INTERNATIONAL JOURNAL OF AGRICULTURE & BIOLOGY
1560–8530/2006/08–6–836–839
http://www.fspublishers.org

Alternative Extension Approaches to Technology Dissemination for Sustainable Agriculture in the Punjab, Pakistan

KHALID M. CHAUDHRY[1], SHER MUHAMMAD† AND IJAZ ASHRAF
Department of Agri. Extension and †Division of Education & Extension, University of Agriclture, Faisalabad–38040, Pakistan
[1]Corresponding author's e-mail: khalidchuaf@yahoo.com

ABSTRACT

Sustainable agricultural development demands practices and technologies, which are technically appropriate, economically viable, environmentally non-degrading and socially acceptable. Sustainable development involves management and conservation of the natural resource base and the orientation of the technology and institutional changes in such a manner to ensure the continued fulfillment of human needs for present and future generations. The concept of sustainable agricultural development is gaining popularity among the extension agents, farmers and various organizations related to agriculture. The goal of sustainable agriculture should be to maintain production levels necessary to meet the aspirations of an extending population without degrading the environment. It would be possible only through the dissemination of recommended and environment friendly agricultural technology among the farmers through the different extension organizations working in the country. Public Sector Extension Approach (PSEA), Participatory Extension Approach (PEA) and Commodity Specialized Extension Approach (CSEA). The present paper is based on the analysis of these extension approaches in the context of technology dissemination for sustainable agricultural development. The study was conducted in Faisalabad district, where all the three approaches are simultaneously in operation for technology dissemination among farmers. Tehsil Chak Jhumra was randomly selected out of the five tehsils of district Faisalabad. Ten villages from this tehsil were taken at random and 12 farmers under each approach were randomly selected from each selected village thereby making a sample of 360 respondents. The data were collected with the help of a pre-tested, valid and reliable research instrument. The analysis of the data show that farm and home visits was the only method used by EFS of PSEA, which was rated good, tending towards excellent, whereas in case of PEA and CSEA, farm and home visits were rated as satisfactory tending towards good and fair tending towards satisfactory, respectively. However, in all the three approaches farm and home visit were ranked at the top of all the extension methods/media. Television and radio were ranked second and third by the respondents of PSEA, whereas these media were far below in rating in case of PEA and CSEA. Lecture and discussion meetings were the extension methods rated as satisfactory tending towards good, satisfactory and poor by the respondents of PSEA, PEA and CSEA, respectively. The practices such as seed rate, plant population, land preparation, improved varieties, fertilizer application and irrigation methods were rated as good by the respondents of PSEA, whereas land preparation, improved varieties, seed rate/plant population were rated as satisfactory in PEA and CSEA. By and large PSEA appeared to be a better approach with regard to knowledge gained by the respondents, whereas PEA and CSEA were relatively less effective.

Key Words: Technology dissemination; Sustainable agriculture; Extension approach

INTRODUCTION

Agriculture sector is facing many problems, which are associated with sustainable agricultural development. Among them, the most important is the use of chemicals such as fertilizers, insecticides, weedicides. The excessive use of these inputs has a deteriorating effect on the soil and embodies a threat to the environment (Garforth & Lawrence, 1997). The challenge to agricultural development is to maintain sustainable and progressive production increases and at the same time, to protect production resources and prevent their degradation (Baier, 1994). The sustainable agricultural development demands practices and technologies, which are technically appropriate, economically viable, environmentally non-degrading and socially acceptable for achieving food security and improved quality of life for present and future generations (Baier, 1994; Williams, 2000). Sustainable development involves management and conservation of the natural resource base and the orientation of technological and institutional changes in such a manner to ensure the attainment and continued satisfaction of human needs for present and future generations (FAO, 1991).

The concept of sustainable agricultural development is gaining popularity among the extension agents, farmers and various organizations related to agriculture, because it can indefinitely meet the demands for food and fiber at socially acceptable and economic costs (Chizari *et al*., 1999). The goal of sustainable agriculture should be to maintain production levels necessary to meet the aspirations of an

expanding population without degrading the environment. It would not be possible without the dissemination of recommended and environment (York, 1991) friendly agricultural technologies among the farmers. The sustainable farming practices demand cooperation among researchers, extension agents and farmers. It is important to treat farmers as co-developers of innovations for the promotion of sustainable agriculture. The development and implementation of sustainable agricultural practices require active involvement, creativity, innovativeness and learning abilities of the farmers and the extension workers (Leeuwis, 2000). Keeping in view the importance of sustainable agricultural practices and their awareness among the farmers, it was thought necessary to analyse the extension approaches presently being used by different organizations for creating awareness among the farmers about improved agricultural technologies.

