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Agricultural Graduate Students' Attitudes towards Sustainable Agriculture: A Case of Razi University, Iran

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ABSTRACT

This study was conducted to investigate agricultural graduate students' attitudes of Razi University towards sustainable agriculture. The sample included 165 agricultural graduate students using Krejcie and Morgan's table (1970) for sample size. The Cronbach's alpha coefficient was 0.83 for the scales of attitudes which showed a highly satisfactory level of internal consistency. The findings revealed that students had positive attitude toward sustainable agriculture, such as negative effects of conventional agriculture, negative effects of agrochemical on human and animal health and so on. However, there were moderate attitudes towards the effect of mix cropping system on risk management. Respondents were strongly disagreeing regarding to maximize profit as the main objective of farmers. It was found that there is a high positive correlation between agricultural graduate students' knowledge and attitudes towards sustainable agriculture. The results of this study can provide information of the knowledge and attitudes of agricultural graduate students and thus serve guidance for the future options concerning the development of agricultural graduate course. Finally, the outcome of this study indicates that further agricultural policy education in agricultural higher education system is urgently needed.

Keywords: agricultural graduate students, attitude, sustainable agriculture, knowledge.

INTRODUCTION

Agriculture is considered as a critical sector in the world economy [9]. It constitutes the major source of food and earning [6]. Despite the dramatically quantitative achievements of modern agriculture, the green revolution technologies were criticized seriously in the early of 1980s [1]. As Rolling and Pretty (1997) argued, during the past fifty years, agricultural development policies have been remarkably successful at emphasizing external inputs, such as pesticides, inorganic fertilizers, and tractors as the means to increase food production [4]. These external inputs have, however, gradually substituted for natural processes and resources, rendering them less powerful; Pesticides have replaced biological, cultural and mechanical methods for controlling pests, weeds and diseases; inorganic fertilizers have substitute for livestock manures, composts, and nitrogen fixing crops; and fossil fuels have substituted for locally generated energy sources. This argument supported by several empirical studies [17][18]. Generally, agriculture in this period emphasized on productivity [19]. Agricultural development in Iran was not an exception of this path of development. In Iran, for example, chemical fertilizer subsidy in 2004 was equivalent to 65 Billion Rials which increased to 5831 Billion Rials at 2009. Considering the constant rate of fertilizer subsidies, it is indicates increase of chemical fertilizers consumption in recent years [21]. This concern has promoted a number of initiatives to promote the adoption and diffusion of more sustainable agricultural technologies. The Sustainable agriculture tries to replace chemical sources of inputs with the biological ones to reduce the damage to the

environment [8]. Sustainable agriculture is a complex and multidimensional concept. From the difficulties evident in gaining a consensus on the definition, it is obvious the term has different meanings for different people. For example, Ikerd (1993) defines a sustainable agriculture as: capable of maintaining its productivity and successfulness to society over the long run [13]. It must be environmental sound, resource-conserving, economically viable and socially supportive and commercially competitive [20]. One of the most comprehensive definitions of sustainable agriculture was given in the 1990 Farm Bill: The term sustainable agriculture is an integrated system of plant and animal production practices having a site-specific application that will, over the long-term, satisfy human food and fiber needs; enhance the environmental quality and natural resources base upon which the agriculture economy depends; make the most efficient use of non-renewable resources and on farm resources and integrate, where appropriate natural biological cycles and controls; sustain the economic viability of farm operations; and enhance the quality of life for farmers and society as a whole [23]. One of the factors affected students' attitudes is their knowledge [7][5]. Chizari et al. (1999) conducted a survey in Iran that revealed the success of sustainable agriculture depends on the motivations, skills, and knowledge of individual agents [5]. Therefore, access to information and the type of information received are fundamental contributors towards attitude formation. Knowledge and information bring confidence, skills, ability and experience. If stakeholders such as students believe that it is easy for them to perform, then they are likely to engage in the behavior [14]. Thus, a correlation between student's knowledge and attitudes toward sustainable agriculture is assumed. According to Ajzen (2005), students' attitudes towards agriculture are the most important determinants of their professional behavior [2]. Attitude has been defined as the predisposition to feel, think or act in a particular way [7]. Attitude simply refers to 'a person's evaluation of any psychological object' [3]. It provides direction and purpose of their performance and behavior [12]. Thus, performance and behavior of current agricultural graduate students as agriculturist and professionals will ensure the sustainability of agriculture in the future. On the basis of understanding their attitudes and knowledge, it is possible to accurately define the constraints, and consequently to take them into account in the decision-making [15][22]. On the other hand, the development of education materials and programs lead to improving the efficiency of current agricultural higher education system would aid the development of teaching and learning initiatives in this area, purposely. Regarding this subject, this study was designed to assess agricultural graduate students' knowledge and attitudes of Razi University towards sustainable agriculture and the relationship between them.

