type of education. Going further, the researcher discovered that majority (36.6%) of the FFS farmers had only primary education. This finding agrees with that of Anaeto *et. al.* (2017), whose findings showed that most (86.7%) of FFS participants received some form of education - formal or the otherwise.

Effectiveness of FFS as an extension approach

Table 3: Mean distribution of farmers on perceived effectiveness of FFS as an extension approach

Variables	\bar{x}	SD	Decision
Giving opportunity to actively participate in trainings	2.46	0.59	Positive perception
Helping farmers realize benefits from the training	2.56	0.54	Positive perception
Giving opportunity to experiment with some of the new methods and techniques	2.43	0.55	Positive perception
Gathering useful information for farm improvement	2.84	0.41	Positive perception
Treating farmers as adults	2.18	0.45	Positive perception
Training/ learning being held in the field	2.50	0.53	Positive perception
Breaking down technical terms/ideas to farmers' understanding	2.48	0.53	Positive perception
Helping farmers to have closer relationship with each other during the training	2.17	0.42	Positive perception
Using practical examples to make farmers understand easily	2.50	0.54	Positive perception
Involving farmers in decision making	2.13	0.43	Positive perception
Fostering deep understanding of farm problems, causes of the problems and possible solutions	2.47	0.57	Positive perception
FFS as a viable tool of agricultural extension	2.79	0.49	Positive perception
FFS as an effective agricultural extension tool for disseminating agricultural information	2.83	0.44	Positive perception
Increasing farmers' knowledge about their enterprise	2.19	0.44	Positive perception

Source: Field survey, 2021. \bar{x} =Mean, SD = Standard Deviation

The perceived effectiveness of FFS was assessed in terms of its suitability as an extension approach. As shown in Table 3, the results revealed positive effectiveness of FFS as an extension approach, especially based on the items captured on the Table. Specifically, Table 3 shows that FFS was effective in helping farmers to gather useful information to improve their farm ($\bar{x}=2.84$); it was also seen that FFS is an effective extension approach for disseminating information ($\bar{x}=2.83$); farmers rated FFS as a viable tool for agricultural extension ($\bar{x}=2.79$); FFS was also perceived to be effective in helping participants to realize benefits from the training ($\bar{x}=2.56$).

Furthermore, majority of respondents consented that FFS training was effective in fostering deep understanding of farm problems, causes of the problems and possible solutions ($\bar{x}=2.47$); meanwhile, most of them also indicated that FFS was effective as an extension approach in breaking down technical terms/ideas for better understanding ($\bar{x}=2.48$). More so, participants acknowledged that FFS gave them practical opportunities to actively participate in the training ($\bar{x}=2.46$). This is a pointer to the participatory nature of FFS, which is one of the characteristic of an extension approach. This point is buttressed by the acknowledgement of participants that FFS was effective in giving them opportunities to experiment with some new methods and techniques ($\bar{x}=2.43$). Furthermore, most of the farmers admitted that the knowledge about their enterprise was greatly enhanced by FFS training ($\bar{x}=2.19$). This is also supported by their indication that they were involved in decision making in the course of the school ($\bar{x}=2.13$).

With regard to the benchmark for decision making, which is 2.0, the results in Table 3 shows that FFS is an effective extension approach, especially considering the items specified in the Table. This result is consistent with the findings of Ebewore (2013a), who researched on “Participatory Nature of Farmer Field School Extension Approach as Compared with other Approaches in Edo and Ondo States, Nigeria”. The researcher compared the effectiveness of FFS as an extension approach and other approaches such as Farming System Research (FSR), Training and Visit (T & V) and Unified Agricultural Extension System (UAES). The researcher discovered that farmers insisted that FFS is more participatory than other approaches. The results also is in agreement with the findings of Adisa and Adeloye (2012).

