PERCEPTIONS OF EXTENSION AGENTS REGARDING SUSTAINABLE AGRICULTURE IN THE KHORASAN PROVINCE, IRAN

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Abstract

As Iran addresses the goal of self-sufficiency in the production of food and fiber products, sustainable agriculture is gaining interest within Extension and the Ministry of Agriculture as a means of achieving this goal. Dependence on pesticide and insecticide imports, compounded by a growing population, limited arable land, and high soil erosion, has led to the call for more appropriate agricultural practice. Little is known, however, about extension agents= perceptions regarding sustainable agriculture practices. A random sample of extension agents in the Khorasan Province was surveyed by mail. Agents perceived sustainable agriculture to mean lower chemical inputs, natural resource and environmental protection, effective and efficient agricultural production system, and reliance on organic matter. Agents also indicated a preference for sustainable agricultural practices. Younger and less experienced agents tended to prefer sustainable over traditional agriculture practices. Agents also indicated the need for more local research. Implications for these results are given and recommendations made.

Introduction

Farmers= concern for effective and efficient use of their land is influenced by a variety of factors including personal views, family views, technology, profitability, complexity, public opinion, research, change agents, and marketing (Betru, 1998; Kotile & Martin, 1998). According to the authors, sustainable agricultural practices offer farmers hope for greater efficiencies and effectiveness. In Iran, sustainable agriculture is gaining popularity among extension agents, farmers, various organizations and ministries and, in particular, the Extension service and the Ministry of Agriculture (Chizari, Pezeshki & Lindner, 1998).

Crosson (1992) defines sustainable agriculture as meeting the demand of future generations, for food and fiber at socially acceptable economic and environmental costs. York (1989) states the goal of sustainable agriculture should be to maintain production levels necessary to meet the increasing aspirations of an expanding world population without degrading the environment. It implies concern for generation of income, promotion of appropriate policies, and conservation of natural resources.

Several factors are influencing change agents and various agencies to consider sustainable agriculture practices. Iran has limited arable land, compounded by high soil erosion. Its population is growing. It is dependent on rice, wheat, and meat imports. It is also dependent on pesticide and insecticide imports.
Not many years ago Iran was self sufficient in agriculture (Nosratie, 1997). The goal of self

sufficiency in Iran has been the focus of recent research (Chizari, Karbasioun & Lindner, 1998; Chizari, Pishbin & Lindner, 1997; Chizari, Lindner & Bashardoost, 1997; Pezeshki-Raad, Yoder & Diamond, 1994). Extension agents have played a key role in helping agriculture systems overcome many problems. However, for agents to help with sustainable agricultural practices they must first understand sustainable agriculture concepts (Agunga, 1995).

Assessing educational needs of extension agents is recognized as an important element among extension services and seen as a critical factor in the success of the organization. According to Buford, Bedeian and Lindner (1995), as Extension agents face the challenge of learning new skills to maintain their proficiency or become qualified for promotion, the importance of an effective staff training program for extension agents becomes evident. These authors state further that to ensure extension agents are well trained, extension management must determine training needs to increase agents' capabilities. Similarly Chizari, Karbasioun and Lindner (1998) note that Extension will be seriously limited in its ability to plan and execute effective educational programs and other technology transfer activities without an adequate number of well-trained agents.

According to Alonge and Martin (1995), the first step toward adoption of new ideas by farmers is to provide information on sustainable practices. What has emerged, however, is evidence of bipolar values among extension agents on this subject. Agencies and institutions engaged in information dissemination and educational activities often have personnel specifically charged with information and education responsibilities who themselves have information and education needs (Rollins & Golden, 1994).

Shahbazi (1993) warned that to deny the lack of knowledge and the educational needs of extension agents of Iran regarding sustainable agriculture is to deny that technologies related to agriculture are changing. Karami (1995) wrote that the problems facing sustainable agriculture in Iran primarily focus attention on ecological aspects. However, the author notes that perceptions, attitudes, educational training, and beliefs of extension agents are equally if not more important factors.

Agunga (1995) noted that extension agents need to be trained in sustainable agriculture in order to develop their understanding, competence, and ability to teach and communicate the concepts to farmers and others. He further stated that the logic is simple: If Extension agents are not convinced of the value of sustainability, how can they be expected to educate farmers? Extension services, due to their large network of personnel, are in a better position to formulate a cohesive structure for promoting sustainable agriculture education.

