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Rice Farmers' Behaviors and Attitudes Toward Agricultural Extension Programs in Healthy Food Production (Case of Lahijan and Amlash Counties, Northern Iran)

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Abstract

This study aimed to explain the behavior and attitudes of farmers in the adoption of Integrated Pest Management (IPM) technologies in rice fields. The main instrument of research was a questionnaire whose validity was confirmed by a panel of professors and executive experts, and its reliability was confirmed by apreliminary test. The sample employed in the research study comprised farmers who were participating in extension programs of integrated pest management held in Lahijan and Amlash during 2012-2014. The findings showed that the predominant activity of farmers was the use of combined methods (chemical and non-chemical), leaving crop residue on the field, and using biological control, with the rank average of 9.27, 9.25, and 9.12 from the total average of 6.5, respectively. In addition to, private extension cooperatives, rice supervisors, agricultural extension staff, educators, and TV programs with the average of 11.14, 10.87, 10.80, and 10.71 of the total average of 7.49 had the highest role in informing the farmers. Based on such findings, some suggestions were also given, such as concentration on special aspects of integrated pest management, attention to the education of rural women, and employing young and educated members of farmers' families as arms of agriculture extension in transferring innovation of integrated pest management to families.

Keywords:
Amlash, healthy food production, Integrated Pest Management (IPM), Lahijan

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INTRODUCTION

One of the greatest challenges of human society that has been consideredas a new global movement is the problem of food security of the increasing population. The need for food supply, in spite of the two crises of population growth and limitation of primary resources, has fueled the movement toward the use of industry and technology in the process of production. Agriculture, since 1950s, accompanied by the green revolution, decades of entering of technology including chemical input, high-yielding varieties, new methods of watering, new machineries, and so on. Only two decades after the arrival of technology, indiscriminate and inappropriate application of chemical inputs has exposed the production process in agriculture to serious problems and crisis whose consequence has beenmuch worse than that of the lack of access to technology. Due to the dangers and crisis of chemical input application in agriculture sector that has created different problems in addition to production quality and health, a movement has been initiated toward sustainable and organic agriculture in recent decades, especially since the 1980s, and tools, activities, and researches by agriculture specialtiesare directed towardthis process (Office of Promotion Affairs and the Improvement of Extensional Systems, 2007).

Agricultural protection technology, which includes a wide range of activities such as integrated pest management, conservative tillage, biologic control, and integrated nutrition of the soil, is a fundamental basis of sustainable agriculture. Among these technologies, integrated pest management has a special place in activities and agriculture planning due to its high effectiveness on health of agriculture, ecosystem, as well asproduction of healthier products (Veisi et al., 2010).

Each year, despite using toxin and chemical materials in agriculture, not only pests and diseases have not become less, but also the level of pollution has increased, and the process of production has faced a serious problem. In the third millennium, the most important challenges for governments are food security and energy that achieving it was not possible,if the current situationin the production system continues, so, reform the management methods of production are essential (Sharifi Moghaddam & Ezatian, 2008).

Integrated pest management that was proposed in response to this need is a system which consists of various parameters and its promotion and facilitation needs considering regionally specific social, economic, and ecological features. In fact, integrated pest management is based on regional feature and ecological conditions as well aslocal socio-economicfeatures (Sharifi et al., 2009). Introduction and facilitation of technologies is one main duty of promotion sector, as it is responsible for the development and growth of agriculture and has gained importance due to the recent needs for knowledge and information about the adoption of sustainable agriculture technology (Veisi et al., 2009).

According to researches, although many attempts have been made for the education of villagers in recent decades, their knowledge and awareness is not sufficient about the integrated pest management, suggesting the inefficiency of current activities (IPM education and extension). The success of integrated pest management practices depends on farmers' motivations, skills, knowledge, as well as the participation of local groups and societies (Ettehadi et al., 2011). Effective promotion of integrated pest management needs identification of the main parameters of the integrated pest management for policy-making and practical planning with participation of agriculture (Noori et al., 2011).

Accordingly, the Office of Extension Management and Improvement of Farming System in Guilan Province has held educational and extensional courses about healthy production in the counties of Lahijan and Amlash with an emphasis on rice cultivation, In this program, farmers were trained on how to produce a healthy product. In this research, the degree of effectiveness of these extension activities is analyzed from the perspectives of educated farmers (Table 1).

