

FARMERS' USE OF ENVIRONMENTALLY SUSTAINABLE PRACTICES IN CROSS RIVER STATE, NIGERIA

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Abstract: This study was carried out to assess farmers' use of environmentally sustainable practices in Cross River State, Nigeria. To achieve the aim of this study, the respondents' socio-economic characteristics were ascertained, so also were the available types of environmentally sustainable practices, level of awareness, the extent of technology use and factors affecting use. Systematic random sampling technique was used to draw 368 respondents from a sampling frame of 3,680 CRADP farmers. Dry season vegetable, crop combination and alley farming were purposively selected for the study. Structured questionnaire was used to collect data for the study. The result of the analysis showed that the respondents were predominantly males (78%) and had a mean age was 41.4 years. The educational level was low, household size was large with 78.5% having more than six members. Primary occupation was crop farming (93.4%). The mean gross income was N132,348 with about 28.4% earning N160,000 per annum or more. Average farm size was 2.1 hectares. Common land ownership is from the family or inherited. Though group participation was common to all respondents, contact with extension was very poor. The most common sources of awareness were friends, neighbours and relatives and contact farmers. Rate of abandoned adoption was highest with alley farming (58.7%) while sustained use was highest with crop combination (66.6%). Major factors influencing sustained use of technology are environmental adaptation, availability of capital and cultural adaptation. Chi-square (χ^2) results showed that education, farmsize, income and gender had significant influence on use of environmentally sustainable practices ($\chi^2=18.019$; 15.335, 17.554,

16.204; $p<0.05$). ANOVA test showed a significant difference in the use of the practices in the three agricultural zones ($F=54.479$, $P<0.05$). This difference is an indication of the adaptability of the practices in each zone. Therefore, farmers should be encouraged to adopt environmentally sustainable practices that are adaptable to their environmental conditions only. This will consequently reduce cost and increase output.

Keywords: Assessment, Environmentally, Practices and Sustainable

INTRODUCTION

Farmers and the environment relate to each other in a mutual manner. As their farming activities affect the environment, it in turn affects the farmers and their plants. The effect of one on the other could be positive or negative. All farmers by virtue of their roles within various cultures are nearer to nature in their activities. The relationship between farmers and the environment in general can be examined within the context of the following problems, deforestation, desertification, drought, erosion, flood and loss of soil fertility.

In the process of exploiting and actual usage of natural resources, rural people exert impact of varying degrees and intensity on the environment. PROSAB (2007) explained that the nature of such impact depends on the environment itself. A negative impact results in environmental degradation. While a positive impact results in environmental sustainability. In Nigeria the level of environmental consciousness is abysmally low (Agbamu (1993) and PROSAB (2007). Nigerians, including farmers and

fishermen, are at best indifferent to the environment. They view the environment as merely a source of livelihood. They see it as discrete entities not interdependent structures of forests, rivers and animals not as something they depend on to reproduce themselves; therefore they treat it with awe in benign indifference (Koyenikan, 2009). David *et al* (2002) identified the following as constraints to sustainable environmental management; economic; capital needs and financial incentives, social conditions, land tenure, availability of infrastructure and educational level of the farmer.

Sustainable agricultural development is related to environmental protection. In the views of Dumanski (1997), it is the development that meets the need of the present population without compromising the ability of the future generation to meet their own needs. Sustainable agriculture provides for basic human food and fibre yet it is able to enhance the quality of life of the farmers and rural people as a whole. Sustainable agriculture in the views of Olokesusi (1997) integrates three main goals; environmental stewardship, farm profitability and prosperous farming community. Sustainable agriculture therefore refers to agricultural production that can be maintained without harming the environment (Wikipedia encyclopedia, 2009).

FAO (2009) reported that Sub-Sahara African's forest cover estimated at 679 million hectares in 1980 has been diminishing at the rate of about 2.9 million hectares per annum till date. Also that as all of its farm land is affected by soil erosion and degradation and up to 80 percent of its pasture and range areas show signs of degradation.