MATERIALS AND METHODS

This study was conducted to assess agricultural graduate students' knowledge and attitudes regarding sustainable agriculture. For this purpose, the study utilized a descriptive survey design. The population of the study included all agricultural senior students of college of agriculture at Razi University, Kermanshah province in Iran (N=284)who were studying in 2011. These students can be viewed as being future experts and decision-makers in the field of agriculture. The sample size were determined by using Krejcie and Morgan's table (1970) and were selected using stratified random sampling method (n=165). The questionnaire assessed the agricultural graduate students' a) attitude towards sustainable agriculture (15 items) and b) their knowledge about sustainable agriculture practices (13 items) which were obtained from review of literature. The respondents were asked to indicate the extent of their agreement on each attitude indicator using a five-point Likert –type scale continuum like strongly agree, agree, undecided, disagree and strongly disagree with assigned scores of 5, 4, 3, 2 and 1, for positive statements, respectively and vice versa for negative statements. In order to determine how their attitudes are related to their knowledge, correlation coefficient was employed. The students' knowledge scale were coded from 1 for lowest and 5 for highest knowledge. The instrument of the study was validated by panel of experts consisting of four associate and assistant professors of the Department of Agricultural Extension and Education at Razi University. Initially, a pilot study was conducted with collaboration of 30 students and the Cronbach's alpha coefficient was 0.83 which showed a highly satisfactory level of internal consistency. A reliability coefficient of 0.70 and above is usually considered acceptable and desirable for consistency levels [11][16]. Data analysis was carried out using $SPSS_{16}$.

RESULTS AND DISCUSSION

The respondents' attitudes towards sustainable agricultural

The respondents' attitudes towards sustainable agricultural practices were calculated by adding up their responses to the 15-items of 5-point Likert-type scale, which sought to measure the agricultural graduate students' attitudes towards sustainability. Then it categorized based on mean scores as follow: the means 1.00–1.49 = strongly disagree (SDA), 1.50–2.49 = Disagree (DA), 2.50–3.49 = Moderate Agree (MA), 3.50–4.49 = Agree (A) and 4.50–5.00 = strongly agree (SA). Table 1 presents the respondents' attitudes of each of the selected sustainable agricultural

practices. Based on the interpretive scale described above, 1 item were placed in the strongly disagree (SDA) and disagree (DA) categories, 6 items in the moderate-agree (MA) category, 5 items in agree (A) category and 2 in the strongly agree (SA). The practice placed in the SDA and DA categories were as follows, respectively: 'farmers' main objective must be maximized profit', and 'agricultural production can only be increased using agrochemicals'. The 6 practices placed in the MA category were 'sustainable agricultural systems should produce an adequate food supply to feed the world population', 'mix cropping systems lead to risk management', 'retaining plant residues for preservation of soil and water', 'tillage operation decreases soil fertility', 'crop diversification and rotation cause pests' invasion to be decreased' and 'long term decreasing effects of agrochemicals on production and farmers' income'. The 5 items placed in the A category were 'natural resources must be protected for next generations', 'we have to protect natural resources even if it led to incur to a short term loss', 'crop rotations reduce weed, disease, and pest problems', 'integrated pest management practices reduce the need for pesticides' and 'sustainable agricultural practices may require additional management beyond conventional practices'. Practices such as: 'conventional agriculture has negative effects on environment' and 'negative effects of agrochemicals on human and animal health' were placed in the SA category.