Table 1
Summary of Related Literature

Title	Year	Authors	Findings
Identify requirements for using integrated pest management in horticultural crops.	2013	Moradi and Omidi Najafabadi	The result of factor analysis divided necessaries into five factors of educational-extensional, economic planning, policy-making, technical supervision and planning that totally explains 66% of the total variance of variables.
Affective factors in accepting gardeners of Shoushtar-county in the field of integrated pest management.	2012	Shoushtari and Amani	A positive, significant relationship was found between level of education, product income, total owned land, amount of water and dry land, mechanization level, social position and degree of accessing communicative channel with level of acceptance of gardeners at the level of 0.01%.
Considering effective factors on the degree of knowledge, skill and level of tendency of participating gardeners of the Dalaho county in integrated pest management programm	2012	Ghorbani Piralidehi et al.	The result of stepwise regression showed that participation in classes, job record, degree of production, interpersonal reliance and social position are effective on knowledge of integrated pest management of gardeners.
Considering extensional and educational factors affecting on applying IPM of the products by farmers of Karaj county.	2012	Faiz Arbabi et al.	The result of multiple regressions denotes that variables participating in educational-extensional classes of IPM of the product, effect of educational extensional methods onincreasingknowledge of farmers, contact with agriculture promotion, effect of educational extensional methods forincreasing farmers' skills and area under cultivation has explained the positive function at applying IPM and 67% of changes of dependent variables.
Affective factors in accepting IPM of wheat pest by relying on approach of farmer fieldschool.	2011	Noori et al.	Two variables of extensive contacts and communicative channels denote changes of variance of the dependent variable to the degree of 37%(degree of acceptance of IPM).
Effectiveness of training of IPM from the perspectives of cotton farmers of Garmsarcounty	2009	Ghane et al.	There is a significant relationship between personality variables and the variables of knowledge, attitude and skill and variables of participation in educational classes, features of the educational period with variables of attitude and skill.
Effect of information resources and communicative channels in accepting IPM of rice	2011	Hejazi and Sharifi	Calculating correlation coefficient denotes the existence of a positive relationship between the variables of the area under cultivation, education, being an excellent farmer; agree with reducing herbicides and pesticides and the possibility of controlling pests of rice without using herbicides by benefiting resources and information channels.
Limitations at accepting IPM, case study 240 rice farmers participating in 14 IPM educational plans in Jamo region	2012	Kumari	Lack of knowledge and skill among farmers, complicated nature of the technology of IPM, inaccessibility to inputs and tools for implementing the plan of IPM, the small size of farm, lack of information about recent strategies of IPM, promotion, services, involvement of experts of IPM andparticipation of rural society such as the main limitation for accepting IPM among farmers is the limitations for the adoption of this technology.
Accepting IPM among farmers, case study of Delta of Nigeria	2008	Sing et al.	There was a significant, negative and positive relationship between the size of the farm and the degree of adoption of products of rice and cotton.
Accepting technology of IPM, case study of potato farmers in the region of Karachi, Ecuador 2005	2005	Mauceri et al.	Hours of training and educational publication are effective mechanism for transferring the technology of IPM to farmers and its acceptance. Hours of training and educational publication, although are somewhat lower cost,but they have considerable effect on this field.

MATERIALS AND METHODS

The present study was a survey conducted by a descriptive method. The study tool was a questionnaire composed of open and closed questions in which the main questions were prepared on the basis of the research paradigm. The statistical society was composed of farmers participating in educational-extension training courses of integrated pest management in Lahijan and Amlash. Theyhave been under the education of IPM in the form of farmer field school (FFS) since 2012-2014. Given the limitedsize of the statistical society, almost all educated people (140 people, including 90 people in Lahijan and 50 people in Amlash) were studied.

Data collected by questionnaire were entered into Statistical Package for the Social Sciences (SPSS) after being codedand processed. They were descriptively studied with a central index and were analyzed with a correlation test and stepwise regression analysis.

RESULTS

From among 140 respondents, 119 were male and 21 were female (i.e.,85 percent of beneficiaries were male and 15 percent were female). Since rural women play a significant role in cultivating rice and in investment in education of rural women as an important part of the rural population, and given the fact that cost-benefit analyses of world bank shows that investment in education of women has the highest degree of return among the investments (Moridsadat et al., 2010), it is necessary to pay attention to the education of women in this field.

