



INCLUSION OF ECOLOGICAL SUSTAINABLE DEVELOPMENT THEMES INTO AGRICULTURAL EXTENSION EDUCATION PROGRAMME: CONTENT AND DELIVERY METHODS

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ABSTRACT

The continuous adoption of unsustainable ecological practices by farmers on land resources threatens sustainable development in agricultural production. With increase in population and agricultural intensification, ecological problems such as erosion, deforestation, overgrazing, low yields of agricultural produce among others may be on the increase if farmers are not very conscious of their activities on land. This study determined the extent of inclusion of ecological sustainable development themes and methods used in teaching these content areas to farmers in the agricultural extension outreach programme of Cross River State. Two research questions were answered and two hypotheses were tested. The study adopted descriptive survey research design and was carried out in Cross River State with a sample of 250 comprising 180 registered farmers and 70 extension personnel. The researchers used mixed method of data collection involving quantitative and qualitative approaches. A 38-item structured questionnaire was used in collecting the quantitative data, while focused group discussions (FGD) and content analysis were used in generating qualitative data. The instrument was face validated by three experts and Cronbach Alpha reliability index of 0.84 was estimated. Out of 250 copies of questionnaire administered, 246 copies were retrieved and analyzed using mean, standard deviation and independent t-test statistic to answer the research questions and test the null hypotheses at $p > .05$. The study found out that 15 ecological sustainable development themes were included as content areas into the agricultural extension outreach programme of Cross River State while only 7 extension teaching methods out of 22 were used in teaching the farmers in the programme. It was recommended that Cross River Agricultural Development Programme should ensure that ESD themes not fully included into agricultural extension programme are integrated and taught to farmers while enabling conditions are made to facilitate individual contacts of extension personnel with farmers to reasonably convince them and prepare them for sustainable ecological resource use and conservation.

KEYWORDS: Inclusion, Ecological sustainable development themes, Delivery methods, Agricultural extension education programme

INTRODUCTION

Sustainable development occupies a central discourse in agriculture as a result of population growth, agricultural intensification and adoption of unsustainable farming practices capable of jeopardizing the agricultural production value chain.

The Food and Agricultural Organization (FAO) (1989) stated that sustainable development involves management and conservation of the natural resource base and orientation of technological and institutional change in such a manner that ensures the attainment and continual satisfaction of human needs for the present and future generations.

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Sustainable development in the agriculture, forestry and fisheries sectors which conserves land, water, plants and animal genetic resource must be ecologically non-degrading, technically appropriate, economically viable and socially acceptable (Alawa, 2015a). Similarly, Rao and Rogers (2006) explained that sustainable development in agriculture must involve all practices that meet current needs for food and fibre among others in the society while maximizing net benefits through conservation of resources to maintain other ecosystem services, functions and human development. Sustainability of the agricultural production system is conceived from three dimensions; social, economic and ecological (Alawa & Adie, 2017; Alawa, 2015a; Yunlong & Smith, 1994). Social sustainability involves continued satisfaction of basic human needs such as food, shelter and higher level social and cultural necessities. Conversely, economic sustainability is concerned with the long-term benefits that accrue to agricultural producers, for example, sustaining certain yield levels, productivity and viability of farming. The ecological dimension which forms the nub of this study involves maintaining the productive potentials of the resource base for crop yields, preserving the hydrology of surface and ground water and protecting the genetic resources and biological diversity (Alawa, 2015a). All these content areas constitute ecological sustainable themes.

Ecological sustainable development (ESD) themes address sustenance of biological diversity and ecological integrity, that is, rather than focusing on opportunity or capital as key units of sustainability, it concentrates on the health of the living world (Alawa, 2019 & Rolston, 1994). The ecological dimension of sustainable agricultural development particularly provides potentials for management of the soil to provide ideal condition for crop yields; preserve the hydrology of surface and ground water and protect the genetic resources and biological diversity of the soil environment. Ecological sustainable development themes are components of the curriculum of agricultural extension education for training of farmers.