Table 1 Agricultural graduate student's attitude towards Sustainable Agriculture (n=165)

Indicators	Mean	SD	Categories
1. Conventional agriculture has negative effects on environment	4.63	.60	SA
2. Negative effects of agrochemicals on human and animal health	4.58	.71	SA
3. Natural resources must be protected for next generations	4.42	.71	A
4. we have to protect natural resources even if it led to incur to a short tern loss	4.13	.80	A
5. Crop rotations reduce weed, disease, and pest problems	3.91	1.20	A
6.Integrated pest management practices reduce the need for pesticides	3.76	1.28	A
7.Sustainable agricultural practices may require additional management beyond conventional practices	3.54	1.18	A
8.Sustainable agricultural systems should produce an adequate food supply to feed the world population	3.38	1.42	MA
9.Mix cropping systems lead to risk management	3.25	1.50	MA
10. Retaining plant residues for preservation of soil and water	3.17	.97	MA
11. Tillage operation decreases soil fertility	2.90	1.15	MA
12. Crop diversification and rotation cause pests' invasion to be decreased	2.70	1.30	MA
13. Long term decreasing effects of agrochemicals on production and farmers' income	2.30	1.03	MA
14. Farmers' main objective must be maximized profit	2.28	1.20	SDA
15. Agricultural production can only be increased using agrochemicals	2.23	1.38	DA

Among the MA category of practices, 'sustainable agricultural systems should produce an adequate food supply to feed the world population', and 'mix cropping systems lead to risk management' were located in higher priorities of students and show that most of them were aware of requirement and potential benefit of sustainable agriculture. This result indicates that higher education system in agriculture is successful in identify necessity and positive impact of sustainable agriculture. According to table 1, practices such as: 'crop diversification and rotation cause pests' invasion to be decreased' and 'long term decreasing effects of agrochemical on production and farmers' income' were relatively low important among MA items of sustainability. It means that agricultural graduate students believe that farming techniques including crop diversification and crop rotation, leading to sustainable pest management and reduced agrochemical, the practice which has negative effect side on production and farmer income in long-term. Thus, they have moderately positive attitudes towards ecological dimension of sustainable agriculture. As discussed, economical viability is one of the three dimensions of sustainability. As mean scores depict, respondents was strongly disagree with 'farmers' main objective must be maximizing profit'. It shows that higher education system could induce all aspects of sustainability and create holistic attitudes among students. It seems that they consider ecological dimension of sustainable agriculture. Students' disagreements with item 15 indicate that they do not recognize agrochemical as the final solution for increasing agricultural production. This confirms their agreement with crop diversification and crop rotation. Based on categorizing of items 3 and 4, students have environmental-friendly and prospective attitude. As they were agree with integrated pest management practices and additional management beyond conventional agriculture. Finally, respondents were strongly agreed with harmful effects of agrochemical on all ingredients of environment, especially human and animal health, items were located in SA category.

Students' knowledge of Sustainable Agriculture

Table 2 reports the means and standard deviations for level of knowledge based on mean scores. The 5-point scale was interpreted as: the means 1.00–1.49 = not informed (NI); 1.50–2.49 = slightly informed (SI); 2.50–3.49 =

moderately informed (MI); 3.50–4.49 = well informed (WI); and 4.50–5.00 = highly informed (HI). However, students in none of the topics have a mean score at the "not informed" level. As shown in Table 2, agricultural graduate students in the study, as a whole, reported they were beyond the well informed category for each of the items regarding sustainable agricultural areas identified.