Amongthe participants, 0.7 percent were younger than 25, 9.3% were between 26-35, 12.9% were between 36-45, and 77.1% were older than 45 years old. The level of education of respondents shows that 23.6% were illiterate, 37.9% hadlimitedliteracy of reading and writing, 29.3% haddiploma, and 7.9% hadliteracy of higher than diploma (in fact it can be said that 62.9% of beneficiaries had not benefited from the advantages of literacy). The main job of 127 respondents was farming among whom 37 people had secondary jobs. The respondents' job experience showed that the minimum and maximum limits ofjob experience were2 and 70 years, respectively. In addition, the average time of occupation was 32.7 years. Furthermore, 3.6 percent had work experience of less than 10 years, 13.6% between 10-19 years, 15.7% between 20-29 years, 23.6% between 30-39 years, 42.1% over 40 years of work experience, and 57.9 percent had more than 30 years of farming experience. This suggests that adolescents have lower tendency toward farming. 27.1% of respondents had personal-leased lands, 67.9% had personal lands and 5% had leased land. The minimum and maximum limits of the cultivation area of the studied population were 0.1 and 4 hectares, respectively. Average cultivation area is 1.14 hectares, showing a low cultivation area.

Table 2
Prioritizing the Use of Ecological and Non-Ecological Features at Rice Cultivation Using the Friedman Test (n=140)

Variable	Friedman test	
	Mean rank	Priority
Using integrated methods	9.27	1
Releasing plant residues	9.25	2
Using biologic control	9.12	3
Using aresistance variety	7.96	4
Using manure in farms	7.66	5
Using crop rotation	7.17	6
Using animals and birds	5.35	7
Second cultivation	5.10	8
Pure use of chemical toxin	5.08	9
Using green fertilizer	4.86	10
Using legume cultivation	4.11	11
Burning plant residues in farm area	3.07	12
χ^2=628.342	Sig=0.000	df=11

For the use of ecological features about rice cultivation, 12 items were designed and farmers were asked to indicatethe degree of their use of available optionsby rating them on a Likert type scale. In Table 2, it is obvious that using the integrated method, releasing plant residues at thefarm area, and using biological control with little differences are the options that farmers use in rice production, while all the other items are given lower priorities (Table 2).

Attitude of farmerstowardproducing healthy products

To discover farmers' attitudes toward producing healthy products of rice,nine statements were-designed, and farmers were asked to show their viewpoint about each item by rating them on aLikert type scale. According to Table 3, it is obvious that the role of government in encouraging and guaranteed purchase of products, the negative effect of indiscriminate consumption of fertilizer and chemical pesticides on water, soil and foods, the effect of farmers' poverty and weak financial power on incorrect applicationof inputs, and the preference of mechanical operations for weed control were placed in the first to fourth priorities, with the means of 6.68,

Table 3
Prioritization of Farmers' Attitudes towards Producing Healthy Products Using Friedman Test

Variable	Friedman test	
	Mean rank	Priority
Government can have a more effective role in proceeding plans of IPM by encouraging farmers and guaranteed purchase of rice produced through this method	6.68	1
Indiscriminate consumption of fertilizer and chemical toxins pollutes the atmosphere and foods	6.63	2
Farmers' poverty and financial weakness are effective in the incorrect application of agriculture inputs	6.38	3
Control weeds by mechanical operation like better weeding by chemical herbicides	6.16	4
Species rotation causes fertility of soil	4.93	5
The main reason of farmers' inattention for sustainable agriculture and production of healthy product is the lack of correct awareness	4.47	6
Farms should cultivate so as to sustain their ability for long-term production even if it means less production and profit	4.28	7
Consecutive cultivation of a species of rice in a land causes a pest outbreak	3.45	8
Cultivation of legume decreases the degree of consuming chemical fertilizers	1.03	9
χ^2=523.263	Sig=0.000	df=8

Table 4
Prioritization of the Effect of Educational-Extension Methods of Producing Healthy Products from the Farmers' Viewpoint Using Friedman Test

Variable	Friedman test	
	Mean rank	Priority
Group training courses	7.24	1
Visiting of educational farms	6.40	2
Implementing of farmer's, field school projects	6.32	3
Establishing demonstration farms	6.01	4
Personal contact	5.66	5
Distributing extension publications	5.19	6
Using TV programm	5.12	7
Displaying educational films	5.06	8
Using radio programm	4.56	9
Holding an exhibition of agricultural products	3.44	10
X=296.84	Sig=0.000	df=9

Table 4
Prioritization of the Degree of the Studied Farmers' Use of Information Resources Using Friedman Test

Variable	Friedman test	
	Mean rank	Priority
Private Cooperatives of extension	11.14	1
Rice supervisors	10.87	2
Extension workers	10.80	3
TV	10.71	4
Pioneering farmers	8.09	5
Extension publications	7.33	6
Radio	6.85	7
Agriculture input shops	6.82	8
Educational film	6.62	9
Internet	5.61	10
Educational and research centers	5.36	11
Newspaper	4.97	12
Book	4.95	13
Journal	4.85	14
X=788.393	Sig=0.000	df=13

6.63, 6.38, and 6.16, respectively. The other items were placed in lower priorities (Table 3).

