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PERCEPTIONS OF FARMERS ON THE IMPLEMENTATION OF AGRI-ENVIRONMENTAL SCHEMES IN OYO STATE, NIGERIA

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Abstract

The study determined farmers' perceptions on the implementation of agri-environmental schemes in Oyo State. The study examined and compared adopters and non-adopters of the program in regards to applying the improved and non-improved sustainable agricultural practices, their perception of the program, and information sources of the program and different farming practices. A total number of 120 farmers in the four agro-ecological area of Oyo state were used for the study. Multistage sampling procedure involving purposive and random sampling techniques was adopted and data were collected by means of a questionnaire to all of the adopters (102 farmers) and 18 non-adopters. The instrument was validated by experts in Agricultural Education Department and has at reliability co-efficient of 0.73. Chi-square test of independence was used for data analyses. Results of the study indicated that adopter farmers significantly ($P<0.05$) differed from non-adopter farmers in applying promoted sustainable agricultural practices which were crop rotation, growing legume crops, using modern irrigation systems, using animal manure, taking adequate measures for soil erosion, and taking adequate measures to protect pastures and preventing overgrazing. It was concluded that promotion have influence on adoption of environmental programs in Oyo State and recommended that government should support the farmers by regular extension services and training activities.

Keywords: Sustainable agriculture, environment, schemes, farmer adoption, perception

Introduction

Globally, evidence shows that human intervention and disturbance of environmental stability were recognized. Although, environmental variability is a natural phenomenon, the increasing frequency and severity of extreme climatic events can in part be attributed to human activities such as deforestation and inappropriate management of land and water resources (United Nations Environment Programme-UNEP, 2010). Climate models predict that climate change will lead to, among other things, an increase in unpredictability

of rainfall, warmer temperatures, and an increase in the severity and frequency of extreme weather events. These changes are expected to decrease agricultural productivity in the developing world by 10% to 20% over the next 40 years. Subsistence farmers in the developing world find it particularly difficult to cope with such climate-related hazards, as they do not have the capital to invest in new adaptive practices with which to protect their homes and families. Especially sensitive to climatic changes are those households that rely almost entirely on rain-fed agriculture for their livelihoods. There has been a recent focus in the international development community and literature on strategies to help subsistence farmers reduce their vulnerability to climate change (Thorlackson & Neufelt, 2010).

Environmental education increases public awareness and knowledge about environmental issues or problems. In doing so, it provides the public with the necessary skills to make informed decisions and take responsible action. Studying the environment involves two basic approaches. The first approach, based on the fact that humans share this planet with other living creatures, focuses on the interactions among living systems. The second broader approach looks at the total environment, and emphasizes that all the planet's resources, both living and non-living, are ultimately limited (Izuogu, 2015). According to Ayodele (2009) The Federal Government of Nigeria (FGN) designed strategies to increase agricultural production, processing, and marketing. Some of these are tied to the National Economic Empowerment and Development Strategy (NEEDS), which the government designed in 2004 to reduce poverty and empower the poor. Given the importance of agriculture in poverty reduction, NEEDS sets out a number of qualitative performance targets that were to be achieved by 2007. These include 6 percent annual growth in agricultural export and a drastic reduction in food import from 14.5 percent of total imports to 5 percent. The "Seven Point Agenda" of the present administration specifies "food security "as one of the priorities in the country's "Medium Term Development Plan and Vision 20: 2020" (Nigeria, Federal Ministry of Agriculture and Water Resources. 2008).