MATERIAL AND METHODS

Faisalabad being an important district in the central mix cropping zone of the Punjab province, where the three extension approaches i.e. PSEA, PEA and CSEA are simultaneously in operation for technology dissemination among the farmers, was selected as the study area. Among the five tehsils of the selected district, Chak Jhumra was selected randomly. Ten villages from this tehsil were taken at random and 12 farmers under each approach were randomly selected from each selected village thereby making a sample of 360 respondents. The data were collected with the help of an interview schedule. The research instrument was pre-tested for its validity and reliability before data collection. The data thus collected were analyzed through a computer software i.e. (SPSS). Frequencies, standard deviation, mean, analysis of variance and LSD values were computed to draw the conclusions.

RESULTS AND DISCUSSION

The data concerning the effective use of extension methods by the extension field staff (EFS) of the three approaches given in Table I reveal that farm and home visits was the only method used by the EFS of PSEA, which was rated as good tending towards excellent and was ranked at 1st. Television and radio were rated as good and were ranked 2nd and 3rd, respectively. Lecture meetings and discussion meetings, were rated as satisfactory tending towards good. The methods that were rated as satisfactory with regard to their effective use by the EFS were: printed material and field demonstrations. The rating of the respondents from satisfactory to good levels gave an impression that these were being effectively used by the EFS of PSEA. The remaining methods, which were rated as fair tending towards satisfactory included: office calls, field days, movies, audio cassettes, video cassettes, exhibitions, campaigns and field trips. Only the personal letters were rated as poor by the respondents. This again showed that the extension methods with rank orders 11 - 17 were used by the EFS of PSEA at below average levels and there was a need for improvement.

In case of PEA, farm and home visits were used as an effective method the EFS and its rating was satisfactory tending toward good, whereas the respondents rated the discussion and lecture meetings as satisfactory with rank orders 2 and 3, respectively. This showed that these three methods were given more emphasis by the EFS of PEA. The EFS of PEA were putting below average efforts in using other extension methods. Thus emphasis needs to be placed on these methods to enhance technology dissemination.

In contrast none of the methods in CASE was rated as good and satisfactory by the respondents. The only three methods (farm & home visits, lecture meetings & field demonstrations) were placed in fair category tending towards satisfactory. It may imply that EFS of CSEA were not using extension methods effectively.

All the three approaches were significantly different from each other when compared for the effective use of different extension methods by their EFS. The weighted scores of all the three extension approaches indicated that PSEA earned the highest score (5934), being a better approach than the other two approaches (PEA & CSEA).

Working efficiency of any extension approach is reflected from the knowledge gained by its beneficiaries. Thus the knowledge gained by the respondents about the technologies developed and advocated by an extension organization, is an index of the success of a particular extension approach. Farmers are willing to adopt the technologies provided they can have access to new advancement in agricultural innovations (Lawrence, 1998). The data regarding the knowledge gained by the respondents are presented in Table II, which indicate that the knowledge gain regarding crop production/protection practices regarding seed rate/plant population, land preparation, improved varieties, sowing methods, fertilizer application and irrigation methods was rated as good by the respondents in case of PSEA. This tended to show that the EFS of PSEA made great efforts in providing information and guiding the farmers regarding these practices. They also created awareness among the farmers regarding the practices such as chemical control of insects/pests and application of insecticides. This effort of ESF of PSEA rated as satisfactory, tending towards good by the respondents. The respondents' knowledge gain was satisfactory with regard to cultural methods of weed control and mechanical control of insects/pests in case of PSEA, showing that the EFS of PSEA had reasonable efforts in providing information to their clientele/farmers regarding these two practices. The respondents got information regarding biological control of insects/pests, integrated pest management, harvesting practices, post harvest technology and marketing of the produce from the EFS of PSEA and

Table I. Weighted scores (WS), rank order and mean ± S.D with LSD-value for the extension approaches with regard to effective use of various extension methods/media

