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Analysis of rice producers' perceptions of participatory communication in use of integrated pest management (Case study: West of Mazandaran province)

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ABSTRACT

The aim of the research was analysis of rice producers' perceptions of participatory communication in the use of integrated pest management (IPM). Research population was consisted of rice producers in the west of Mazandaran province (N=16126), whose 187 ones were selected using Cochran's formula. Data were gathered by systematic random sampling method. The instrument for data collection was a questionnaire which its validity was confirmed by a panel of experts. Its reliability was confirmed by Cronbach's alpha coefficients. Results of descriptive statistics showed that the rice producers are in the good status in terms of use of integrated pest management's technologies. The results of ANOVA showed that there are significant differences among rice producers based on their perceptions of participatory communication and use of integrated pest management. Rice producers with higher perception use integrated pest management's technologies more than others. The results of the correlation coefficient also showed that there is significant positive relationship among all factors related to perceptions of participatory communication (individual effect, contextual education, information receiving and Agricultural Jihad's flexibility) and the use of integrated pest management, except to the information sending one. Stepwise regression analysis showed that two factors including Agricultural Jihad's flexibility and contextual education can explain 70/02% of the changes in the dependent variable (use of IPM).

Key words: Integrated pest management, Participatory Communication, Rice, Mazandaran province.

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INTRODUCTION

In recent years, inappropriate use of chemical pesticides cause harmful effects on the environment, human health, hygiene and other insects and natural enemies of pests in the country. Pesticides act like a double-edged sword in the pest control because they kill both beneficial and harmful insects and plants. Traditional methods of pest management like rotation and diversity gradually was stopped along with increased use of pesticides. Effectiveness of pesticides are declining with the emergence of pesticide-resistant pests and diseases, and in order to obtain same effect, it is requiring use more chemical pesticides (Nassiri & Niknejad, 2011).On the same hand, due to the vulnerability of rice to wider range of pests, the inappropriate use of pesticides in rice cultivation is more visible.IPM as an appropriate strategy to reduce use of chemical pesticides and as an alternative approach for the pesticide application has been introduced to farmers, given the known risks from the use of chemical pesticides on the environment and human health (Yorobe Jr. et al, 2011). IPM is a long-term pest control strategy through a combination of biological, cultural and chemical methods to reduce pest populations up to a certain tolerable threshold (Liang et al, 2012). According to the IPM definition, biological control is one component of integrated pest management's strategies. But agricultural extension's traditional approaches were not so successful in development and acceptance of the IPM. Reasons for this are including: low level in usage of agricultural education' program, limited access to the media and poor understanding of the integrated pest management's programs that lead to the greater usage of chemical pesticides (Rola et al, 2002). Another known factor in the successful development of IPM is the hard working one because IPM is involved of a complex decision-making process in prevention of the pests (Zilberman and Castillo, 1994). Considering reasoning for the unsuccessful development of IPM and the complexity of decision making process, the participatory communication approach can act as a powerful strategy in order to develop IPM among farmers. The importance of the participatory communication rises from the knowledge-sharing and as a basis for it, where the internals and externals in the community are meeting each other, in order to achieve their desired development through knowledge creation, knowledge acquisition and sharing of knowledge in the informal and individual communication's environment (White cited in Rodlytok , 2007). Participatory communication is defined as a dynamic, interactional and transitional process which is caused by dialoguing among people, groups and institutions that empowers them to realize their potential and to take steps towards their happiness(White cited in Rodlytok , 2007). It suggests that communities should be a champion of social change processes, rather than act as passive beneficiaries in the decisions made by foreign experts (Jafari, 2010).Participatory communication in general means working with/by people against working for one. It should be noted that information exchange is very important factor in participatory communication for successful development and transfer of technology through communications network among agriculture system's components (Leeuwis 2004). The communications network is composed of interlocking people that are related to use a pattern of communication and this model specifies structure of the relationship among them (Rogers cited in Demiryurek et al, 2008). Rogers (1995) emphasizes that information exchange (communications) and its distribution takes place within a social system and individuals, informal groups, organizations and subsystems will form it. Communication has a vital and constructive role in the transmission of information in times when farmers are in an interactive, dependent environment and similar conditions for the education (Novak & Sellnow, 2009). Researchers suggest that farmers' participatory communication can act as a potential to solve problems in which are rising a result of the rejection of the IPM technologies (Lilja et al, 2011). Participatory communications both improve the quality of products, and increases the individual's knowledge and capacity to accept other technologies such as IPM (Bartlett, 2008). Results of the Feder et al (2004) and Yamazaki and Resosudarmo (2008) studies showed that intensive educational activities such as Farmer Field School(FFS) and also communication and participatory training have been effective in the improvement of environmental impacts which is caused by agricultural production in the southern and southeast regions of the Asian continent. Dalton et al (2011) in their study also showed that there is positive relationship among participatory communication and extension and adoption of the new