Purpose and Objectives

The purpose of this study was to identify perceptions of extension agents regarding sustainable agriculture in Khorasan Province, Iran.Specific objectives were:

1. Describe the meaning of sustainable agriculture as perceived by extension agents regarding sustainable agriculture in Khorasan Province, Iran.
2. Describe extension agent perceptions toward current research and extension efforts in sustainable agriculture.
3. Explore relationships among extension agents' perceptions toward traditional agriculture versus sustainable agriculture methods.
4. Explore relationships toward sustainability by selected extension agent demographics.

Methods and Procedures

Population

Extension agents (N = 125) in Khorasan Province, Iran were the target population for this study. Extension agents (89) were selected by simple random sample to participate in this study (Krejcie & Morgan, 1970). The Ministry of Agriculture-s Extension organization directory was used to locate the agents in each township within the province. The researchers verified the list before distribution of the survey to control for frame and selection threats to external validity.

Khorasan Province is the largest province of Iran (315,000 square kilometers), and produces many agricultural crops: rice, wheat, rye, barley, cotton, potato, sorghum, corn, fruits, and sugar cane. It is located in the northeast part of the country and has 150,000 hectares of arable land. The province has a population of 6.1 million, of which 3 million live in rural areas.

Research design and data analysis

The research design used for this study was a descriptive survey. A questionnaire was developed from the review of literature. The questionnaire consisted of three separate sections according to the purpose and objectives of the study. Likert-type scales were used to quantify the responses. Content and face validity was established by a panel of experts consisting of faculty members and graduate students at Tarbiat Modarres University, Iran. A pilot test was conducted with 12 extension agents in two townships of Tehran Province three weeks before the study. As a result of the pilot test, minor changes in wording were made in the questionnaire. Questionnaire reliability was estimated (based on the pilot test) by calculating Cronbach-s alpha. Reliability for the overall instrument was .79.

Data were collected through a questionnaire mailed to the 89 agents in the Khorasan Province, Iran. Those who failed to respond were sent a postcard reminder. If the reminder failed to elicit a response, a follow-up letter and duplicate questionnaire were mailed. The response rate was 99%. An early versus late respondent comparison was made to determine if nonresponse was a threat to the validity of the study (Kerlinger, 1986; Miller & Smith, 1983). Using this procedure, no statistically significant differences between the groups were found. Therefore, findings from this study are assumed to be generalizable to the population from which it was drawn. Data collected were analyzed using the Statistical Package for the Social Sciences, Personal Computer Version (SPSS Inc., 1991). Appropriate statistical procedures for description (frequencies, percents, means, and standard deviations) were used.

Results

All the participants had a Bachelor of Science in an agriculture-related degree. However, only 8% of the respondents were agricultural extension majors. Fifty-two percent of respondents held an agronomy and plant breeding degree. Eleven percent of respondents had a horticulture degree. All subjects were male. Thirty-seven percent of the respondents were between the age of 25-32 years. Thirty-five percent had one to five years experience working for Extension. Most of the agents (60%) were married.

Objective One

Participants were given a set of statements representing different meanings of sustainable agriculture. Respondents were instructed to choose those statements that represented the meaning of sustainable agriculture. A limitation of this study is that the narrow definition of sustainable agriculture as presented may not completely represent the complexity of sustainable agriculture. Furthermore, the study does not represent what sustainable agriculture is, but what agents perceive sustainable agriculture to mean.

As shown in Table 1, 98% of the extension agents agreed or strongly agreed that using less chemical inputs while maintaining profitability was the meaning of sustainable agriculture. Ninety-four percent of the agents agreed or strongly agreed that protecting natural resources and environment protection was the meaning of

sustainable agriculture. Sixty-six percent of the participants agreed or strongly agreed that sustainable agriculture meant using a lot of organic matters. Sixty-one percent of the Extension agents agreed or strongly agreed that sustainable agriculture was a system that is effective, productive and efficient. No other statement representing the meaning of sustainable agriculture received the 50% agreement or strong agreement level.

Objective Two

Table 2 summarizes extension agents' perceptions about the current condition of research and extension efforts in sustainable agriculture. Ninety-three percent of agents stated they needed to do a better job of diffusing sustainable agriculture principles to farmers. Only 15% of agents indicated there were insufficient number of information centers and resources on sustainable agriculture. Also, only 8% of Extension agents thought enough research regarding sustainable agriculture has been conducted.