Agricultural extension according to Osinem (2008) is an aspect of education which involves adult learners and prepares them along their felt needs and immediate interests. He explained that agricultural extension is borne out of the philosophy that education is action and rural people are intelligent, capable and have a desire to acquire information and using it to better their lots. Agricultural extension is a system that provides need-and demand-based knowledge and skills to rural men, women and youths in an informal participatory manner with the objectives of improving their quality of life (Qamar, 2005). It is a primary mechanism through which farmers can learn the reason and value for a change as well as the result that can be achieved through the change process (Williams, 1995). Agricultural extension is therefore an informal participatory educational system that provides the rural youths and adults with knowledge and skills that leads to

attitudinal change in ecological sustainable land resource use and management.

Agricultural extension education takes many forms. These include; Ministry of Agriculture extension system which is a colonial inheritance with three components of extension services, that is, advisory, input and support services; university agricultural extension system and Agricultural Development Programmes (ADP) (Alawa, 2015a; Osinem, 2008). Others according to the authors include specialized agricultural extension systems where the operators are usually government agencies working in specialized areas of agriculture such as rubber, cocoa and oil palm estates and non-governmental extension system where religious organizations, oil companies and private commercial companies provide specialized extension services to farmers. In the study locale, (Cross River State), the unified agricultural extension system tagged Cross River Agricultural Development Programme (CRADP) is practiced with its Headquarters in Calabar. It is organized into three zones namely northern, central and southern agricultural zones headed by Zonal managers with eighteen area extension offices in the Local Government Councils headed by Area extension officers. Agricultural extension service plays a crucial role in providing network of information on sustainable agriculture (Hersman, 2004). The objective of agricultural extension education include training and influencing farmers to adopt improved practices in crops and livestock production, soil conservation and marketing of agricultural produce (Alawa, 2015a; Osinem, 2008; & Obibuaku, 1983). The authors further stated that agricultural extension is capable of changing the world view of farmers to the point where they will be receptive to their own initiatives and continuously seek means of improving their environment and farm businesses.

There is evidence of the inclusion of environmental and sustainable development themes (social, economic and ecological contents) generally into agricultural education and training programmes. For instance, Alawa (2019), Hazell and Lutz (1998) and FAO (1994) reported that many developing countries' national agricultural education, research and extension systems have integrated environmental concerns successfully into their programme. The reports particularly documented that developed and developing countries have over several decades included environmental concerns into their teaching curriculum, research activities and outreach extension programme but the seeming adoption of unsustainable practices, such as, bush burning, clean clearing, continuous cropping and so on by farmers who are direct beneficiaries of the agricultural extension education programme in their farm operation remains a threat to sustainable agricultural development in Nigeria in general and Cross River State in particular. At the moment, the researcher have observed that there are cases of soil erosion of varying degrees, deforestation, overgrazing and poor agricultural yields which have

increased the poverty levels of farmers in the State. This ought not to be so because the adoption of these unsustainable cultures in agricultural operations would have been reduced if farmers were exposed to ecological management themes in their outreach programme using appropriate delivery methods. The questions begging for solutions therefore are: What is the extent of inclusion of ESD themes as content in the curriculum of agricultural extension education programme of the State? What methods are used in teaching these contents to farmers in this programme? Attempt to investigate into these problem issues as focused in this study becomes very imperative more so because the effectiveness of every teaching/training and learning programme is dependent on relevance of the content and teaching methods used.