It is important to look at the evolution of Nigerian environmental policy before establishing its links to agricultural policies. The illegal dumping of toxic waste at the Koko Port in the then- Bendel State (now Delta State) culminated in the creation of the Federal Environmental Protection Agency (FEPA) through Decree 58 of 1988, as amended by Decree 59 of 1992. The states then followed by creating agencies dealing with environmental protection. In 1999, all units and departments in the different federal agencies that deal with the environment, including FEPA, were to form the Federal Ministry of Environment, Housing, and Urban Development (FMEH & UD) in order to eliminate duplication (Nigeria, Federal Environmental Protection Agency.1999). The Ministry is therefore made up of following technical departments: Environmental Assessment,

Erosion Flood Control and Coastal Zone Management, Pollution Control and Environmental Health, Forestry, Drought and Desertification Amelioration. It is important to note that the forestry and the erosion, flood control and coastal zone management departments came out of the then ministry of agriculture and water resources (Nigeria, Federal Ministry of Environment. (2005). The Federal Ministry of Agriculture and Water Resources (FMAWR) formulate policy aimed at developing the agricultural sector. Its stated goals are to foster an agricultural sector "with reduced drudgery," and a "small effective workforce ensuring national food security and meeting the industrial raw material and export needs of the nation"(Nigeria, Federal Ministry of Agriculture and Water Resources, 2008).

Federal Environmental Protection Agency (FEPA) works throughout the geographic conditions, agricultural potential and socioeconomic characteristics of the region, and determine the certain boundaries of the landscape where the program must be implemented. Depending on agricultural systems applied in different regions, each of the provincial and district program implementation teams number of agronomists, agricultural engineers, horticulturists, and agricultural technicians. These are given training in advance. Training subjects are determined considering the landscape, climate, crops, livestock, farming infrastructure, and potential rural livelihoods in the region. Specific duties and responsibilities given to the program implementation teams are to follow program oriented legislation and regulations released by the ministry, to teach specific farming practices and provide extension services covered by the program, to keep program records related to farming activities, and to monitor and evaluate the program.

Scientists' understanding of farmer perception about technology is often clouded by misleading metaphor by which the process of technology development and delivery are described. Farmers tend to be seen as passive recipients and users of technology developed by other people. At best, it is acknowledged that some feedback on farmer reaction to a new technology is desirable in order to refine that technology but this is likely to be regarded as a need for mere fine. These metaphors are misleading because farmers are not passive consumers but active problem solvers who in fact develop for themselves most of the technologies they use (Kaimowitz & Merril-Sands, 1989).

Objectives of the study

The broad objective of the study was to determine the perceptions of farmers on the implementation of agri-environmental schemes in Oyo state. Specifically, the study compare adopters and non-adopters in terms of:

i. promoted sustainable agricultural practices
ii. non-promoted sustainable agriculture practices
iii. FEPA program and
iv. sources of information about sustainable agricultural practices and

v. whether or not they have adequate knowledge and information about these practices.

Research Questions

1. What are the perceptions of farmers (adopter and non-adopter) on promoted sustainable agriculture practices?
2. What are the perceptions of farmers (adopter and non-adopter) on non-promoted sustainable agriculture practices?
3. What are farmers' perceptions to the FEPA program?
4. What are farmers' perceptions on the sources for information on sustainable agricultural practices?
5. What is the level of adequacy of knowledge and information possessed by the farmers about these practices?

Methodology

The population of the study consist all the farmers in the four (4) zones of Oyo-State Agricultural Development Programme (ADP). A total of 120 farmers were used for the study and multistage sampling procedure involving purposive and random sampling techniques were used for the study. The first stage was the purposive selection rural farmers in Oyo state, Nigeria. This is because these are the four Agricultural zones within the state. At the second stage, two Local Government Areas were selected from each zone. In Oyo zone, Afijio and Atiba LGAs were purposively selected while two L.G.As randomly selected from each of Ogbomoso, Ibadan/Ibarapa and Saki zones. The purposive selection of Oyo and Saki was as a result of the researchers' familiarity with the area and high incidence of agri-environmental hazard emanating from flooding, erosion, and bush fire incidents etc. The third stage of the sampling was the random selection of farmers in two rural communities in each of the selected LGAs in Afijio, and Atiba, while Itesiwaju and Iwajowa communities purposively selected from Saki LGA; Oriire and Ajawa communities was purposively selected from Ogbomoso L.G.A. and Ona-ara and Akinyele communities was purposively selected from Ibadan/Ibarapa L.G.A. This as a result of evidence of agri-environmental influenced in these communities. The fourth stage was the random selection of eight (8) farmers from each of the fourteen and four (4) from Ibadan/ Ibarapa making sixteen autonomous communities which gave a sample size of 120 respondents. The instrument used was questionnaires. It included about promoted and non-promoted sustainable agricultural practices, farmers' sources of information on environmental programs and different agricultural practices. The content validity of the questionnaire was achieved by experts in the department of Agricultural Education right from the start of their construction and adjustments were made and items which were relevant to the study were retained. The reliability of the questionnaire was established by computing the internal consistency of the items after pre-testing them on a sample of 10 farmers. The reliability coefficient of the questionnaire was 0.73. This value was considered adequate for the study. Data obtained were analyzed using the