Effectiveness of Farmer Field School on farmers' productivity**Estimated output (Cassava) before and after FFS****Table 4:** Estimated output (Cassava) farmers before and after FFS

Output (kg)	Before FFS		After FFS	
	F	%	F	%
1-200	205	64.5	44	13.8
201-400	72	22.6	42	13.2
401-600	26	8.2	69	21.7
601-800	9	2.8	46	14.5
801-1000	6	1.9	74	23.3
1001-1200	0	0	20	6.3
1201-1400	0	0	8	2.5
1401 and above	0	0	15	4.7
Total	318	100	318	100.0

Source: Field survey, 2021

The breakdown of participants (Cassava farmers), on the bases of output before and after participation in FFS is shown in Table 4. Findings in the Table shows that majority (64.5%) of the participants had output of between 1-200kg before participation, while more people (14.5% + 23.3% + 6.3% + 2.5% + 4.7% = 51.3%) had output of 601kg and above after participation. However, a large number of participants (23.3%) were found to have output of 801-1000kg after participation. The result also revealed that the maximum output before participation was between 801-1000kg. However, after participation, the maximum output was 1401kg and above. This result implies that FFS was perceived to be effective in increasing the output of participants. This increase in output could be attributed to access to information, skills, materials and other production resources.

Effect of FFS on income of participants**Table 5:** Estimated Income of participants before and after participation in FFS

Income ₦	Before FFS		After FFS	
	F	%	F	%
1-100,000	307	96.5	118	37.1
100,001-200,000	11	3.5	107	33.6
200,001-300,000	0	0.0	77	24.2
300,001-400,000	0	0.0	5	1.6
400,001-500,000	0	0.0	6	1.9
500,001 and above	0	0.0	5	1.6
Total	318	100.0	318	100.0

Source: Field survey, 2021

Table 5 presents the array of respondents depending on their estimated monthly income before and after their participation in FFS. Before participation, it was discovered that majority (96.5%) of the respondents earned between ₦1 - ₦100,000 monthly, and only 3.5 percent of them earned between ₦100,001 - ₦200,000. After participation, 37.1 percent of the participants still earned between ₦1 - ₦100,000. This could be because of mismanagement of fund or inaccessibility of financial resources. However, more people (24.2% + 1.6% + 1.9% + 1.6% = 29.3%) of the participants earned over ₦200,000, with about 1.6 percent of them earning ₦500,001 and above, which became the maximum monthly income after participation. This reveals that more farmers earned higher income after participating in FFS.

Test of hypothesis**Table 6:** Paired t-test of mean yield and income of participants before and after participation

Parameters	Before	After	df	t-cal.	t-critical
Mean yield of Cassava (kg)	69.90 (100.77)	146.96 (170.43)	317	17.38****	1.9685
Mean income (₦)	35773.58 (27964.47)	75411.95 (100100.66)	317	7.64***	1.9674

Source: Field survey, 2021. Values in parenthesis=SD *** = Significant at P<0.01

The null hypothesis “there is no significant difference between yields and income of participants before and after participation” was tested using paired t-test. Table 6 presents the mean difference in output, as well as monthly income before and after participation in FFS. The Table shows the calculated t-value, the tabulated t-value, as well as the P-value. The findings revealed that the mean output of cassava farmers before participation was 69.90kg and the mean output after participation was 146.96kg. Evidence from the result indicates that the mean output after participation was greater than that before participation. The calculated t-value of 17.38 was significantly (1%) greater than the critical value of 1.9685.

In the same vein, Table 6 shows the mean estimated monthly income of farmers before and after participation in FFS. It is seen from the Table that the mean estimated monthly income before participation was ₦35,773.58 and the mean estimated monthly income after participation became ₦75,411.95. As observed, the mean estimated monthly income after participation was higher than that before participation. This difference has a calculated t-statistic of 7.64, which is greater than the critical t-value of 1.9674, and is significant at 1% alpha level. With this evidence, the null hypothesis that “there is no significant difference between yield and income of participants before and after participation” was dismissed, and it was asserted that there is significant difference in the yield and income of participants before and after participation in FFS.

CONCLUSION AND RECOMMENDATIONS

After a thorough investigation and analysis of data generated from this research, it was concluded that Farmer Field School was an effective extension approach. The effectiveness of FFS, as revealed by the study was seen significantly in the areas of farmers’ productivity – yield and income. As a result, policy framework aimed at expanding Farmer Field School to accommodate new sites in the study area and across the State and nation, will serve as an effective strategy for enhancing increased yield, income, food security and of course, reduced poverty.