Table 2- Knowledge of sustainable agriculture practices as perceived by agricultural graduate students (n=165)

Items	Mean	SD	categories
1. Conservation tillage practices that reduce soil erosion and conserve water	4.80	2.97	HI
2. Paying attention to natural process instead off- farm inputs	4.71	2.05	HI
3. Provider of government services such as extension services	4.68	2.65	HI
4. Support of market prices.	4.50	3	HI
5. Crop rotations that increase soil nitrogen and reduce the need for purchased fertilizers	4.32	1.98	WI
6. Sustainable agriculture decreases soil erosion because of Less use of tillage.	4.28	2.71	WI
7. Community-based food systems (e.g., local markets for local production	4	2.11	WI
8. Establishing farmer-to-farmer information networks	4	2.24	WI
9. Developing multicultural instead monoculture	3.75	3.34	WI
10. Integrated agricultural systems (Agro forestry, cropping management, Water and soil management, intercropping and…)	3.30	2.27	MI
11. Enhancement conservational production technologies by direction payments	2.60	2.41	MI
12. Reduction of inputs prices	2.37	2.58	SI
13. Provide tax exemption for farmers in sustainable agriculture	2.15	2.09	SI

The findings revealed that, students are relatively highly-informed on the items of conservation tillage practices that reduce soil erosion and conserve water, paying attention to natural process instead off- farm inputs, provider of government services such as extension services and support of market prices. Table 2 indicates that respondents have adequate knowledge or well-informed in topic such as: crop rotations that increase nitrogen soil and reduce the need for purchased fertilizers, sustainable agriculture decreases soil erosion because of less use of tillage, community-based food systems, and developing multicultural instead monoculture. The research findings show a medium level of knowledge (MI) among the students about integrated agricultural systems and enhancement of conservational production technologies by direct payments. Finally, they have low level of knowledge (SI) related to reduction of inputs prices and provide tax exemption for farmers in sustainable agriculture. The results for agricultural graduate students' level of knowledge in sustainable agriculture indicate that the mean scores for the most practices are above well-informed.

Correlation Analysis

The results of correlation analysis in Table 3 revealed that there was significant positive relationship between agricultural graduate students' attitude and their knowledge towards sustainable agriculture ($p<0.01$).

Table3- Correlation between students' knowledge and attitudes towards sustainable agriculture

		knowledge	Attitudes
Knowledge	Pearson Correlation	1	.73**
	Sig. (2- tailed)		.00 0
	N	165	165
Attitudes	Pearson Correlation	.73**	1
	Sig. (2- tailed)	.00 0	
	N	165	165

*** Correlation is significant at the 0.01 level (2-tailled).*

CONCLUSION

It is relevant that a fundamental requirement for a successful policy implementation in sustainable agriculture is based on understanding the graduate students' attitudes and knowledge. The present study showed that senior students' attitudes are positive towards sustainable agriculture in general and especially towards environmental aspect. This finding implied the importance of the ecological dimension in agricultural higher education. Results showed that students' knowledge in the field of agricultural policies is low, it seems that curriculum development program with emphasis on the negative impacts of agricultural policies is necessary. Based on results, there is a high correlation between knowledge and attitudes of students ($r = 0.73.$, $p<0.01$) which indicate they have knowledge-based attitudes. According to Ajzen (2005), attitude is the most important determinants of professional behavior [2].

As students are future agricultural experts and decision makers, in addition to course work and in order to put the student's knowledge and attitudes into practice, specific attention should be paid to a few experiential learning opportunities as extra curricula activities such as on-farm research and demonstration plots, featuring sustainable agriculture practices could enhance learning for students and help them realize the potential benefits of sustainability. Finally, they will be empowered to gain career opportunities which compatible with sustainable agriculture.

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