statistical tools of frequency counts, percentages and Chi-Square.

Results

Table 1: Demographic Characteristics of the Farmers in the Study Area

Variables	Frequency	Percentage
Sex		
Male	99	82.50
Female	21	17.50
Age (years)		
Below 30	12	10.00
31-40	31	25.83
41-50	23	19.17
51-60	50	41.67
61-70	04	03.33
Religion		
Islam	25	20.83
Christian	84	70.00
Tradition	11	09.17
Marital Status		
Single	12	10.00
Married	97	80.83
Divorced	06	05.00
Widow/Widower	05	04.17
Educational Status		
Primary	45	37.50
Post primary	04	03.33
Post-secondary	02	01.67
Non formal	69	57.50
Farm size (ha)		
1-2	78	65.00
3-4	23	19.17
5-6	12	10.00
7 and above	07	05.83

Table 1 presents the demographic characteristics of the farmers in the study area which shows that male farmers (80%) were more prominent in farming activities than female farmers and the least number of female farmers might due to the fact that women preferred to trade than farming while the high proportion of male farmers engaging in farming activities might be linked to their access to farmland and their position as head of family. The age distribution revealed that the active farmers' age were51-60 age groups (41.67%) while most the farmers in the study was predominantly (70.00%) Christian and were married (80.83%). Majority of the farmers are illiterate (57.50%) who can maintain 1-2 ha of land (65.00%).

Table 2: Chi-square Estimation of Adopter and Non-adopter for Enhanced Sustainable Agriculture

Sustainable Agricultural Practice	Adopters		Non adopters		Total		X^2/(Sig)	Remark
	N	%	N	%	N	%		
Do you practice crop rotation?								
Agreed	91	89.22	07	38.89	98	81.67		
Disagreed	11	10.78	11	61.11	22	18.33		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**40.45/0.02**	**Accepted**
Do you plant legume crops in the crop rotation?								
Agreed	93	91.18	06	33.33	99	82.50		
Disagreed	09	8.82	12	66.67	21	17.50		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**54.90/0.01**	**Accepted**
Do you controlled and applied organic fertilizer?								
Agreed	90	88.24	07	38.89	97	80.83		
Disagreed	12	11.76	11	61.11	23	19.17		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**34.89/0.00**	**Accepted**
Do you controlled and applied chemical fertilizer?								
Agreed	89	87.25	15	83.33	104	86.67		
Disagreed	13	12.75	03	16.67	16	13.33		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**32.67/0.07**	**Rejected**
Do you controlled and applied pesticide?								
Agreed	90	88.24	13	72.22	103	85.83		
Disagreed	12	11.76	05	27.78	17	14.17		
Total	**102**	**100**	**18**	**100**	**120**		**4.89/1.05**	**Rejected**
Do you controlled and applied herbicide?								
Agreed	95	93.14	11	61.11	106	88.33		
Disagreed	07	6.86	07	38.89	14	11.67		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**3.56/1.06**	**Rejected**
Do you used and applied irrigation methods?								
Agreed	81	79.41	06	33.33	87	72.50		
Disagreed	21	20.59	12	66.67	33	27.50		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**43.77/0.02**	**Accepted**
Do you apply adequate measures for soil erosion?								
Agreed	94	92.16	10	55.56	104	86.67		
Disagreed	08	7.84	08	44.44	16	13.33		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**5.89/2.90**	**Rejected**
Do you apply adequate measures for pastures?								
Agreed	79	77.45	06	33.33	85	70.83		
Disagreed	23	22.55	12	66.67	35	29.17		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**43.55/0.01**	**Accepted**
Do you apply measures preventing overgrazing?								
Agreed	78	76.47	7	38.89	85	70.83		
Disagreed	24	23.53	11	61.11	35	29.17		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**51.43/0.02**	**Accepted**