The study revealed that FFS had significant effect on participants’ yield and income of farmers in the study area. Thus, FFS should be scaled up to cover all the Local Government Areas in the State and Country at large. FFS was also observed to be highly effective in training participants and enhancing their knowledge of farm activities. Therefore, FFS should be used by extension service providers as effective training approach to avail participants with hands-on knowledge about their enterprises.

References

- Abdullah, M., Xia, L. C. & Ghazanfar, S. (2014). Effectiveness Comparison Between the Farmers Field School and the Training & Visit Approaches of Agricultural Extension in Two Districts of Pakistan. *American-Eurasian Journal of Agriculture & Environmental Science*, 14 (1): 33-39.
- Adeogun, S. O. (2014). Effect of Farmer Field School Training on Cocoa Farmer Job Performance (CFJP) in South-West Nigeria. *Scholar Journal of Art, Humanities and Social Sciences*, 2(1): 37-44.
- Adisa, B. O. & Adeloje, K. A. (2012). Analysis of Farmer Field School as an Extension Approach to Cocoa Production in Osun State, Nigeria. *World Journal of Agricultural Sciences*, 8(4): 421-428.
- Adisa, B. O. & Adeloje, K. A. (2012). Analysis of Farmer Field School as an Extension Approach to Cocoa Production in Osun State, Nigeria. *World Journal of Agricultural Sciences*, 8(4): 421-428.
- Ajani, E. N. & Onwubuya, E. A. (2010). Farmer Field School (FFS) and Junior Farmer Field and Life School (JFFLS) as challenges to agricultural extension development and practice in Nigeria. *Journal of Agricultural Extension*, 14 (1): 34-47.
- Ajayi, M. T. & Okafor, C. (2006). 'Extension Agents' perception of participatory Agricultural Extension Approaches adopted by Agricultural Development Program (ADP) in Ondo state, Nigeria". *International Journal of Agricultural and Biological Sciences*, 4(1): 20-25.
- Ajayi, M. T. & Okafor, C. (2006). 'Extension Agents' perception of participatory Agricultural Extension Approaches adopted by Agricultural Development Program (ADP) in Ondo state, Nigeria". *International Journal of Agricultural and Biological Sciences*, 4(1): 20-25.
- Aliyu, F. K., (2016): Economic Evaluation of the National Programme on Food Security in Three Selected States on North-West, Nigeria. A Ph. D Thesis. <http://kubanni.abu.edu.ng:8080/jspui/bitstream/123456789/8273/1/ECONOMIC%20EVALUATION%20OF%20THE%20NATIONAL%20PROGRAM%20ON%20FOOD%20SECURITY%20IN%20THREE%20SELECTED%20STATES%20OF%20NORTH-WEST%2C%20NIGERIA.pdf> (Accessed 21/11/2019).
- Anaeto, F. C., Asiabaka, C. C., Ani, A. O., Umunakwe, P. C. & Ejiogu-Okereke, E. N. (2017). Farmers' Perceived Effectiveness of Farmers Field School in Anambra State, Nigeria. *International Journal of Agriculture and Earth Science*, 3(2):11-21.
- Anandajayasekeram, P., R. Puskur, W. Sindu & D. Hoekstra, (2008). Concepts and Practices in Agricultural Extension in Developing Countries: A Source Book. International Food Policy Research Institute, Washington D.C., USA and International Livestock Research Institute Nairobi, Kenya. <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/125973> (Accessed 23/04/2019).
- Braun, A. R. & Duveskog, D. (2008). The FFS Approach History, Global Assessment and Success Stories. Commissioned report 2010 by IFAD a Background Paper for the IFAO Rural Poverty. <https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.gfras.org/en/component/phocadownload/category/90-casestudies.html%3Fdownload%3D741:the-farmer-field-school-approach-history-global-assessment-and-successstories&ved=>