The deterioration state of the environment in Nigeria has been observed on land, water atmosphere, vegetation, wildlife, fisheries and human habitation. This deterioration occurs in the form of deforestation, bush burning, erosion, drought, etc. These in the views of Koyenikan (2009) are usually the consequences of adopting inappropriate agriculture practices and technologies (bush burning, clearing, use of chemicals, excessive tillage, e.t.c) extensive deforestation (firewood collection, logging or timber exploitation), infrastructural development, sewage disposal and wrong poverty coping techniques.

Rural people are, to some extent, aware of the damage their practices and other natural calamities caused on the environment and have therefore adopted a conservation and management strategies that would ensure sustainability and rational utilization of their forests and other natural resources. However Stephen (2003) said this has not been sustainable enough in societies where such practices have proven successful in maintaining the environment. It is therefore necessary to assess

farmer's use of environmentally sustainable practices, with a view to identifying areas of improvement in Nigeria.

Management of the rural environment and its natural resources is as important as the use of the resources especially in a country like Nigeria that has the largest forest reserve in Sub-Saharan Africa (Mofi News, 2011). Understanding the environment in the views of Ogunsumi (2010) should not only be in its technical sense but also in its socio-economic and cultural context. It is not enough to know that farmers deplete the environment through their activities; there is also a need to understand why they behave this way and measures they adopt in ensuring that their environment is sustainably managed. This understanding will form the basis for developing appropriate technologies and also designing an environmental management programme that will not only be socio-economically acceptable to the rural farmers but also culturally adaptable. Such programme in the opinion of Onasanya (2007) will enhance local community participation in the management of the environment. According to Mofi News (2011), better understanding of the traditional roles, competing local interests and rural response to environmental management policy implementation, will help in designing effective approach to community participation in sustainable natural resource and environmental management. These issues further strengthen the need to assess farmer's use of environmentally sustainable practices in Cross River State.

OBJECTIVES OF THE STUDY

The general objective of this study is to assess farmers' use of environmentally sustainable practices in Cross River State, Nigeria.

SPECIFIC OBJECTIVES

The specific objectives of this study are to; (a) Determine the socio-economic characteristics of the respondents (b) Identify the sources of farmers' awareness of environmentally sustainable practices (c) Ascertain the extent of farmers' use of environmentally sustainable practices. (d) Identify factors affecting farmers' use of environmentally sustainable practices. (e) Make policy recommendations

HYPOTHESES

(a) Ho₁: farmers' socio-economic characteristics (such as age, education, marital status, farm size, income, gender and contact with extension) do not significantly influence their use of environmentally sustainable practice. (b) Ho₂: There is no significant difference in the sustainable use of technology among farmers' in the three agricultural zones.

METHODOLOGY

The study area was Cross River State. The state has 18 Local Government Areas and is divided into three agro-ecological zones, which are Calabar, Ikom and Ogoja.

A sample frame of all farmers practicing the three environmentally sustainable practices containing 3,680 respondents across the three agricultural zones in the state was obtained from CRADP from where systematic random sampling technique was used to obtain the tenth number on the list; this resulted to a final sample size of 368 respondents. Three environmentally friendly practices disseminated across the three zones in the state were also purposively selected for the survey. They include dry season vegetable, crop combination and alley farming.

Descriptive statistics was used to analyse objectives. While the factors affecting farmers' use of environmentally sustainable practices were ranked. Chi-square and Analysis of Variance (ANOVA) was used to analyse hypotheses one and two respectively.