Extension teaching methods as conceived by Saville in Okunade (2007) are tools used by the extension workers or agents to achieve their objectives as teachers. This implies that these methods are invaluable to the extension personnel and extension delivery processes. Osinem (2008) classified extension methods into three groups as individual contact, group contact and mass contact methods. The author explained that the individual contact methods include farm and home visits, office calls, telephone calls and personal letters while the group contact methods are method demonstration, result demonstration, national demonstration, leaders-training meetings, conferences, discussion meetings, workshops and fieldtrips. The mass contact methods the author explained are achieved through bulletins, leaflets, circular letters, radio, television, exhibitions, fairs, posters, movies, charts, slides and film strips, models, internet resources, mobile phone calls and text messages. Similarly, Gaforth (1993) classified extension teaching methods into three broad classes in terms of area of coverage as individual, group and mass methods. According to the author, individual contact methods are good for conviction and action because of face-to-face relationship of teacher and learner, for example, farm and home visits, office calls, telephone calls, correspondence and result demonstration. Group contact methods the author explained are suited for bringing specific information about practices and help to move the individual through the desire for conviction and sometimes to taking action. Examples are method demonstration, Small Plot Adoption Technique (SPAT), result demonstration, general meeting, lectures, group discussion and excursion. Mass media methods the author concluded attract attention and stimulate the interest and desire for further information.

There are the methods used to reach many people at the same time and include circulars, letters, leaflets, radio, television and cinema. To Alawa (2015b) and Alawa (2014), the objectives of agricultural extension delivery could be achieved if a variety of teaching methods are used in training the rural people with the notion that the more a variety of ways a content is presented and practised, the quicker the people tend to grasp the content therein. Therefore, in general terms, this study determines the inclusion of ESD themes into agricultural extension education programme. In specifics, it focuses on the extent of inclusion of these ESDs and the delivery methods used in teaching the contents to farmers in the programme.

Theoretical framework

The study adopts Provus discrepancy evaluation model of 1971 as its theoretical backdrop. The model presents evaluation as the art of describing a discrepancy between expectation and performance of a programme. Basically, the model operates with standard (S), performance (P) and discrepancy (D). In this model, evaluation is the process of defining programme standards; describing whether a discrepancy exists between some aspects of the programme and the standards governing that aspect of the programme and using discrepancy information either to change performance or programme standards (Alawa 2015a, Provus, 1971).

In this study, the standard for the inclusion and teaching of ESD themes in agricultural extension education programme may have been compromised as there is continued adoption of unsustainable practices by farmers who are products of this programme. An assessment of the extent of inclusion and teaching of ESD themes in agricultural extension education programme as intended in this present study is capable of determining the discrepancies that exist in this programme. These discrepancies could be responsible for the low adoption of sustainable cultures by farmers who are products of agricultural extension education programme. Information obtained from the assessment could be used to improve the programme and ensure better performance.

Research questions

The study was guided by the following research questions.

1. What is the extent of inclusion of ESD contents in agricultural extension education programme in Cross River State?
2. What methods are used in teaching ESD contents to farmers in agricultural extension education programme in Cross River State?

Hypotheses

1. There is no significant difference between the mean ratings of registered farmers and graduate extension personnel on the extent of inclusion of ESD contents in agricultural extension education programme in Cross River State
2. There is no significant difference between the mean ratings of registered farmers and graduate extension personnel on methods used in teaching ESD contents to farmers in agricultural extension education programme in Cross River State