Table 1

Extension Agents' Perceptions of the Meaning of Sustainable Agriculture.

Rank	Statement	Frequency[a]	Percent	M[b]	SD
1	Using less chemical inputs while maintaining profitability	87	98	4.6	0.6
2	Protecting natural resources and environmental protection	84	94	4.5	0.6
3	A system that is effective, productive and efficient	54	61	3.6	0.9
4	Using a lot of organic matters	59	66	3.5	1.1

[a]Number of agree and strongly agree responses
[b]Scale: 1 = strongly disagree; 2 = disagree; 3 = no opinion; 4 = agree; 5 = strongly agree

Table 2

Extension Agents' Perceptions of Current Research and Extension Efforts in Sustainable Agriculture.

Rank	Statement	Frequency[a]	Percent	M[b]	SD
1	Extension agents need to do a better job of diffusing sustainable agriculture principles to farmers	83	93	4.6	0.7
2	Information centers and resources about sustainable agriculture are lacking	13	15	2.5	0.9
3	Enough research on sustainable agriculture in Iran has been conducted	6	8	2.2	0.8

[a]Number of agree and strongly agree responses
[b]Scale: 1 = strongly disagree; 2 = disagree; 3 = no opinion; 4 = agree; 5 = strongly agree

Objective Three

Respondents were asked to indicate their preference for sustainable over traditional agriculture practices. As shown in Table 3, the highest ranked sustainable agriculture practice was fertility (96%). Agents indicated it is better to use green fertilizer, organic matter, and crop rotation than chemical fertilizer. Crop mix (87%) and crop production management (87%) were the next highest ranked sustainable agriculture practices as evidenced by agents= preferences for lower purchased inputs and higher labor costs rather than higher purchased inputs and lower labor costs. Agents (85%) expressed social concerns in terms of protecting natural resources for future generations. Agents (74%) preferred as few tillage operations as possible. Agents (71%) indicated traditional agriculture practices have contributed to overall environmental pollution. According to agents, preference should be given to varieties that require low chemical inputs and produce average yields (67%) over varieties that require high chemical inputs and produce greater yields. Weed control (9%) was the only farming practice where agents preferred traditional agriculture practices. They preferred chemical weeding to mechanical weeding. This finding contradicts some of the findings of this study and indicates the difficulty of adopting sustainable agriculture systems, which to be successfully implemented must be adopted across the entire farming operation.

Table 3

Extension Agents= Preferences for Sustainable Agriculture Practices.

Rank	Statement	Frequency[a]	Percent	M[b]	SD
1	Fertility	85	96	3.0	0.2
2	Crop mix	77	87	2.9	0.4
3	Crop production management	77	87	2.9	0.5
4	Social concern	76	85	2.9	0.4
5	Tillage system	66	74	2.7	0.5
6	Environmental protection	64	71	2.6	0.6
7	Variety selection	60	67	2.6	0.7
8	Weed control	8	9	1.6	0.7

[a]Number indicating a sustainable agriculture practice
[b]Scale: 1 = disagree; 2 = no preference; 3 = agree

Objective Four

The first hypothesis in this objective was to test for significant differences in preferences for sustainable agriculture practices by degree major. At an alpha level of .05, the null hypothesis was not rejected, $F(6, 82)=2.21$, and it was concluded that preferences for sustainable agriculture practices were not significantly related to degree major (Table 4).

Table 4

Extension Agents' Preferences for Sustainable Agriculture Practices by Degree Major (n = 88).

Degree Major	Percent	M[ab]
Soil Science	6	4.4
Agronomy and plant breeding	51	4.3
Other	6	4.2
Horticulture	11	4.1
Extension education	8	3.9
Animal science	8	3.9
General agriculture	10	3.7

[a]F (6, 82) = 2.21, $p \leq .05$
[b]Scale: 1 = strongly disagree; 2 = disagree; 3 = no opinion; 4 = agree; 5 = strongly agree

The second hypothesis in this objective was to test for significant differences in preferences for sustainable agriculture practices by years of experience. At an alpha level of .05, the null hypothesis was rejected, $F(2, 86)=3.03$. It was concluded that years of experience was significantly related to agents' preference for sustainable agriculture practices (Table 5). Agents with less experience are more likely to support sustainable agriculture practices.

Table 5

Extension Agents' Preferences for Sustainable Agriculture Practices by Work Experience (n = 88).