technologies in the field of IPM. According to the research findings of Maraddi et al (2007), number of extensional contacts and participation in the related training classes, can contribution to the adoption of IPM practices among farmers. Research findings of Ofuoku et al and (2009) and Asghari (2003) showed that the number of farmers' contacts with extension agents, extension courses, connection with research centers, participation in the demonstration farms, participation in the program of the field day and farmer's communication with extension workers have a significant relationship with the use of IPM. According to the above, the present study examined the role of rice producers' perceptions of participatory communication in the use of IPM.

MATERIALS AND METHODS

Design of the study was a descriptive survey that was done between years 2011-2012. Research population was consisted of rice producers in the west of Mazandaran province (N=16126), whose 187 ones were selected by systematic random sampling method and using Cochran's formula and considering standard deviation of total score of the IPM. The instrument for data collection was a questionnaire including two parts. The first part was consisted of 22 questions related to the rice producers' perceptions of participatory communication (Novak &Sellnow's questionnaire, 2009) which were measured on a five-point likert scale which ranged from 1(completely disagree) to 5 (completely agree) and witch adapted to the basis of farmers' status. This part is composed of five sections, which are: information sending (4 items), individual effects (4 items), information receiving (4 items), Agricultural Jihad's flexibility (5 items) and contextual educational (5 items).The second part was consisted of 19 questions related to IPM in a 5-years period on a four-point likert scale (never, rarely, often, and always). It is presented in table 1.The total score for each respondent were considered as the use of IPM among rice producers. After conducting a pre-test, reliability of the questionnaire was measured by computing Cronbach's alpha coefficient ($\alpha \geq 0/7$). Face and content validity of the questionnaire was obtained using a panel of experts after carrying out the necessary reforms. Four categories including (low, relatively low, relatively high and high) was made based on the minimum, mean, standard deviation and maximum using Algebraic Sum of items related to IPM (Sadighi &Mohamadzadeh cited in Razzaghi et al, 2012).

Mode of conversion of the achieved scores is as follows:

low: Min<A< Mean- Sd

relatively low: Mean- Sd< B< Mean

relatively high: Mean< C<Mean+Sd

high: Mean+Sd<D

***Table 1*.** Indicators of Integrated Pest Management

	item
1	The first plowing in winter
2	Water logging of the farm in winter
3	Early planting to prevent pests
4	Planting the precocious cultivars
5	Disinfection of rice seeds before planting
6	Elimination of the infected plants in rice nursery
7	Removal of the rice plants from the marginal farm after re-transplant
8	Usage of the light traps to hunts pests butterfly
9	Usage of the Trichogramma wasps (TW)
10	Prevention of the direct spraying after use of the TW
11	Usage of the biological toxins
12	Usage of the pesticides by the Agricultural Jihad on the recommended time
13	rice and fish cultivation
14	Usage of ducklings in the paddy
15	Removal of the weeds
16	Planting different varieties of rice in different years
17	Crop rotation(cultivation of the other Crops after the harvest)
18	livestock grazing after the harvest
19	Poultry grazing after the harvest

(Scale: not = no year; rarely = 1 to 2 years; often = 3 to 4 years; always = every 5 years)

RESULTS AND DISCUSSION

Based on the results of descriptive statistics mean age of respondents is 50/68 years with SD 13/67.The youngest farmer has 22 years old and the oldest one has 75. 20.2% of respondents are illiterate, 25.8 % have primary degree, 16.4% have secondary degree, 30.4% are diploma and only 7/2% has academic degrees .The mean number of children is 3/53 and the highest frequency is related to the two-person households (22/5%). In terms of marital status 88/8% of respondents were married and the rest were single. 10/3% is civic and 89/7% are rural.

Some questions are asked as described in Table 2 on a five-point likert scale in order to investigate the perceptions of participatory communication by rice producers. The highest average was awarded to the individual effect and the lowest one to the flexibility of Agricultural jihad. Coefficient of variation test (CV) also was used in order to prioritize the rice producers' perception of participatory communication and prevent the individuals' views from dispersion. The values are shown in Table 2. Findings show that the first and last priorities are related to two factors, information receiving and flexibility of Agricultural Jihad respectively.