METHODOLOGY

The study was carried out in Cross River State. Cross River State is one of the 36 States in Nigeria. It is located in the South-South geo-political zone of the country and lies between Latitude 5°45' and 5.750° North of the Equator and Longitude 8°30' and 8.500° East of the Greenwich Meridian. The descriptive survey research design was used and was targeted at a population of 3740; comprising 3,670 registered farmers obtained from the Extension Division of CRADP and 70 graduate extension personnel obtained from the Personnel Division of CRADP. The multi-stage sampling approach comprising three stages was adopted in selecting the sample of registered farmers used for the study. The first staged involved the random selection of three extension blocks from each of the three agricultural zones, that is, southern, central and northern zones of the State to obtain a total of nine blocks. The second stage involved the random selection of two extension cells from each of the selected blocks to get a total of eighteen extension cells. At the third stage, accidental technique was used to select 10 registered farmers each from the eighteen extension cells chosen making a total of 180. The entire sub-population of graduate extension personnel was used as it was manageable by the researchers. The sample for the study therefore, was 250 respondents. Both quantitative and qualitative methods were used for data collection in this study. For the quantitative data, a 38-item structured questionnaire was used while content analysis and focused group discussions (FGD) were held with respondents for generation of qualitative data. The questionnaire for collection of quantitative data had two parts; I and II. Part I was designed to obtain demographic information of the respondents while Part II concentrated on the research variables in the study with the following scale; very high extent/very often, High extent/often, moderate extent/rarely and very low extent/not at all. The highest level in the scale received 4 points and the least was allocated 1 point. Two types of validity, that is, face and content validity were done on the instrument by three experts; one each from Agricultural Extension and Crop Science Departments in the Faculty of Agriculture and Wildlife Resources and one from Agricultural Education unit of the Department of Vocational Education, University of Calabar. A content validity index of 0.80 obtained was appropriate (Davis, 1992). Cronbach alpha reliability method was used to determine the

internal consistency of the questionnaire and a coefficient of 0.84 was obtained. The researchers administered two hundred and fifty (250) copies of the questionnaire on the respondents with the help of four trained research assistants. Two hundred and forty six (246) copies of the of the questionnaire (representing 98% retrieval rate) were retrieved and analyzed using mean, standard deviation and independent t-test from SPSS version 20 to answer the research questions and test the null hypotheses at $p > .05$.

For the research questions, the real limits of numbers were used to interpret the mean values of items. Thus, any item with a mean score of 3.50 to 4.0 was regarded as very high extent/very often, while items with mean scores of 2.50 to 3.49 were regarded as high extent/often. Similarly, any item with a mean score of 1.50 to 2.49 was regarded as moderate extent/rarely and items with means scores from 1 to 1.49 were regarded as very low extent/not at all. The standard deviation was used to determine the closeness or otherwise of the opinions of the respondents from the mean and from one another. Thus, any item with a standard deviation of 1.96 or below indicated that the respondents were close and therefore, the item was valid while any item with a standard deviation above 1.96 indicated that the respondents were not close to the mean and therefore, the item was not valid.

Content analysis of the farmer business school training guides used for extension outreach training of farmers in CRADP and FGDs with registered farmers and extension personnel were carried out in line with the objectives of the study. The FGDs were held once with staff in Cross River Agricultural Development Programme (CRADP) in the State while one meeting each was held with key informants (registered farmers) in ADP across the three agricultural zones of the State. The trustworthiness of qualitative data was established through triangulation, prolong engagements with participants, peer debriefing and data collection was logical, traceable and documented (Alawa, *et al.*, 2020; Lincoln & Guba, 1985). The FGD data generated was analyzed through the development of codes (themes), patterns and establishment of relationships based on the patterns.

Results

The results of this study were obtained from the research questions answered and hypotheses tested using data collected and analyzed.

Research question 1

What is the extent of inclusion of ESD contents in agricultural extension education programme in Cross River State?

Research hypothesis 1

There is no significant difference between the mean ratings of registered farmers and graduate extension personnel on the extent of inclusion of ESD contents in agricultural extension education programme in Cross River State. The data for answering research question 1 and testing hypothesis 1 is presented in Table 1.