Extension methods/media	PSEA			PEA			CSEA			LSD-value	
	WS	Rank	Mean ± S.D	WS	Rank	Mean ± S.D	WS	Rank	Mean ± S.D		
1) Farm and home visits	535	1	4.46 ± 0.68 A	463	1	3.86 ± 0.74 B	329	1	2.74 ± 0.81 C	0.190	**
2) Office calls	312	8	2.60 ± 0.87 A	317	5	2.64 ± 0.90 A	181	6	1.51 ± 0.73 B	0.213	**
3) Telephone calls	276	11	2.30 ± 0.74 A	289	8	2.41 ± 0.69 A	162	8	1.35 ± 0.64 B	0.176	**
4) Personal letters	163	17	1.36 ± 0.66 A	177	17	1.48 ± 0.77 A	132	17	1.10 ± 0.33 B	0.156	**
5) Field demonstrations	392	7	3.27 ± 0.73 A	338	4	2.82 ± 0.93 B	290	4	2.42 ± 0.67 C	0.199	**
6) Lecture meetings	473	4	3.94 ± 0.74 A	415	3	3.46 ± 0.73 B	315	2	2.63 ± 0.72 C	0.185	**
7) Discussion meetings	471	5	3.93 ± 0.76 A	417	2	3.48 ± 0.80 B	302	3	2.52 ± 0.77 C	0.197	**
8) Field days	303	9	2.53 ± 0.76 A	252	9	2.10 ± 0.82 B	173	7	1.44 ± 0.62 C	0.187	**
9) Field trips	226	16	1.88 ± 0.74 A	195	12	1.63 ± 0.77 B	156	10	1.30 ± 0.54 C	0.175	**
10) Printed material	398	6	3.32 ± 0.88 A	302	6	2.52 ± 0.99 B	235	5	1.96 ± 0.85 C	0.230	**
11) Radio	526	3	4.38 ± 0.79 A	181	16	1.51 ± 0.72 B	146	13	1.22 ± 0.51 C	0.177	**
12) Television	527	2	4.39 ± 0.76 A	181	16	1.51 ± 0.70 B	140	15	1.17 ± 0.49 C	0.167	**
14) Movies	299	10	2.49 ± 0.79 A	289	8	2.41 ± 0.87 A	157	9	1.31 ± 0.62 B	0.189	**
15) Audio-cassettes	273	12	2.28 ± 0.83 A	233	10	1.94 ± 0.82 B	155	11	1.29 ± 0.54 C	0.185	**
16) Video-cassettes	267	13	2.23 ± 0.84 A	225	11	1.88 ± 0.79 B	150	12	1.25 ± 0.49 C	0.165	**
17) Campaigns	242	15	2.02 ± 0.78 A	189	14	1.58 ± 0.73 B	138	16	1.15 ± 0.36 C	0.169	**
18) Exhibitions	251	14	2.09 ± 0.76 A	194	13	1.62 ± 0.76 B	140	15	1.17 ± 0.42 C	0.093	**
19) Any other (specify)	0	0	0 ± 0	0	0	0 ± 0	0	0	0 ± 0	-	
Overall mean	5434	-	2.75 ± 0.46 A	4657	-	2.16 ± 0.49 B	3381	-	1.54 ± 0.38 C		**

** = Highly significant (P<0.01), * = Significant (P<0.05), NS = Non-significant (P>0.05)
Means sharing similar letters in a row are statistically non-significant (P>0.05)

Table II. Weighted scores (WS), rank order and mean ± S.D with LSD-value for the extension approaches with regard to knowledge gain regarding crop production and protection practices

Crop production / protection practices	PSEA			PEA			CSEA			LSD-value	
	WS	Rank	Mean ± S.D	WS	Rank	Mean ± S.D	WS	Rank	Mean ± S.D		
1) Land preparation	527	3	4.40 ± 0.65 A	371	1	3.09 ± 1.30 B	376	5	3.13 ± 0.96 B	0.256	**
2) Improved varieties	527	3	4.40 ± 0.70 A	370	2	3.08 ± 1.30 B	379	2	3.16 ± 0.94 B	0.257	**
3) Seed rate / plant population	532	1	4.43 ± 0.65 A	369	3	3.08 ± 1.30 B	376	5	3.13 ± 0.96 B	0.255	**
4) Sowing methods	526	4	4.38 ± 0.74 A	359	4	2.99 ± 1.25 B	379	2	3.16 ± 0.96 B	0.255	**
5) Irrigation methods	511	6	4.26 ± 0.86 A	350	5	2.92 ± 1.18 B	377	3	3.14 ± 0.97 B	0.257	**
6) Fertilizer application	518	5	4.32 ± 0.76 A	341	6	2.84 ± 1.17 B	359	6	2.99 ± 1.08 B	0.259	**
7) Cultural methods for weeds eradication	374	9	3.12 ± 0.94 A	281	9	2.34 ± 0.97 B	270	9	2.25 ± 0.83 B	0.232	**
8) Application of weedicides	432	8	3.60 ± 0.68 A	306	8	2.55 ± 1.08 B	302	8	2.52 ± 0.97 B	0.234	**
9) Mechanical control of insects/pests	329	10	2.74 ± 0.77 A	277	10	2.31 ± 0.96 B	232	12	1.93 ± 0.73 C	0.210	**
10) Biological control of insects/pests	320	11	2.67 ± 1.01 A	266	11	2.22 ± 0.96 B	258	10	2.15 ± 0.99 B	0.251	**
11) Chemical control of insects/pests	456	7	3.80 ± 0.88 A	319	7	2.66 ± 1.25 B	350	7	2.92 ± 1.23 B	0.287	**
12) Integrated pest management	307	12	2.56 ± 0.82 A	248	12	2.07 ± 0.87 B	235	11	1.96 ± 0.80 B	0.210	**
13) Harvesting practices	283	13	2.36 ± 0.89 A	239	13	1.99 ± 0.84 B	209	13	1.74 ± 0.70 C	0.206	**
14) Post harvest technology	275	14	2.29 ± 0.83 A	232	14	1.93 ± 0.82 B	203	14	1.69 ± 0.73 C	0.202	**
15) Marketing of the produce	268	15	2.23 ± 0.82 A	228	15	1.90 ± 0.79 B	202	15	1.68 ± 0.72 C	0.198	**
Overall mean	6185	-	3.43 ± 0.50 A	4556	-	2.53 ± 0.93 B	4507	-	2.50 ± 0.67 B	0.237	**