X^2 = Chi-square, Sig = Significant at $p<0.05$, N = Number of Observation

Table 2 indicated the chi-square tests performed for enhancing sustainable agricultural practices among selected farms in Oyo State. The result at overall, adoption of the FEPA program in Oyo state is dependent of practice of crop rotation, planting of legume crops, uses of organic fertilizer (manure, animal dungs), utilization of irrigation water and application of modern irrigation systems, using organic fertilizer, and applying adequate measures to protect pastures and avoiding overgrazing, but solely independent of taking adequate measures against soil erosion. Among the ten practices, six were found statistically significant ($P<0.05$) on chi- square and were accepted.

Table 3: Evaluation of Adopters and Non-adopters in Respect to Non-enhanced Sustainable Agriculture

Sustainable Agricultural Practice	**Adopters**		**Non adopters**		**Total**		**X^2/(Sig)**	**Remark**
	N	**%**	**N**	**%**	**N**	**%**		
Aspiration to acquired more land and expanding farm size								
Agreed	85	83.33	12	66.67	97	80.83		
Disagreed	17	16.67	06	33.33	23	19.17		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**6.78./0.82**	**Rejected**
Desired to dispose farmland for non-farm purposes								
Agreed	22	21.57	05	27.77	27	22.50		
Disagreed	80	78.43	13	72.22	101	77.50		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**4.91/0.09**	**Rejected**
Aspiration to share farm land among the family members?								
Agreed	93	91.18	12	66.67	105	87.50		
Disagreed	09	8.82	06	33.33	15	12.50		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**4.89/0.30**	**Rejected**
Do you put in place measures for reforestation of non- farm environment?								
Agreed	68	66.67	10	55.56	78	65.00		
Disagreed	34	33.33	08	44.44	42	35.00		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**2.67/0.10**	**Rejected**
Engaging in burning of residues?								
Agreed	26	25.49	07	72.22	33	27.50		
Disagreed	76	74.51	11	27.78	87	72.50		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**0.34/0.35**	**Rejected**
Practicing Vaccination of livestock?								
Agreed	90	88.24	12	66.67	102	85.00		
Disagreed	12	11.76	06	33.33	18	11.67		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**7.06/0.01**	**Accepted**
Desired to reduce off-farm inputs								
Agreed	95	93.13	10	55.56	105	72.50		
Disagreed	07	6.87	08	44.44	15	27.50		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**3.97/0.32**	**Rejected**

X^2 = Chi-square, Sig = Significant at $p<0.05$, N = Number of Observation

Table 3 shows the comparison of selected sustainable agriculture applications which weren't subject to promotion. At of the seven applications, only one was statistically

significant at an Alpha level of 0.05 (Chi-square). This was regularly applying vaccination for livestock for which farmers who positively responded the question related to this practice were 85.00% in all farmers while no significant associations were found between adoption and other variables of aspiration to acquired more land and enlarging farm size, desired to dispose farm land for other purposes such as housing and industrialization, aspiration of equally sharing farm land among the family, taking adequate measures for reforestation of nonfarm environment, burning residues, and desired to reducing off-farm inputs.