With respect to farmers'viewpoints about the effect of educational-extensional methods on producing healthy products of rice, 10 items were designed, and farmers were asked to express their viewpoints about each item by using a Likert type scale. Regarding Table 4, it is obvious that group training courses, visiting of educational farms, implementing of farmer's, field school projects, andestablishing demonstration farms with a mean of 7.24, 6.40, 6.32, and 6.01 are methods that studied farmers have emphasized more than the planners, and implementers of educational-extension plans should pay due attention to them (Table 4).

Prioritization of the degree of farmers' use of information resources about producing healthy products

With respect to the degree of farmers' use of information resources about producing healthy products, 14 items were designed, and farmers were asked to show their viewpoints about each item by using a Likert type scale. According to Table 5, it is obvious that private cooperatives of extension, supervisors of rice, extension workers, and TV programs have made the greatest contributions to informing farmers with a mean of 11.14, 10.87, 10.80, and 10.71, respectively. The other items were placed in lower ranks (Table 5).

The relationship between respondents' personal characteristics and the effectiveness of extensional activities in producing healthy products

Pearson and Spearman correlation coefficients were used to test the relationship between personal features and degree of effectiveness of extensional activities at producing healthy prod-

Table 6
The Relationship between Personal Features and Degree of Effectiveness of Extensional Activities in Producing Healthy Products of Rice

Independent variable	Correlation coefficient	r	p-value
Gender	Pearson	-0.069 ^{ns}	0.417
Age	Pearson	-0.176*	0.038
Level of education	Spearman	0.222**	0.008
Years of occupations	Pearson	-0.084^{ns}	0.321
Main or side job	Pearson	-0.057^{ns}	0.504
Farm ownership	Pearson	-09.194*	0.021

*p<0.05 **p<0.01 ns: Non-significant

Table 7
The Relationship between Economic Features and The Effectiveness of Extensional Activities In Producing Healthy Rice Products

Independent variable	Correlation coefficient	r	p-value
Area under cultivation	Spearman	0.406**	0.000
Amount of production	Spearman	0.428**	0.000
Using agricultureloan	Pearson	-0.142ns	0.095

**p<0.01 ns: Non-significant

ucts of rice, and as it is observed in Table 6, the effectiveness of extension activities is significantly related to the age, educational level, and farm ownership at the level of 0.05, 0.01, and 0.05% level of significance, whereas it did not highly correlate with gender, years of occupations, and the job type. In fact, as farmers grew older, the effectiveness of extension activities would bereduced. Higher educational level was related to higher effectiveness, and leasing farm was accompanied with lower effectiveness (Table 6).

The relationship between economic features and effectiveness of extensional activitiesin producing healthy products

The relationship between economic activities and the effectiveness of extensional activities in producing healthy rice product was tested by Pearson and Spearman correlation coefficients. As can be seen in Table 7, there is a direct significant relationship between cultivation area and the level of production, as well as the effectiveness of extensional activities of producing healthy products of rice at the level of 0.01%, whereas no significant relationship was found between the use of agricultural loans and the effectiveness of the extension activities (Table 7).

The relationship between farmers' knowledge and attitude and the effectiveness of extensional activitiesin producing healthy products

A correlation coefficient of Kendall Tau-b and Spearman were used to test the relationship between farmers' knowledge and attitude and the

Table 8
The Relationship between Farmers' Knowledge and Attitude about Index of Producing Healthy Products and Degree of Effectiveness

	Independent variable	Dependent variable	Correlation coefficient	r-value	p-value
Attitude	Cultivation of legume reduces the degree of using fertilizer	Effectiveness of extension activities	Kendal tau b	0.192**	0.002
	Consecutive cultivation of a species of rice in a piece of land over some years causesa pest outbreak				
	Weeds are better to be controlled by mechanical operations than by chemical herbicides				
	Species rotation of rice cause fertility of soil				
	Indiscriminate consumption of fertilizer and chemical toxins pollutes the atmosphere and foods				
	Financial weakness of farmers is effective in the incorrect application of inputs				
	Farms should be cultivated so as to save their long-term ability of production		Spearman	0.265**	0.002
	Government can play more effective role in proceeding plans of IPM by encouraging farmers to produce healthy products and guaranteed purchase of rice produced through this method				
	The main reason for the inattention of application of sustainable agriculture and production of healthy product is the lack of correct awareness in this field				
Knowledge	Familiarity with sustainable agriculture		Kendal tau b	0.230**	0.001
			Spearman	0.276**	0.001

