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The Effect of IPM/FFS Educational Approach on Local Communities Capabilities to Protect the Environment, Case Study: Fereidoonkenar Mazandaran

Batebi Mahboubeh¹, Jozi Seyed Ali^{2*}

¹Department of Environment, College of Marine Science and Technology, North Tehran Branch, Islamic Azad University, Tehran, Iran.

²Associate Professor, Department of Environment, College of Engineering, North Tehran Branch, Islamic Azad University, Tehran, Iran.

***Corresponding Author: Jozi Seyed Ali**

ABSTRACT

The main objective of this applied research was to investigate the effect of integrated pest management/ farmers field school educational approach (IPM/FFS) on empowering local communities to protect the environment in Fereidoonkenar, Mazandaran. The research population included the farmers of several villages in Fereidoonkenar Mazandaran which had successively participated at training courses (IPM/FFS) and 60 families were studied through the census method. The necessary data was calculated and analyzed through a questionnaire in 7 segments including the rate of familiarity with IPM/FFS plan, the utility of the training courses, capability features of local community, social characteristics, production characteristics, economic characteristics, and individual characteristics. The results showed that the rate of created capability to protect the region environment was at a "high" level. There was a positive and significant relationship between the attitude towards the utility of training courses of IPM/FFS, annual agricultural income, age, number of courses, and capability of local community to protect the environment due to the implementation of IPM/FFS. The results of regression analysis showed that three factors including the attitude towards the utility of training courses, the planted area, and the number of training courses explained about 76% of the dependent variable of local community capability to protect the environment.

Keywords: education, environment protection, educational approach to IPM/FFS, Fereidoonkenar, Mazandaran

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INTRODUCTION

Recently, a considerable number of countries have seriously planned to break the deadlock resulting from the use of chemical pesticides and their effects on humans and environment. Integrated pest management (IPM) is realized with the educational method of "farmers field school" (FFS) via the research institutions partnership, promotion of local institutions as facilitators, farmers' participation in learning process, development of technology compatible with agricultural ecologies, and improvement of farmers' knowledge, skills, and capacity [1]. Many studies have been done on the results and achievements of IPM/FFS educational approach to reduce the consumption of chemical pesticides and inputs. The results of some of the studies that are consistent with the findings of this research are mentioned in the following. The research on the importance and role of farmers field school in Uganda and Pakistan indicated the positive effect of FFS on the increase of product yield and safety principles during spraying and the skill and better knowledge of the participants in FFS [2,3]. Studies in East Africa showed that there was a negative correlation between age and agricultural experience and the attitude towards IPM and the effect of plan on the rate of adoption was followed by creating workforce opportunities for women. Moreover, there was a correlation between participating in FFS and the capability to cooperate and communicate with external organizations for better management of the village [4]. Studying the acceptance limits of integrated pest management by the rice planting farmers in Jammu India, despite the farmers participant in 14 weekly programs of IPM/FFS indicates points such as lack of knowledge and skill, difficult and complex nature of this method, small size of farms, interference in transfer and

collaborative learning instead of facilitating [5]. Variety of operating systems and special conditions of agricultural ecosystems in Iran raise many questions and ambiguities in relation to the effectiveness of this approach in country. The present research was carried out to investigate the effect of IPM/FFS educational approach on local communities' capability to protect the environment in Fereidoonkenar, Mazandaran.