Table 4: Farmers' Perception of the FEPA Program in Oyo State

Perception variables	**Adopters**		**Non adopters**		**Total**		**X^2/(Sig)**	**Remark**
	N	**%**	**N**	**%**	**N**	**%**		
How did you first know about FEPA program?								
Mass Media	14	13.73	02	11.11	16	13.33		
Government Agricultural Programme	45	44.12	07	38.89	52	43.33		
Other farmers	30	29.41	06	33.33	36	30.00		
Village headman	13	1275	03	16.67	16	13.33		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**4.42/0.34**	**Rejected**
Do you think environmental quality enhanced after the FEPA program being applied?								
Agreed	89	87.25	06	33.33	95	79.17		
Disagreed	13	12.75	12	66.67	25	20.83		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**14.53/0.01**	**Accepted**
Have you experiences any changes in income after FEPA program carry out?								
Agreed	48	47.06	07	38.89	55	45.83		
Disagreed	54	52.94	11	61.11	65	54.17		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**32.45/0.01**	**Accepted**
Do you acquire adequate knowledge and information about the aims of the FEPA programm?								
Agreed	56	54.90	08	44.44	64	53.33		
Disagreed	46	45.10	10	55.56	56	46.67		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**12.47/0.01**	**Accepted**

X^2 = Chi-square, Sig = Significant at $p<0.05$, N = Number of Observation

The farmers' perceptions about the FEPA program are presented in Table 4. The significant variables of whether or not environmental quality enhanced after the program, whether or not the program caused an increase in farmers' income and whether or not farmers have enough information about the objectives and implementation process of the FEPA program were accepted at $P < 0.05$. Chi square test performed between these two variables yield significant association indicating that the idea that environmental quality, incomes and information increased the FEPA Program which dependent on adoption.

Table 5: Farmers' Sources of Information on Sustainable Agricultural Practices in Oyo State

Perception variables	Adopters		Non adopters		Total		X^2/(Sig)	Remark
	N	%	N	%	N	%		
What are the primary sources of information about soil and plant ?								
Mass Media	12	11.76	06	33.33	18	15.00.		
Government Agricultural Programme	20	19.61	07	38.89	27	22.50		
Other farmers	35	34.32	03	16.67	38	31.67		
Personal experience	35	34.32	02	11.11	37	30.83		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**20.15/0.42**	**Rejected**
Do you acquire enough information about soil nourishment and plan nutrition?								
Agreed	83	81.37	10	55.56	93	77.50		
Disagreed	19	18.63	08	44.44	37	22.50		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**34.34/0.90**	**Rejected**
What are the primary sources of information about pests and plant diseases?								
Personal Experiences	30	29.41	05	27.78	35	29.17		
Other farmers	31	30.39	05	27.78	36	30.00		
Government Agricultural programme	12	11.77	03	16.67	15	12.50		
Mass media	11	10.78	04	22.22	15	12.50		
Pest dealers	18	17.65	01	5.56	19	15.83		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**24.45/0.76**	**Rejected**
Do you acquire adequate information about pests and plant diseases?								
Agreed	85	83.33	13	72.22	98	81.67		
Disagreed	17	16.67	05	27.78	22	18.33		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**12.47/0.10**	**Rejected**
What is your primary source of information about animal husbandry?								
Other Farmers	45	44.11	09	50.00	54	45.00		
Mass media	17	16.67	03	16.67	20	16.67		
Veterinarian	40	39.22	06	33.33	46	38.33		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**7.45/1.41**	**Rejected**
Do you acquire adequate information about animal nutrition and diseases?								
Agreed	95	93.14	11	61.11	106	88.33		
Disagreed	07	6.86	07	38.89	14	11.67		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**13.26/1.95**	**Rejected**
What is your primary source of information about irrigation?								
Other Farmers	64	62.75	09	50.00	73	60.83		
Irrigation Association	12	11.75	02	11.11	14	11.67		
Mass media	05	4.91	02	11.11	07	5.83		
Government Agricultural programme	21	20.59	05	27.78	26	21.67		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**3.45/0.52**	**Rejected**
Do you apply adequate knowledge and information about irrigation?								
Agreed	91	89.22	12	66.67	103	85.83		
Disagreed	11	10.78	06	33.33	17	14.17		
Total	**102**	**100**	**18**	**100**	**120**	**100**	**15.79/0.01**	**Accepted**

X^2 = Chi-square, Sig = Significant at $p<0.05$, N = Number of Observation

Table 5 presents the comparisons of adopters and non-adopters in respect of their sources of information on selected sustainable agricultural practices and whether or not they thought that they have enough knowledge and information about these practices Farmers who thought that they had enough knowledge and information about irrigation was only variable that was accepted at $P<0.05$. Chi-square test performed between the variables yield significant association indicating that having enough knowledge and information about irrigation is dependent to adoption.