**p<0.01

Table 9
Summary of Multivariable Regression

Step	R	$R_{Sq.}$	R_{Ad}	Std.Error of
1	0.249	0.062	0.055	5.289
2	0.309	0.096	0.083	5.212

Table 10
Standard and Non-Standard Coefficients of The Effect of Information Resources on Applying IPM

	Variable	B	Standard error	Beta	t	p-value
X_1	Agriculture promoter and teachers	0.759	0.297	0.212	2.557	0.012
X_2	Radio	0.887	0.393	0.187	2.254	0.026

effectiveness of extensional activitiesin producing healthy rice product. Table 8 shows a direct and positive significant relationship between farmers' knowledge and attitude, as well asthe effectiveness of extension activities. In other words, as farmers have a more positive attitude toward producing healthy products; it affects the effectiveness of extensional activities to the same extent. In addition, as they obtain more and more information about sustainable agriculture,the effectiveness of extensional activities of producing healthy productsis affected to the same degree (Table 8).

Considering the effect of information resources on applying integrated pest management

Stepwise multivariable regression was used to predict the changes of dependent variable through independent variables. The goal of regression analysis is to consider the effect of each independent variable of research on the dependent variable (application of training of integrated pest management) and predicting the changes of the dependent variable, and determining the share of each independent variable in explaining the variance of the dependent variable. The results show that only 0.083% of the dependent variable was accounted for by thevariables listed in Table 9 through two steps into the regression.

In addition, given the existing coefficient in Table 10, standard equation of the regression line in the second step is as below:

$Y=27.50+0.75(X_1)+0.88(X_2)$

According to the result of Tables 9 and 10, it can be said that the effect of information resources on applying education of integrated pest management (0.083) was insignificant. It can be explained bytwo reasons: either these resourceslacked sufficient information for presenting them to the farmers, or the farmers could not use these resources due to various reasons. It seems that the first reason (lack of presenting sufficient information) is more tenable.

CONCLUSION AND RECOMMENDATION

The findings of this research, which are inconsistent with those of many other studies conducted across these counties or other counties, suggest that integrated pest management is a combination of different actions that overlap and are in close relationship. It undoubtedly requires planning and implementing educational and promotional trainings at extended levels for beneficiaries, along with supplying economicandsocio-cultural facilities. This finding is similar to the result reported by Pretty (1997), Mauceri et al. (2005), Ghane et al. (2009), Kumari (2011), Moradi and Omidi Najafabadi (2013), (see Table 1), according to which it is necessary to change and improve the procedures of extensional activities in the promotion of sustainable agricultural technologies such as integrated management.

Overall, the results, given the overall goal and objectives of the study, were obtained from the following sources:

Interviewing with farmers and collectioninformation through a questionnaire containing open and closed questions polling their opinions about their attitude and behavior, the details of which are given in the corresponding tables. Aging of over 45 years and an illiteracy coefficient

of 65% of respondents were a limiting factor in information retrieveal that was reduced by the accuracy of interviewers to much extent.

Field observation and informal interview with authorities (e.g., private educators, experts of Jihad Agriculturein Lahijan and Amlash) is the second source of data for this research. It shows that this innovation, like any another new idea, needs capacity building, providing facilities, continuation and improvement of training courses, and, above all, using of material and moral incentives, which is in agreement with Fuglie and Kascak (2001), emphasizing the roles of policy support, regional factors, as well asincome levels on the acceptance of innovation. In addition improving knowledge of farmers through extensional trainings and developed social communications are in agreement with De Harreraand Sain (1999), under scoring the roles of communication and information channels inthe adoption of integrated pest management.

Findings of research about implementing pest integrated management among rice farms indicated that among the identified actions, farmers mostly apply 'combined methods', 'leaving crop residue in the field' and 'using biological control', therefore, as a necessity, it is suggested that these items should be emphasizedin educational-promotional plans about integrated management. Moreover, considering the effectiveness of promotional educations and degree of achievement, and behavior changing of farmers, it is suggested that department of extension affairs, before holding educational trainings, should do a primary assessment of the society to assess the level of difference of learning of learners after education and apply it in future planning. Another important point is senility and the erosion of man power in the farmers' community that calls for injecting the spirit of happiness and creating change in their viewpoints and behavior. It is not possible by current condition and requires economic and social infrastructure. Therefore, it is suggested to choose an educated member from the farmer's family andto train him/her to act as arms for promoting the agriculture in the field of pest-integrated management in the family and todistribute this idea as innovators at the level of society.

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