MATERIALS AND METHODS

The coastal zone of the Caspian Sea in Mazandaran has important ecological conditions, agricultural potential, diversity of species and international wetlands. The project of local communities capability in the cultivation management of agricultural farms with emphasis on IPM/FFS approach was implemented in the margin of Fereidoonkenar international wetland where different species of wild birds (particularly the Siberian crane which is being extinct) spend their winter following the major problems of the farmers of the region in producing rice such as weeds, blast, stem borer, and indiscriminate use of pesticides up to 9 times during an agricultural season during the recent years. The population included the farmers of the villages of Azbaran and Suteh in Fereidoonkenar who had participated in IPM/FFS educational courses since 2002 to 2014. Due to the small size of the research population (75 subjects), 60 subjects were studied on the whole through the census method. In order to answer the research questions and the desired objectives a questionnaire including 7 parts (Figure 1) was developed and in order to assess its validity and reliability it was submitted to the scholars and experts in agriculture and environment and the assessment was done through the pilot test and completing 15 questionnaires. The Cronbach's alpha coefficient for the questionnaire was calculated to be $\alpha = 0.805$ and after extracting the data, they were analyzed through SPSS v 16 software. The dependent variable of the research is the local community capability to protect the environment through the IPM/FFS implementation.

RESULTS AND DISCUSSION

According to the objectives of the study and the mentioned research method the results are listed in five sections: The respondents' individual characteristics and the production unit characteristics are presented in Table (1).

Table (1): Description of individual characteristics and production unit characteristics

Description of production unit characteristics		Description of individual characteristics	
Results	Items	Results	Individual characteristics
75% land owners	Land ownership condition	Suteh: 40%, Azbaran: 60%	Residential village
46.7% have two- or- three-piece lands	Condition of pieces of land	Male:91.7%;Female: 6.7%	Gender
Mean = 1.9	The area of the cultivated land (Ha)	91.7% married, 6.7% single	Marital status
Mean = 1.61	The area of the cultivated land via IPM method (Ha)	Mean=45.44	Age
93.3% rice	The product covered by IPM/FFS	About 45% higher than diploma	Education
Average distance between the fields and agricultural jihad center (6.53 km)	Distance between field and agricultural jihad center (km)	Mean= 3.6	Number of family members
		Mean:6.16 million Tomans	Average annual agricultural income
		Mean: 735.5 million Tomans	Average annual non-agricultural income

2. Social characteristics with 6 items were investigated and the total mean of cooperation with different segments was about average (2.92)

Table (2): description of respondents' social characteristics

Item	mean	priority
Collaboration with the village Islamic council	3.38	1
Collaboration with Basij Base	3.29	2
Collaboration with agricultural jihad center	3.23	3
Collaboration with village governing	3.07	4
Collaboration with non-governmental organizations	2.68	5
Collaborations with the parents and lecturers society of school	2.50	6
Collaboration with rural cooperatives	2.30	7

3. Respondents' attitude towards the goal of using IPM/FFS was investigated and the results showed that the increase of production and income changes resulting from the implementation of this method were little from the points of view of 32% and 43% of people, respectively. Considering the diversification of income sources, about 20% of the subjects reported no variation in income and 41% of the subject told that producing healthy products had created new income sources. 77% of the subjects reported that the changes in the reduction of seed consumption were "high" and 77% reported that the changes in the reduction of pesticide consumption were "high" and "very high". Figure (2) shows the achievement rate of the other objectives. Finally, about 52% of the respondents stated that if the product price were the same they would use this method for sale in the long term.



Figure (2): The rate of achievement to IPM/FFS objectives from the subjects' point of view

Local Community Capability

Local community capability through the implementation of IPM/FFS approach was assessed in three parts: The increase of the studied farmers' desire to participate in teamwork to protect the environment; the total mean of contribution made by the individuals who had participated in IPM/FFS educational classes according to the summation of the respondents ideas was above the average (to some extent) (3.2) (Table 3).

Table (3): ranking the respondents collaboration feature due to participation in IPM/FFS educational courses

Promoting collaboration levels to protect the environment due to participating in IPM/FFS educational program	Mean	Standard deviation	Changes coefficient	Ranking
To what extent has the cooperation in this project led to friendship and familiarity with other members of the community?	3.87	0.769	0.198	1
To what extent are they willing to do teamwork?	4.05	0.999	0.246	2
To what extent are they consulting with other farmers about daily problems?	3.32	0.911	0.274	3
To what extent they participate in specific activities related to the environment protection?	3.50	0.158	0.330	4
To what extent has the project attracted the rural women's participation?	2.25	0.856	0.380	5
To what extent has the project attracted the university graduates' participation?	2.63	0.008	0.383	6
To what extend are they willing to form and join the monetary fund (organizations and institutions)?	3.05	0.213	0.397	7
To what extend do day consult with the officials about the village problems and issues?	2.98	0.359	0.456	8
Total mean	3.2			

The total average of the leading characteristic of the respondents who had attended IPM/FFS training classes according to the summation of their opinions was about the average (2.81) (Table 4).