Table 2. Rice producers' perceptions of participatory communication

Priority	*perceptions*	*Items*	*Mean*	*Sd*	*CV*
1	information sending	I have an opportunity to talk my ideas about my daily work to other farmers.	3.91	0.33	0.084
2		Agricultural job can provide me an opportunity to consult with other farmers.	3.91	0.36	0.092
3		Other farmers usually ask me to tell them about my knowledge and skills.	3.88	0.42	0.108
4		I can continually talk about agriculture among farmers, although it may be wrong.	2.48	0.85	0.343
3		**Total**	**3/54**	**0/49**	**0.138**
1	individual effect	I have some ideas that affect the quality of my work.	4.01	0.18	0.045
2		My ideas about agricultural work affect the long-term planning.	3.96	0.18	0.046
3		My work affects the other farmers in the field.	3.95	0.25	0.063
4		My acts affect the quality of the agriculture directly, in paddy.	3.98	0.28	0.070
2		**Total**	**3/97**	**0/22**	**0.055**
1	information receiving	I will gain the needed information, if I want to work well.	۳.۹۸	0.10	0.025
2		I will gain the needed information, if a change occurs in my field.	۳.۹۰	0.12	0.031
3		I can take enough data for rice cultivation.	3.97	0.14	0.035
4		I will gain the needed information, if a problem occurs in my field	3.96	0.23	0.058
1		**Total**	**3/95**	**0/14**	**0.035**
1	Agricultural Jihad's Flexibility	Experts treated the farmers with respect.	3.99	0.73	0.183
2		Everyone can participate in the training sessions with agricultural experts.	2.99	0.97	0.324
3		Agricultural Organization encourages opinions and ideas.	2.55	0.87	0.341
4		Agricultural organization accepts good ideas always.	2.91	1.03	0.354
5		Agricultural organization encourages the farmers to express their ideas.	2.52	0.94	0.373
5		**Total**	**2/99**	**0/90**	**0.301**
1	Contextual Education	It is always spoken us about safe rice production.	3.79	0.50	0.132
2		It is always spoken us about good quality of rice production.	3.79	0.54	0.142
3		It is always spoken us about the effect of agricultural practices on the environment	3.77	0.55	0.146
4		Educational experts help farmers in Agricultural Organization.	3.17	0.98	0.309
5		Agricultural Organization always act as a pioneer in the training of new farmers.	2.5	0.88	0.352
4		**Total**	**3.40**	**0.69**	**0.203**

(Scale: strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, strongly agree = 5)

Respondents were divided into four categories including: low, relatively low, relatively high and high in order to assess the use of IPM based on respondents' scores. Accordingly, it is seen that the highest frequency is related to the category of “relatively high” (Table 3).This means that more rice producers (41/6 percent)are in the good status in terms of the use of integrated pest management’s technologies.

Table 3. Frequency distribution of the use of integrated pest management

usage rate of IPM	***Frequency***	***Percent***
low	28	15/7
relatively low	50	28/1
relatively high	74	41/6
high	26	14/6
total	178	100

ANOVA test was used to investigate the effect of rice producers’ perceptions of participatory communication on the use of IPM. For this purpose, respondents were divided into four categories including: low, relatively low, relatively high and high, regarding the level of perceptions of participatory communication. To perform ANOVA Test, normality of the variance of dependent variable was evaluated by Leuven’s Test. considering the significance level of the Leuven’s Test (24/428 >0/05), equality of error variances is assumed, and then we can use ANOVA Test. The results are showed in Table 4.

Table 4. Analysis of variance summary, rice producers’ perceptions of participatory communication on the use of integrated pest management

Sources of change	***Ss***	***df***	***Ms***	***F***	***Sig***
Between-group	104.807	3	34.936	3.314	0.021
Within-group	1813.006	172	10.541		
total	1917.813	175			

As it is shown in Table (4), there is significant effect between different levels of the perceptions of participatory communication and the use of IPM. Comparison groups (table 5) also showed that there is significant difference in the use of integrated pest management among the individuals who has high perceptions of participatory communication and the low or relatively low one. This means that the perceptions of participatory communication have positive effect on the use of integrated pest management.