- [2ahUKEwj73LP10fvzAhU9A2MBHbn7CE4QFnoECAQQAQ&usg=AOvVaw3rNCWC1ZpWNHlnkVd_SBuL](https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.researchgate.net/publication/228343459_A_Global_Survey_and_Review_of_Farmer_Field_School_Experiences&ved=2ahUKEwiPloCx0vvzAhULmBQKHTZkC0wQFnoECAUQAQ&usg=AOvVaw1AhS05Ftge9CTN_fXidtfk) (Accessed 23/11/2018).
- Braun, A., Jiggins, J., Röling, N., Berg, H. V. D. & Snijders, P. (2006). A Global Survey and Review of Farmer Field School Experiences. Final Report, International Livestock Research Institute, Nairobi, Kenya. https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.researchgate.net/publication/228343459_A_Global_Survey_and_Review_of_Farmer_Field_School_Experiences&ved=2ahUKEwiPloCx0vvzAhULmBQKHTZkC0wQFnoECAUQAQ&usg=AOvVaw1AhS05Ftge9CTN_fXidtfk (Accessed 23/3/2019).
- Bunyatta D.K., Onyango, C. A., Nyando., V. V. & Kibett J.K. (2015). Impact of Soil and Crop Management Farmer Field Schools on Farming Systems and Productivity among Smallholders in North Rift, Kenya. *International Journal of Humanities and Social Science*, 5(3):173-179.
- David, D. (2009). An assessment of the implementation of recent farmer field schools to improve vegetable production in Trinidad and Tobago. *International Journal of Agriculture and Extension. Education*, 16(2): 7-19.
- David, M., Bernard, B., Lynne, C., Anna, M. N., Grace, N., John, F. O., Ivan, L., May, S. & Michael S. M. (2017). The Contribution of Farmer Field Schools in Facilitating Smallholder Farmer's Adaptation to Drought in Kiboga District, Uganda. *International Journal of Agriculture and Forestry* 2017, 7(3): 67-75.
- David, S., Agordorku, S., Bassanaga, S., Couloud, J. Y. Kumi, M. NA., Okuku, I. & Wandu, D. (2006). A guide for Conducting Farmer Field Schools on Cocoa Integrated Crop and Pest Management. Sustainable Tree Crop program, International Institute of Tropical Agriculture, 102. https://www.google.com/url?sa=t&source=web&rct=j&url=https://cgspace.cgiar.org/handle/10568/91323&ved=2ahUKEwjV6IbP1PvzAhVx5-AKHR-mA04QFnoECAQQAQ&usg=AOvVawIiomZ685DxK_BQUiefWgfk (Accessed 1/8/2018).
- Davis, K., Nkonya. E. & Keto, E. (2010). Impact of FFSs on Agricultural productivity and Poverty in East Africa. IFPRI, Discussion paper 00992 Washington DC: International food policy research institute. https://www.google.com/url?sa=t&source=web&rct=j&url=https://ebrary.ifpri.org/digital/collection/p15738coll2/id/2348&ved=2ahUKEwjvX8Cg1fvzAhUSmxQKHRWjD04QFnoECAUQAQ&usg=AOvVaw3VMLx6gorQ_0o3dEOe-L9d (Accessed 16/4/2019).
- Dennis, N. H. (2018). National Programme for Food Security (NPFS) and Rural Development: A Content Analysis. *International Journal of Advanced Academic Research, Social & Management Sciences*, 4(1): 18-32.
- Deshmukh, N. D., Wadkar, J. R. & Khodke, M. V., (2013). Impact of Farmers Schools on knowledge level of cotton growers regarding improved cultivation practices. *Mysore Journal of Agricultural Sciences*, 47 (2): 360-367.
- Dinpanah, G., Mirdamadi, M., Badragheh, A., Sinaki, J. M., & Aboeye, F. (2010). Analysis of Effect of Farmers' Field School Approach on Adoption of Biological Control on Rice Producer's Characteristics in Iran. *Agriculture & Environmental Science*, 7 (3), 247-254.