TABLE 1: Mean ratings and t-test analysis of the responses of registered farmers and extension personnel on the extent of inclusion of ESD themes into CRADP contents of extension system in Cross River State N=246

1	2	3	4	5	6		7		8
S/N	Ecological sustainable development themes	\bar{X}	SD	RM	Registered farmers \bar{X}_1	SD ₁	Extension personnel \bar{X}_2	SD ₂	p-value
1	Causes, effects, prevention and control of soil erosion	2.99	0.12	HE	2.98	0.15	3.00	0.14	0.53**
2	Cropping systems and agricultural production	2.91	0.27	HE	2.93	0.25	2.87	0.34	0.17**
3	Environmental pollution and its effects on man, livestock and crop production	3.60	0.64	VHE	3.65	0.61	3.47	0.72	0.07**
4	Livestock management and health	2.93	0.35	HE	2.94	0.32	2.91	0.41	0.58**
5	Crop health prevention and control	2.92	0.28	HE	2.92	0.26	2.87	0.34	0.21**
6	Farming practices and their effects on soil and crop production	2.93	0.28	HE	2.93	0.25	2.90	0.33	0.16**
7	Land management and conservation practices and agricultural production	3.50	0.61	VHE	3.64	0.63	3.47	0.71	0.08**
8	Relationship between soil properties and agricultural production	2.94	0.22	HE	2.92	0.24	2.87	0.32	0.21**
9	Water harvesting, management and utilization	2.93	0.23	HE	2.93	0.25	2.87	0.34	0.17**
10	Uses, care and maintenance of farm tools	3.59	0.64	VHE	3.63	0.63	3.46	0.72	0.07**
11	Waste disposal and management	2.90	0.25	HE	2.92	0.26	2.87	0.34	0.21**
12	Problem soils and management	2.94	0.36	HE	2.95	0.29	2.91	0.41	0.44**
13	Atmospheric quality, human health and agricultural production	2.91	0.37	HE	2.92	0.28	2.87	0.33	0.27**
14	Wildlife conservation and management	2.90	0.38	HE	2.95	0.30	2.91	0.40	0.51**
15	Organic farming	2.21	0.40	ME	2.23	0.49	2.30	0.52	0.38**
16	Precautions and use of agro-chemicals in agricultural production	2.93	0.39	HE	2.95	0.33	2.90	0.39	0.32**

$N_1=177$; $N_2=69$, $\bar{X}_1 = \text{Mean of group one}$, $\bar{X}_2 = \text{Mean of group two}$, $SD_1 = \text{Standard Deviation of group one}$, $SD_2 = \text{Standard Deviation of group two}$; $p \alpha .05$, $df = 244$, $NS = \text{Not significant}$; $VHE = \text{Very high extent}$; $HE = \text{High extent}$; $VLE = \text{Very low extent}$, $RM = \text{Remarks}$

Table 1 columns 3 and 4 presents the mean ratings and standard deviations of respondents on the extent of inclusion of ESD themes in Agricultural extension education programme of Cross River State. The data in (column 3) revealed that 3 out of 16 ESD themes received mean values ranged from 3.50 to 3.60. The item numbers are 3, 7 and 10. This showed that environmental pollution and its effects on man, livestock and crop production; land management and conservation practices and agricultural production and uses care and maintenance of farm tools are to a very high extent included as ESD themes into Agricultural extension education outreach programme of the ADP extension system of Cross River State. The data also showed that 12 out of 16 ESD themes received mean values that ranged from 2.90 to 2.99. The items include number 1, 2, 4, 5, 6, 8, 9, 11-14, and 16. This implies that causes, effects, prevention and control of soil erosion; cropping system and agricultural production; livestock management and health; crop health; relationship between soil properties and agricultural production; waste disposal and management; problem soils and management; wildlife conservation and management and precautions and use of agro-chemicals are to a high extent included as ESD themes into Agricultural extension education outreach programme of the ADP extension system of Cross River State. The data further indicated that 1 out of 16 ESD themes (item 15) received a mean value of 2.21. This showed that organic farming was to a very low extent included into the extension outreach programme of the State. The standard deviations of the 16 ESD themes (column 4) ranged from 0.12 to 0.64 and were less

than 1.96 (95% confidence limit). This indicated that the respondents were not too spread from each other in their responses. They were also not too far from the mean which added value to the reliability of the mean.