Work experience	Percent	M[ab]
1 to 5 years	35	2.8
6 to 15 years	33	2.6
More than 15 years	33	2.5

[a]F (2, 86) = 3.03, $p \leq .05$
[b]Scale: 1 = disagree; 2 = no preference; 3 = agree

The third hypothesis in this objective was to test for significant differences in preferences for sustainable agriculture practices by age. At an alpha level of .05, the null hypothesis was rejected, $F(2, 86)=3.03$. It was concluded that age was significantly related to agents' preferences for sustainable agriculture practices (Table 6). The younger the agent, the more likely they were to support sustainable agriculture practices. Although including both age and experience as variables could be questionable, the researchers chose to do so because of the lack of national research regarding the correlation of age and experience.

Table 6

Extension Agents= Preferences for Sustainable Agriculture Practices by Age (n = 88).

	Percent	M[ab]
25 to 32 years	37	2.8
33 to 41 years	33	2.6
Over 41 years	30	2.6

[a]F (2, 86) = 3.03, p ≤ .05
[b]Scale: 1 = no preference; 2 = traditional agriculture practices; 3 = sustainable agriculture practices

Conclusions and Recommendations

Based on the findings of this study, the following conclusions were drawn and recommendations made.

According to Agunga (1995, p. 170), ASustainable agriculture is an innovation that seeks to replace or modify current beliefs and practices about industrial agriculture@. Our research indicates that extension agents in the Khorasan Province perceive sustainable agriculture to mean lower chemical inputs, environmental and natural resource protection, an effective and efficient agricultural production system, and reliance on organic matter. These results are consistent with York=s (1989) goal of sustainable agriculture. Most extension agents, however, reported that they need to do a better job diffusing sustainable agriculture information to farmers. They indicated that there are adequate information centers and resources regarding sustainable agriculture, but, they also recognized a need for continued research.

Although sustainable agriculture is a relatively new concept in Iran, extension agents in Khorasan Province indicated a preference for sustainable agriculture practices related to fertility, crop mix, crop production management, social concerns, tillage systems, environmental protection, and variety selection; however, they preferred traditional agriculture weeding practices. These perceptions were consistent regardless of academic degree. However, younger, less experienced agents were more likely to prefer sustainable agriculture practices than their counterparts.

Continued reliance on traditional agriculture practices can result in damage to the credibility of change agents and detract from the ability of conventional farmers to adapt to sustainable farming practices (Higgins, 1996). Research is needed to determine if these findings hold true for other extension agents in Iran. The results from such a study could have implications in developing techniques and strategies for implementing sustainable agriculture programs in the country.

More research needs to be conducted in the several provinces to determine the educational needs of extension agents regarding sustainable agriculture. Extension agents will be better equipped to deal with the barriers to implementing sustainable agriculture practices once they are better educated and trained. Iran=s goal is to become self sufficient in food and fiber production. Results from this study may serve as a basis for further research regarding sustainable agriculture, and educational needs of extension agents.

The extent to which problems and issues associated with natural resource management and profitable farming systems will be solved systematically remains uncertain. Research is needed to determine the relationship between the goal of self sufficiency and sustainable agriculture practices. Research is also needed to determine the best economic returns when implementing sustainable agriculture systems. The significant drop in percentages of extension

agents who agree or strongly agree that sustainable agriculture is a system that is effective, productive, and efficient suggest this is another area of needed research. What does effective, productive, or efficient mean or measure? Is increased labor more effective, productive, or efficient or is it more environmentally friendly and socially acceptable? What do these terms mean to extension agents as they try to answer the question?

Our final comments are directly attributed to an anonymous reviewer of this manuscript. These comments capture the complexity of researching sustainable agriculture and provide a challenge to those of us who attempt to do so.

> I don=t believe sustainable agriculture is more efficient. I believe it is more management, knowledge, and information intensive. To have a successful sustainable farming system of mixed crops and livestock the farmer will need more knowledge/ information on biological, chemical, microbial, mechanical interactions of plants and animals to improve production, minimize pests (weeds, insects and diseases) to economically acceptable levels, while protecting the environment and natural resources, and providing the farmer with an economic return. The farmer will have to spend more time thinking, developing a farming system management strategy, and then more time implementing the strategy to attain a sustainable agriculture production farming unit. Likewise, extension agents will need considerably different training and willingness to make a commitment to providing more management information on sustainable agriculture.

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