- Dubey, A. K., Srivastva, J. P., Singh, R.P. & Sharma, V. K. (2008), Impact of KVK Training Programme on Socio – Economic Status and Knowledge of trainees in Allahabad district. *Indian Research Journal of Extension Education*, 8 (2&3): 60-61.
- Ebewore, S. O. (2013a). Participatory Nature of Farmer Field School Extension Approach as Compared with other Approaches in Edo and Ondo States, Nigeria. *Journal of Biology, Agriculture and Healthcare*, 3(1): 1-14.
- Ebewore, S. O., Egho, E. O. & Enujeke, E. C. (2013). Effects of FFSs Training on Management of Cocoa Mirid (*S. singularis*) by farmers in Edo State Nigeria. *Asian Journal of Agricultural Sciences*, 5(1): 6-10.
- Elemi, G. F, Angba, A. O., Ajah, E. A., Agube, E. I. & Idiku, F. O. (2015). Effect of National Special Programme for Food Security on cassava output among rural farmers in Cross River State, Nigeria. *International Journal of Agricultural Extension and Rural Development Studies*, 1(2): 17-25.
- FAO (2006). Strengthening implementation capacity for Integrated Production and Pest Management (IPPM) (2007). Training based on the Farmer Field School approach in Kyrgyzstan. Pro forma project agreement for 2006 and 2007, FAO, Rome, 18. https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.tropentag.de/2010/abstracts/full/475.pdf&ved=2ahUKEwimptLb2fvzAhUeA2MBHdnrB04QFnoECAYQAQ&usg=AOvVaw0YR2iTaI5pX6F_rzaDrYHn (Accessed 1/10/2018)
- Gwary, M. M., Muhammad, F. A. & Mustapha, S. B. (2015). Review of Farmer Field Schools Approach to Extension Service Delivery: Utilization and Impact in Nigeria. *World Journal of Agricultural Sciences*, 1(4): 229-238.
- Lwala, R. J., Elepu, G. & Hyuh, T. S. (2016). Effect of Farmer Field School on Adoption of Improved Cotton Production Technologies in Eastern Uganda. *Journal of Agricultural Economics, Extension and Rural Development*, 4(4): 419-428.
- Manoj, A. & Vijayaragavan, K. (2014). Impact of Farmers' Field School on Farmer's Knowledge of Integrated Crop Management Practices in Paddy. *Indian Research Journal of Extension Education*, 14(1): 34-49.
- Muhammad, A., Li, C. X., Jia, L., Sidra, G., Yasir, M., Mazhar, N. & Shah, S. (2014). Effectiveness Comparison Between the Farmers Field School and the Training & Visit Approaches of Agricultural Extension in Two Districts of Pakistan. *American-Eurasian Journal of Agriculture & Environmental Science*, 14 (1): 33-39.
- Obaiah, M. C., (2004). A study on capacity building of rice growing farmers of Farmers Field Schools (FFS) in Krishna Godavari Zone of Andhra Pradesh. Ph.D. Thesis submitted to Acharya N.G. Ranga Agricultural University, Hyderabad. https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.semanticscholar.org/paper/Study-On-Capacity-Building-Of-Rice-Growing-Farmers-Obaiah/ae1e694f73ad57c4c6b2d3ed0a19b2c104953e1b&ved=2ahUKEwiS1Z_j6PvzAhUR5uAKHVv1Dk4QFnoECBMQAQ&usg=AOvVaw0_vAWoL52kdSJCipr7Kagn (Accessed 26/6/2019).
- Ohen, S. B. & Abang, S. O. (2011). Evaluation of price linkages within the supply chain of rice markets in Cross River State, Nigeria. *Journal of Stored Products and Postharvest Research*, 2(8): 151-155.

Onuoha, O. C., Onugu, C. U & Edoga, J. C. (2018). Contributions of the National Programme on Food Security (NPFS) on Household Food Security in Enugu State. *International Journal of Trend in Scientific Research and Development (IJTSRD)*, 2(4): 512-520.

Röling, N. (1995): What to Think of Extension: A Comparison of three Models of Extension Practice article for Francophone issue of AERDD bulletin edited by Salama, N. ICPA, Montpellier. Pp 77.

Wikipedia (2019) www.wikipedia.com