FGDs by the researcher with registered farmers and extension personnel of ADP extension system in Cross River State revealed that ESD themes included in their outreach programme are soil conservation and management techniques, agro-chemical use and management, pest and diseases management of crops, livestock diseases and management, timely and proper harvesting of crops; forest management techniques and use of improve varieties of crops for planting; uses and maintenance of farm tools and pollution.

Furthermore, content analysis of the farmer business school training guides used for extension outreach training of farmers revealed that Cross River State revealed CRADP has a mandate to include, teach, research, conduct field trials and network with research institutions to disseminate agricultural information including ESD their extension outreach programme to farmers. It also shows that ecological contents included in the CRADP extension outreach programme are, crop production techniques and health, animal husbandry and health, agro-chemical use and precautions, ecosystem destruction and loss of biodiversity, soil degradation and conservation measures, use of farm tools, equipment and their maintenance and cropping systems. The qualitative information sought through FGDs with farmers and graduate extension provided more value to the quantitative data further increasethe reliability of the

data collected to provide answer to research question one.

Hypothesis testing

To test hypothesis one, independent t-test statistic was used and the data is presented in Table 1 columns 6 to 8. The data showed that the 16 ESD content areas had p-values that ranged from 0.07 to 0.58. The values were greater than 0.05 indicating that there were no significant differences in the responses of the two groups of respondents on the extent of inclusion of the 16 ESD themes as contents into CRADP extension system. The null hypothesis was upheld for the 16 ESD themes as contents in extension outreach programme of cross River State. This implies that both farmers and extension personnel did not differ in their responses on the inclusion of the 16 ESD themes as contents in extension outreach programme. Respondents did not allow such differences among them as intelligence, literacy level, institutional roles, location and experience to influence their responses on ESD

content areas included into their programme. Rather, they demonstrated objectivity in their responses which is a function of their active involvement in the extension outreach programme of the State.

The results obtained from both the qualitative and quantitative (mixed methods) were not different. This adds to the value of mixed methods of data collection as there were complementary.

Research question 2

What methods are used in teaching ESD contents to farmers in agricultural extension education programme in Cross River State?

Hypothesis 2

There is no significant difference between the mean ratings of registered farmers and graduate extension personnel on methods used in teaching ESD contents to farmers in agricultural extension education programme in Cross River State. The data for answering research question 2 and testing hypothesis 2 is presented in Table 2.

TABLE 2: Mean ratings and t-test analysis of the responses of registered farmers and extension personnel on methods used in teaching ESD themes in ADP extension system in Cross River State N=250

1 S/N	2 ESD teaching methods in ADP extension system	3 \bar{X}	4 SD	5 RM	6 Registered farmers		7 Extension personnel		8 p-value
					\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	
1	Farm and home visit	2.22	0.42	R	2.19	0.41	2.28	0.45	0.15**
2	Office calls	2.16	0.37	R	2.15	0.35	2.21	0.41	0.26**
3	Telephone calls	2.17	0.38	R	2.16	0.36	2.21	0.42	0.29**
4	Personal letters	1.53	0.86	R	1.47	0.84	1.67	0.91	0.11**
5	Method demonstration	2.85	0.35	O	2.87	0.33	2.81	0.39	0.28**
6	Result demonstration	2.86	0.34	O	2.86	0.32	2.80	0.39	0.23**
7	Conferences	1.47	0.76	NAA	1.42	0.73	1.61	0.82	0.91**
8	Discussion meetings	2.91	0.36	O	2.92	0.35	2.87	0.41	0.32**
9	Workshops/farm schools	1.51	0.81	R	1.46	0.79	1.64	0.85	0.11**
10	Field trips	1.50	0.80	R	1.45	0.78	1.64	0.85	0.10**
11	Bulletins	2.88	0.32	O	2.90	0.30	2.84	0.37	0.25**
12	Leaflets	2.25	0.49	R	2.22	0.47	2.32	0.56	0.18**
13	Radio	2.90	0.38	O	2.91	0.35	2.90	0.46	0.86**
14	Television	2.85	0.35	O	2.88	0.32	2.78	0.41	0.04*
15	Exhibition	2.17	0.37	R	2.16	0.37	2.18	0.39	0.72**
16	Posters	2.85	0.36	O	2.87	0.34	2.78	0.41	0.10**
17	Movies	2.22	0.48	R	2.19	0.44	2.30	0.57	0.17**
18	Charts	2.17	0.37	R	2.16	0.37	2.19	0.39	0.72**
19	Slide/film shows	1.56	0.93	R	1.51	0.90	1.70	0.98	0.14**
20	Models	1.56	0.93	R	1.50	0.89	1.72	1.02	0.10**
21	Internet resources	1.54	0.87	R	1.48	0.85	1.67	0.91	0.14**
22	Text messaging	1.53	0.86	R	1.46	0.84	1.66	0.91	0.11**