Discussion

The patterns of demographic characteristics of the farmers in this current study were in line with findings of Ekong (1988) and Olujide (2000). These authors in their different observations reported similar ranges of responses for sex, age, religious, marital status, educational status and farm size.

The findings on enhancing sustainable agricultural practices among selected farms in Oyo state agreed with submissions of Boz (2016) on farmers' use and perception of agri-environmental program implemented in Eregli Reed Bed area of Konya province Turkey and Olayemi (1994) on Agricultural policies for sustainable development: Nigeria experience. The farmers in the studies areas adopted similar sustainable agricultural practices at their different location which were corroborated with this current report.

Results of the study showed that farmers who adopted the FEPA program used enhanced sustainable agricultural practices more that non-adopter farmers. These practices were applying crop rotation, growing legume crops, applying modern irrigation systems, taking adequate measures for soil erosion, and taking adequate measures to protect pastures and preventing overgrazing. However, selected non-enhanced sustainable agricultural practices only one was statistically significant indicating that there were no major differences between adopters and non-adopters in terms of non-promotes sustainable agricultural practices. From the results of comparisons of adopters and non-adopters in terms of enhanced and non-enhanced sustainable agricultural practices, a basic conclusion can be drawn that promotion was really effective in adoption of the FEPA Program. Therefore, any agri-environmental program aiming to reach greater rate of adoption should seek opportunities of providing promotions. This observation was in line with the findings of Abegunde, Adeyinka, Olawuni and Oluodo (2011) who reported that farmers in their study area in the South-eastern part of Nigeria has been identified for practicing vaccination

of their livestock as part of improvement of the sustainable agriculture. This study was also in accordance with the findings of Boz (2016)and Oladele (2011) who revealed the similar trend of results in their findings.

The farmers' perceptions about the FEPA program are presented in Table 4. The significant variables of whether or not environmental quality enhanced after the program, whether or not the program caused an increase in farmers' income and whether or not farmers have enough information about the objectives and implementation process of the FEPA program were accepted at $P<0.05$. Chi square test performed between these two variables yield significant association indicating that the idea that environmental quality, incomes and information increased the FEPA Program which dependent on adoption. This current study was in accordance with the findings of Abegunde *et al.*(2011) and Izuogu and Ekumankama (2015) on assessment of rural infrastructure and productive assets provided by Fadama II development project in Okigwe Agricultural Zone of Imo State who claimed that farmers adoptions of sustainable agriculture in Imo State were depends on environmental quality, increase in farmers' income and farmers have enough information about the objectives and implementation process. Tatlidil, Boz and Tatlidil (2009) also found that farmers' perception of sustainable agriculture and its determinants: a case study in Kahramanmaras province of Turkey was similar to this findings who also reported that adoption of sustainable agriculture were due to environmental quality, farmers' source of incomes and sources of information.

Thus, this result agreed with the work of Ifenkwe and Izuogu (2011) on rural household's farmer perception of environmental hazards in Imo State, Nigeria. Olhan, Ataseven and Arisoy (2010) reported similar result on the features of farmers preferring environmentally friendly agricultural methods: The case of Turkey. Carey, Manchester and Firbank, (2005) found similar range of result on source information on performance of two agro-environment schemes in England.

Conclusions

Adopter farmers had more positive reflection that the program increased environmental quality and income level of farmers as compared to non-adopter farmers. They also had more knowledge and information about the objectives of the FEPA program. However, there were no significant differences in terms of sources of information about selected sustainable agricultural practices and farmers' knowledge levels of these practices. The only difference in

this section was that adopter farmers had more knowledge on irrigation as compared to non-adopters.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The support of Governmental at the beginning period may increase farmers' participation in the program. Hence government should encourage farmers' participation in environmental agriculture.

2. However, in order to establish sustainable agricultural production in environmentally sensitive areas, governmental support should be accompanied by regular extension services and training activities.

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