RESULTS AND DISCUSSION

Respondents' Socio – Economic Characteristics

Table 1 indicates that the respondents mean age is 41.1 years, with only 9.1% falling below 30years and 18.2% above 50years. 78% of the respondents are females, majority (68.6%) of whom are married with about 78.5% having a fairly large family size of more than 6 members. Crop farming is the main occupation (93.4%). The respondents cultivate a mean farm size of 2.1ha. Average income is #44,106 per annum, with majority (58.1%) earning between #36,000-<#80,000. Only 2.5 percent had tertiary education and 22.9 percent had no formal education. Very few (7%) of the respondents had frequent contact with extension at an average of once in a month, while 55percent had occasional contact with extension agents (1-4 times a year). Others never had any contact with extension. According to Ogunsumi (2010) Sustainable of agricultural Technology requires an understanding of farmers' socio-economic and farming characteristics as well as the choice of technology adopted by the farming household. New technologies according to Onasanya (2007) works best when embedded in the local society, its physical environment, cultural experience and its socio-economic structures. According to FAO (2005), frequency of farmers contact with extension will increase in direct relationship to the ease of access by farmers in a social context. The level of education can enhance such contact in direct ways. Economic factor that determine farm practices in the opinion of Onasanya (2007) also include farmers' income access to soil

enhancing input, educational level, farm size or number of farm plots e.t.c.

Table 2 shows respondents' land ownership system. The most common means of land acquisition was through inheritance as majority of respondents used inherited land for the cultivation of the three enterprises. However, 95 (25.8%) respondents combined family and inherited lands for crop combination. Family ownership of land was also prevalent for dry season vegetable production. An appreciable number of Alley farmers, 59 (16%) purchased lands for cultivation. Other combinations of land ownership were not common for Alley farming and vegetable production (IITA, 1989; Stephen, 2003; and Onasanya 2007)

GROUP MEMBERSHIP

Group membership was a common phenomenon as virtually all the respondents were either in one group or another as indicated in Table 3. Membership in cooperatives (83.2%), age groups (60.9%) and social clubs (31%) were the most common group association by respondents. Other groups with very small membership of less than 27 included village council, agricultural/extension committees, women in agriculture groups, farm leadership e.t.c. It was observed that most of the cooperatives were formed within existing age groups and social clubs. The concentration of respondents in these two groups could be due to the fact that they are necessary or mandatory for adults in most parts of the study area. Mougeot (2005) asserted that group participation as a framework by which peasant farmers defend and negotiate their interest is essential to the success of agricultural development projects. Onasanya (2007) also found out that social participation was one of the variables that was positively related to the farmers' decision to adopt new practices but however that the adoption behaviour of the small-scale farmers could not be predicted on the basis of their family size and farming experience. The results in Table 4 indicate that the most common sources of awareness of dry season vegetable are friends, neighbours or relatives (53.0%) and contact farmer (36.4%). That of crop combination is basically friends, neighbours and relatives (88.3%), while Alley farming are contact farmers (49.7%) and friends, neighbours and relatives. (47.3%). This shows that Alley farming technology is basically an introduction by extension services while crop combination and dry season vegetables are also a product of indigenous knowledge improved upon. The use of mass media as a common instrument for creating awareness according to Stephen (2003) is undermined by these results. However, studies by Igodan (1991) reported that extension agents, friends and family are the most widely used sources of information by farmers.

Table 1: Socio-Economic Characteristics of the Respondents

	Description of items	Frequency	Percentage
1	Age (in years): Below 30 years	33	9.1
	30-39 years	126	34.2
	40-49 years	142	38.5
	50 and above	67	18.2
	X = 41.4 years		
2	Gender		
	Male	287	78.0
	Female	81	22
3	Household size		
	5 Members and Less	79	21.5
	6-10 members	209	56.7
	More than 10 members	80	21.8
4	Marital Status		
	Single	28	7.7
	Married	252	68.6
	Widowed	42	11.3
	Divorced	19	5.2
	Separated	27	7.2
5	Primary Occupation		
	Crop farming	344	93.4
	Livestock farming	4	1.0
	Trading	13	3.6
	Hunting and Gathering	0	-
	Civil Service	7	2.0
6	Farm Size		
	2ha and less	151	41.0
	Above 2ha-5ha	177	48.0
	More than 5ha	40	11.0
	X=2.1hac		
7	Income (per/annum)		
	Less than 36,000	49	13.5
	36,000 - <80,000	214	58.1
	80,000 - <120,000	59	16.0
	120,000 and above	46	12.4
	X = ₦ 44,106		
8	Highest Level of Education		
	Non-formal education	84	22.9
	Primary school	149	40.5
	Secondary education	126	34.1
	Tertiary education	9	2.5
9	Contact with extension		
	Not at all	140	38
	Occasionally	202	55
	Frequently	26	7