$N_1=177$; $N_2=69$, \bar{X}_1 = Mean of group one, \bar{X}_2 = Mean of group two, SD_1 = Standard Deviation of group one, SD_2 = Standard Deviation of group two; $p < .05$, $df = 244$, NS= Not significant; * = Significant; O=Often; R= Rarely; NAA= Not at all, RM= Remarks

Table 2 columns 3 and 4 presents the mean ratings of respondents on the methods used in teaching ESD themes in ADP extension system in Cross River State. The data in column 3 revealed that 7 out of 22 teaching methods recorded mean values ranged from 2.85 to 2.91. The items were number 5, 6, 8, 11, 13, 14 and 16. This implies that method demonstration; result demonstration; discussion meetings; bulletins; radio; television and posters are often used in teaching ESD themes in their programme. The data also showed that 14 out of 22 teaching methods had their mean value ranged from 1.50 to 2.25. They include items number 1-4, 9, 10, 12, 15, 17-22. The implication of this result is that farm and home visits; office calls; telephone calls; personal letters; workshop/farm schools; field trips; leaflets; exhibition; movies; charts; slide/film shows; models; internet resources; text messaging are rarely used in teaching ESD themes in ADP extension system of Cross River State. Furthermore, one teaching method (item 7) had a mean value of 1.47 indicating that conference is not used at all as a teaching method in ADP extension system of Cross River State.

The standard deviations of the 22 extension teaching methods (column 4) ranged from 0.32 to 0.93 and were less than 1.96 (95% confidence limit). This showed that respondents were not far from the mean and from one another in their responses.

Data obtained through FGDs by the researcher with farmers and extension personnel revealed that methods used in teaching contents in the CRADP extension outreach system include; monthly meetings, demonstration fields (demo plots), group discussion, field days, observation and farmer field schools. Other methods the participants listed included the use of posters, bulletins, radio and farmer field schools. When asked to comment on the frequency of use of these methods an extension personnel had this to say:

"...we are mostly disposed to monthly meetings/discussions which are held at the zonal agricultural offices. These meetings are often held in the offices with farmers registered with us. Other methods like demonstration, radio broadcast and posters are not regular again. Even farm visit is not done again because field technical staff strength is reduced..."

Although respondents were at liberty to express themselves in FGDs and complete the designed questionnaire, information generated through the mixed methods were in agreement and complimented each other

Hypothesis testing

To test hypothesis 2, Independent t-test statistic was used and the data is presented in Table 2 columns 6 to 8. The data revealed that 21 out of 22 methods of teaching ESD themes, that is, items number 1-14, 16-22 had p-values that ranged from 0.10 to 0.91. The values were greater than 0.05. This indicated that there was no significant difference in the

responses of the two groups of respondents on the 21 methods of teaching ESD themes in ADP extension outreach programme. The null hypothesis of no significant difference was upheld for the 21 ESD teaching methods. The implication of this result is that respondents exhibited agreement in their responses as they did not differ significantly on the 21 ESD teaching methods in ADP extension system in Cross River State.