** = Highly significant (P<0.01), * = Significant (P<0.05), NS = Non-significant (P>0.05).
Means sharing similar letters in a row are statistically non-significant (P>0.05).

this knowledge gain was rated as fair. It could mean that these practices have not been given due attention and need that more attention.

In case of PEA the awareness of the respondents regarding land preparation, improved varieties and seed rate/plant population, was rated as satisfactory by the respondents, showing that these practices received average level attention from the EFS of PEA. The knowledge gained by the farmers about sowing methods, irrigation methods, fertilizer application, application of weedicides and chemical control of insects/pests was rated as fair, tending towards satisfactory, which probably indicate that the EFS of PEA put below average efforts in making their clientele aware of these practices. Mechanical and biological control of insects/pests were rated as fair with regard to their knowledge gain. The practices, which were rated poor tending towards fair by the respondents, were harvesting practices, post harvest technology and marketing of the

produce in case of PEA. It could be stated that the EFS of PEA did not put serious efforts in making farmers aware of these practices.

In case of CSEA, the practices, whose knowledge gain by the farmers was rated as satisfactory were improved varieties, sowing methods, irrigation methods, seed rate/plant population, land preparation and fertilizer application. This implied that the EFS of CSEA put average efforts in providing information to their registered growers regarding these practices. Application of weedicides and chemical control of insects/pests were rated as fair tending towards satisfactory, with regard to the knowledge gained by their registered growers, whereas the production/protection practices that included cultural methods for weeds eradication and biological control of insects/pest were also rated as fair. The practices like integrated pest management, harvesting practices, post harvest technology and marketing of produce were rated poor tending towards fair. It showed that these practices were not properly addressed by the EFS of CSEA.

It is evident from above discussion that PSEA was significantly different from the other two approaches (PEA & CSEA), whereas PEA and CSEA were non-significantly different from each other. As indicated from the overall weighted scores of the three approaches, PSEA was more effective in creating awareness among the farmers regarding crop production and protection practices. The other two approaches were relatively less effective.

CONCLUSIONS

Farm and home visits was the only methods used by EFS of PSEA, which was rated good, tending towards excellent, whereas in case of PEA and CSEA, farm and home visits were rated as satisfactory tending towards good and fair tending towards satisfactory, respectively. Lecture and discussion meetings were rated as satisfactory tending towards good, satisfactory and poor by the respondents of PSEA, PEA and CSEA, respectively. The practices such as seed rate, plant population, land preparation, improved varieties, fertilizer application and irrigation methods were rated as good by the respondents of PSEA, whereas land preparation, improved varieties, seed rate/plant population were rated as satisfactory in PEA and CSEA. PSEA was a better approach with regard to knowledge gained by the respondents, whereas PEA and CSEA were less effective.

REFERENCES

Baier, E.G., 1994. *Gender, Environment, Population Education and Sustainable Development Themes in Agricultural Education*. FAO, Rome, Italy

Chizari, M., J.R. Lindner and S. Karjoyan, 1999. *Factors Affecting Involvement of Volunteers in Extension Education*

FAO, 1991. The den Bosch declaration and agenda for action on sustainable agriculture and rural development. *Proceedings of FAO/Netherlands Conference of Agriculture and Environment*. S-Hertogenbosch, the Netherlands, 15–19 April

Garforth, C. and A. Lawrence, 1997. ODI Natural Resources Perspective No. 21

Lawrence, L.D., D. Shamebo and O.S. Verma, 1998. Promotion of development through extension system: experience from extension, effort for the development of wheat in Bale Zone of South Eastern Ethiopia. *J. Ext. Sys*. 14: 97–104

Leeuwis, C., 2000. Learning to be sustainable. Does the Dutch agrarian knowledge market fail? *J. Agric. Edu. Ext*. 7: [Online] page numbers

Williams, D.L., 2000. Students' knowledge of and expected impact from sustainable agriculture. *J. Agric. Edu.* 41: [Online] page numbers

York, E.T., 1991. Agricultural sustainability and its implications to the horticulture profession and the ability to meet global food needs. *Hort. Sci*., 26: 1252–6

(Received 25 August 2006; Accepted 25 September 2006)