Table 2: Land Ownership System

Land ownership	Crop combination		Alley farming		Dry season vegetable	
	Freq	Percent	Freq	Percent	Freq	Percent
Family	53	14.4	43	11.7	131	35.6
Inherited	109	29.6	218	59.2	151	41.1
leased	20	5.4	12	3.3	27	7.4
Borrowed	2	0.5	3	0.8	6	1.7
Purchased	18	4.9	59	16.0	49	13.4
Family/inherited	95	25.8	17	4.6	4	0.8
Inherited/leased	32	8.7	2	0.5	0	0
Inherited/purchased	8	2.2	3	0.8	0	0
Other combination	31	8.4	11	3.0	0	0
Total	368	100	368	100	368	100

Table 3: Respondents' Group Membership

Group Membership	Member		Officer	
	F	Percent	F	Percent
Co-operatives	306	83.2	31	8.4
Age-group	224	60.9	52	14.1
Village council	27	7.3	7	1.9
Agric. Ext. committees	26	7.1	1	0.3
Women in agriculture	12	3.3	1	0.3
Farm leadership council	26	7.1	2	0.5
Social clubs	114	31.0	32	8.7

Multiple responses were allowed

Table 4: Sources of Awareness

Technology	Extension Agent	Contact Farmer	Friends, Neighbours & Relatives	Mass Media
Dry Season Vegetable	27(7.3)	134(36.4)	195(53.0)	12(3.3)
Crop Combination	12(3.3)	16(4.3)	325(88.3)	15(4.1)
Alley Farming	8(2.2)	183(49.7)	174(47.3)	3(0.9)

Table 5: Farmers' Use of Selected Environmentally Sustainable Practices

Technology	Aware	Never practiced	Used but Discontinued	Still practicing
Dry season vegetable	368(100)	160(43.5)	82(22.3)	126(34.2)
Crop Combination	368(100)	32(8.7)	91(24.7)	245(66.6)
Alley Farming	368(100)	123(33.4)	216(58.7)	29(7.9)

Table 6: Rank Order of Factors Influencing the Use of Environmental Practices

S/N	Factors	Frequency	%	Rank
1.	Environmental Adaptation	333	90.5	1 st
2.	Availability of capital	316	85.9	2 nd
3.	Cultural Adaptation	221	60.1	3 rd
4.	Returns for use	214	58.2	4 th
5.	Availability of technology	202	53.9	5 th
6.	Cost of practicing technology	151	41.0	6 th
7.	Social acceptability	144	39.1	7 th
8.	Availability of input	76	20.7	8 th
9.	Cost of Technology	55	14.9	9 th
10.	Religious acceptability	44	12.0	10 th

Multiple responses allowed

Table 7: chi-square (χ^2) results of the Influence of education, marital status, Farm size, Income, gender, frequency of farmers' contact with extension agents on the use of selected environmentally sustainable practices

Variables	(χ^2) Value	df	p.
Age	8.999	4	0.722
Education	18.019	8	0.21*
Marital Status	7.474	4	.113
Farm Size	15.335	4	0.001*
Income	17.554	4	.012*
Gender	16.204	4	.003*
Contact with Extension agents	18.958	8	0.899

*Significant at $p < 0.05$ **Table 8:** ANOVA Test of Difference in Pattern of Use of Environmentally Sustainable Technology among Farmers in the Three Zones

Sources	df	SS	MS	F - Ratio	F - Prob
Between Groups	2	66.958	33.479	54.479	.000
Within Groups	366	221.230	.615		
Total	368	288.187			

Table 5 shows that all the respondents were aware of the three technologies. 208 (56.5%) of them adopted the cultivation of dry season vegetable. out of these, 82(22.3%) practiced but stopped, while 126(35.1%) were still using the technology. Environmental adaptability is seen as a common reason for use of dry season vegetable production and also nearness to stream. Availability of water and other ecological factors in the views of CRADP (1998) are responsible for dry season vegetable production. Of the 336 (91.0%) adopters of crop combination technology, 245 (66.6%) were still using the technology, 91(24.7%) used and discontinued.