However, one method, that is item 14 (television) out of the 22 methods of teaching ESD themes had a p-value of 0.04. This value was less than 0.05. This implies that there was a significant difference in the responses of the two groups of respondents on the use of television as method of teaching contents in ADP extension system in Cross River State.

DISCUSSION OF RESULTS

It was found out from the research question one answered by the study that 15 ecological ESD themes were included into ADP contents of extension system. They include environmental pollution and its effects on man, livestock and crop production; land management and conservation practices and agricultural production and uses care and maintenance of farm tools; causes, effects, prevention and control of soil erosion; cropping system and agricultural production; livestock management and health; crop health; relationship between soil properties and agricultural production; waste disposal and management; problem soils and management; wildlife conservation and management and precautions and use of agro-chemicals. This result truly confirms that ESD are included into the CRADP extension system. The adoption of unsustainable practices by farmers at the moment in their farm operation in Cross River State is not connected to the content used as guides in training them in the agricultural extension outreach programme but other associated factors in the content delivery process. The finding strengthen earlier research evidences of Alawa (2015a), Hazell and Lutz (1998) and FAO (1994) in affirmation of the inclusion of environmental sustainable development themes, that is, social, economic and ecological dimensions into agricultural education and training programmes in developed and developing countries. The result of research question 2 revealed that method demonstration; result demonstration; discussion meetings; bulletins; radio; television and posters are used in teaching ESD themes in their programme. Other teaching methods such as farm and home visit; office calls; telephone calls; personal letters; workshop/farm schools; field trips; leaflets; exhibition; movies; charts; slide/film shows; models; internet resources; text messaging are rarely used in teaching ESD themes in ADP extension system of Cross River State. It was also found out from the FGDs held with respondents that monthly discussion meeting is the predominant method used, while others were rarely used in the ADP extension system of the State. With this result, it has become clear that

reducing the entire extension outreach programme to mere monthly meeting devoid of participatory approaches and farm visitation may not yield desired results in the delivery process. With this result, the adoption of unsustainable practices by farmers in Cross River State is persisting because of the lack of farmer friendly teaching methods which are capable of taking them through conviction to adoption of innovations in agriculture generally and ESD themes in particular. The absence of follow up checks to individual farmer's plots makes the farmer extension outreach programme ineffective. This finding negates Alawa (2015b), Osinem (2008) and Garforth (1993) who sued for individual and participatory approaches in the delivery of contents in agricultural extension programme to facilitate easy adoption of agricultural innovations.

CONCLUSION

The concern of the Federal Government of Nigeria (FGN) has been meeting the food needs of her citizenry with great dependence on the arable land frontier. However, this concern is being threatened as a result of unsustainable ecological practices of farmers in Nigeria in general and Cross Rivers State in particular that have potentials to negate sustainable development in agricultural production. The extent of inclusion of ecological sustainable development themes into agricultural extension education programme and delivery methods used in the Cross River Agricultural Development Project was handled in this study. It is hoped that if the findings of this study are utilized, ecological problems will be kept low as farmers are core stakeholders in ecological management and their attitudes can be positively influenced by extension personnel in their outreach programme. This in turn will guarantee sustainable cultures in agricultural production systems in Nigeria in general and Cross River State in particular.

RECOMMENDATIONS

Based on the findings of this study, it was recommended that:

1. The Cross River Agricultural Development Programme should ensure that ESD themes not fully included into agricultural extension programme are integrated and taught to farmers.
2. There should be an overhaul of the agricultural extension programme by the Ministry of Agriculture with enabling conditions to facilitate individual contacts of extension personnel with farmers that would reasonably convince and prepare these land users for sustainable environmental resource use and conservation.

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