Table 5. Comparison groups in the use of IPM

groups (I)	***groups (J)***	***Mean Difference (I-J)***	***Std. Error***	***Sig.***	***95% Confidence Interval***	
					Lower Bound	*Upper Bound*
low	relatively low	-.46296	.65712	.981	-2.2536	1.3277
	relatively high	-1.48718	.78825	.323	-3.6144	.6400
	high	-2.09009*	.73172	.034	-4.0755	-.1046
relatively low	low	.46296	.65712	.981	-1.3277	2.2536
	relatively high	-1.02422	.66105	.551	-2.8043	.7558
	high	-1.62713*	.59250	.045	-3.2304	-.0239
relatively high	low	1.48718	.78825	.323	-.6400	3.6144
	relatively low	1.02422	.66105	.551	-.7558	2.8043
	high	-.60291	.73525	.960	-2.5824	1.3766
high	low	2.09009*	.73172	.034	.1046	4.0755
	relatively low	1.62713*	.59250	.045	.0239	3.2304
	relatively high	.60291	.73525	.960	-1.3766	2.5824

*The mean difference is significant at the 0.05 level.

The Pearson's correlation coefficient was used to investigate the relationship between perceptions of participatory communication and the use of IPM. Results (Table 6) showed that there were significant positive relationship among all variables related to perceptions and the use of IPM except to the information sending one. These findings confirm the researches' results of Leeuwis (2004), Rogers (1995), Bartlett (2008), Feder et al (2004), Yamazaki and Resosudarmo(2008), Dalton et al(2011), Ofuoku et al and (2009) and Asghari (2003).

Table 6. Correlation coefficient between perceptions of participatory communication and the use of IPM

Variable	***Correlation coefficient***	***The significant level***
Information Sending	0/072	0/337
Personal Effects	0/173*	0/021
Information Receiving	0/151*	0/046
Agricultural Jihad's Flexibility	0/818**	0/00
Contextual Education	0/628**	0/00

**Significant at 0/01, * significant at 0/05

Stepwise regression analysis was used to identify explanatory variables. According to the results (Table 7), two factors: Agricultural Jihad's flexibility and contextual education were entered into the regression equation respectively. Factor of Agricultural Jihad's flexibility with beta 0/822 has most direct effect on

the use of IPM. The results of Maraddi et al (2007), Feder et al (2004) Yamazaki and Resosudarmo (2008), studies also showed the positive role of extensional contacts, participation in training classes, communication and participatory workshops on the development and adoption of the IPM practices.

Table 7. Stepwise regression analysis

Variable	***β***	***Beta***	***t***
Constant coefficient b0	13/685	------	2/209
Agricultural Jihad's Flexibility x_1	1/214	0/822	19/931
Contextual Education x_2	1/592	0/171	4/135
$\mathbf{R^2}$=0/706	$\mathbf{R^2_{Ad}}$ = 0/702	**F**= 207/525**	

Multiple correlation coefficient (R) is 0/084 and the adjusted coefficient of determination (R^2_{Ad}) is 0/702. Thus, the two variables in the regression analysis can explain70/2% of the change in the depended variable. The results are shown in Table (8).

Table 8. Determination coefficients of the use of IPM

Step	***Variable***	***R***	R^2	R^2_{Ad}
1	Agricultural Jihad's Flexibility x_1	0/823	0/677	0/675
2	Contextual Education x_2	0/840	0/706	0/702

CONCLUSIONS AND RECOMMENDATIONS

Results showed that rice producers were in the good status in terms of the use of technologies related to IPM. One reason can be due to the educational level of rice producers because most of them (30/4%) have diploma degree. Results of ANOVA revealed that there were significant differences among rice producers based on their perceptions of participatory communication and use of integrated pest management. So rice producers with higher perceptions use integrated pest management's technologies more than others. The results of correlation coefficient showed that there were significant positive relationship among all factors related to the perceptions of participatory communication (individual effect, contextual education, information receiving and Agricultural Jihad's flexibility) and the use of IPM, except to the information sending one. Results of regression analyzes indicated that two factors including: contextual education and Agricultural Jihad's flexibility can explain 70/2% of changes in the depended variable (use of IPM).

Based on results of this study, the following recommendations are suggested:

- Because use of IPM status was good among farmers, it has suggested that the Mazandaran province to be as a model for other provinces and they analyze factors which affect this important achievement, identify weaknesses and strengths and tailored them to their provinces, then localization it to more sustainable agriculture be seen in the country consequently.
- Given the significant differences based on the perceptions of participatory communication among rice producers in terms of use of IPM, it has recommended that Agricultural Extension and Education System gives more attention to the participatory approaches based on information exchange among components of agricultural systems and dialogue and provides useful contextual education in order to improve farmers' perception of participatory communication.

- According to significant relationship between individual effect and information receiving on use of IPM, it is recommended to meetings be held among farmers, research agents and agricultural extension and education. So the rice producer can share their information and knowledge with other people and achieve new scientific information from agricultural and academic research centers.
- Based on the results of the regression analysis, it is recommended that agricultural jihad officials provide various educational programs based on the participatory approach among rice producer.

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