About 245 of the respondents adopted alley farming technology. 216 (58.7%) used and discontinued, 29 (7.9%) were still using technology. In spite of all the advantages of alley farming as indicated by IITA (1989) and Igodan (1991), they however said that if alley farming technology is to have a significant impact on land use pattern in Nigeria it must be widely adopted by the resource poor farmers who make up the vast majority of the population. They went further to say that a farmer's decision on whether to adopt alley farming or not depend on the institutional environment in which the farmer

operates. Inadequate institutional capacity to carry on project activities without outside support may be detrimental and could lead to continual termination of the efforts and gains.

Table 6 three indicates that environmental adaptability (90.5%) is the major reason influencing the use of environmentally sustainable practices. Availability of capital (85.9%) and cultural reasons (60.1%) ranked 2nd and 3rd respectively. The least factors of influence as ranked are Religion (12%), cost of technology (14.9%) and availability of input (20.7%). For a practice to be sustainable in the views of Rigby and Caceres (2001), it has to be environmentally adaptability, economically viable and socio-culturally acceptable. According to PROSAB (2007), factors that may influence the partial or total rejection of technology include-misapplication, shortage of input, increase in cost of production and decrease in returns.

The results in Table 7 show that educational level, farmsize, income and gender contributed significantly to the use of environmentally sustainable practices at a (χ^2)-value of 18.019, 15.335, 17.554 and 16.204. However, age, marital status and contact with

extension agents had no effect on sustained use of technologies ($\chi^2=8.999, 7.474$ and 18.958). These results agree with the reports of the researches carried out by Agbamu (1993), Abang *et al* (1994) and Onasanya (2007) where profitability of the use of technology by farmers, was seen as the most important factor that will ensure continued use.

The result in Table 8 indicates that there is a significant difference in the pattern of use of technology among farmers in the three agricultural zones with F-ratio of 54.479. This is an indication of a wide diversity in ecological, cultural, social, economic and environmental zones and so the availability of land which consequently resulted in adaptive diversity of use of technologies. With more respondents from Ogoja zone practicing crop combination and from Calabar practicing dry season vegetable cultivation. Ecological and environmental diversity in the views of Onasanya (2007) and Ogunsumi (2010) are major factors responsible for differences in sustained technology adoption.

CONCLUSION AND RECOMMENDATIONS

From the result of the study, Males are predominant in the study area and virtually all the respondent are involved in crop farming. There is a strong marital and family tie as divorce rate was low. Farmers' contact with extension was very low, while group participation was common. Most common land ownership system is from the family or inherited as a result of the land tenure system. The most accessible social contacts formed the major sources of awareness. The highest rate of abandoned adoption was in alley farming due to the factors affecting adoption and sustained use.

More men being household heads is an indication of the place of men in farm communities. Educational level is very low which obviously will affect the adoption of new technologies. Gender had a significant relationship with use of environmentally sustainable practices. This may be related to the tendency that most females are more likely to attribute use of new technologies to the male or their husbands. ANOVA test showing a significant difference in the pattern of use of technology in the three zones is an indication of environmental adaptability of each of the practice to each zone. For technology to be environmental sustainable, it should consider the diverse, socio-cultural and ecological condition of the people. The use of communal socio-relationships and groups should be intensified as a channel of creating awareness. Though culture is dynamic, technologies should be made compatible with the cultural domain of the farmers.

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