Table (4): Ranking the leading characteristics of the respondents participating in IPM/FFS training classes

Leadership	Mean	Standard deviation	Changes coefficient	ranking
To what extent do you recommend others to use this method?	3.95	0.199	0.303	1
To what extent do people come to you to solve their agricultural problems and issues?	3.07	0.023	0.333	2
To what extent are your opinions and ideas used in other similar projects?	2.45	0.928	0.378	3
To what extent do people come to you to talk about their personal and family issues?	1.76	0.823	0.467	4
Total mean	2.81			

To improve the knowledge, insight, and skill on the environment, according to table (5) the items of familiarity with the hazards of indiscriminate use of pesticides, applying the lessons learned in the farmers field school in the private land, paying attention to the producers' health, producing health products, were rated on the top and on the whole, individuals' acquired knowledge, insight, and skill in relation to environmental issues due to training were above the average and close to "high" (3.73).

Table (5): Ranking the acquired knowledge, insight, and skill in relation to environmental issues

Knowledge, insight, and skill in relation to the environmental issues	Mean	Standard deviation	Changes coefficient	ranking
Hazards of indiscriminate use of pesticides	4.40	0.669	0.192	1
Have you used the lessons learned in farmers field school in your own land?	3.78	0.739	0.195	2
keeping the producers' health	3.83	0.806	0.210	3
producing health products	4.03	0.882	0.218	4
Keeping consumers' health	3.75	0.836	0.222	5
How well are you familiar with non-chemical methods of pest control?	3.85	0.860	0.223	6
Keeping water and soil health	3.93	0.899	0.228	7
Importance of wetlands and protecting the birds	4.12	0.958	0.232	8
To what extent are the results of implementing the plan in your own field consistent with the results of the educational plan?	3.65	0.860	0.235	9
Clearing the surrounding fields	3.77	1.267	0.336	10
To what extent can you decide on the proper time to control the pesticides?	3.78	0.904	0.239	11
How long after the implementation of the plan do you follow it enthusiastically?	3.75	0.914	0.243	12
The importance of biodiversity and protection of natural enemies of pests	4.03	1.057	0.262	13
Professional agriculture hygiene and maintaining farmers health	3.58	1.013	0.282	14
Safety tips on pesticides spraying and maintenance	3.72	1.075	0.288	15
Respecting the rules of hunting	3.85	1.147	0.297	16
Using natural fertilizers	3.28	1.075	0.327	17
Collecting garbage and producing compost	2.98	1.263	0.423	18
Introducing alternative activities for hunting	2.88	1.464	0.508	19
Total mean	3.734			

Generally, according to the relationship between the mean and standard deviation in relation to the local community capability to protect the environment through the implementation of IPM/FFS, the results are shown in Table (6). The mean of 107.48 indicates that the local community capability to protect the environment through training has been rated as "high".

Table (6): Respondents frequency distribution according to the rate of capability resulting from IPM/FFS implementation

Rate of capability	point	frequency	percent
low	Less than 90	10	16.7
medium	90-107	16	26.7
high	107-125	26	43.3
Very high	More than 127	8	13.3
total		60	100
Standard Deviation: 17.421		Mean: 107.48	
Min: 61		Max: 134	

The findings on the educational features and the familiarity of the farmers with the project showed that the average of passed courses was 2.48 mainly during 2006 to 2009 and the role of the managers was more significant than the other factors in getting familiar with the project and justifying the individuals. The ranking of the utility of the effective factors in the classes is according to Table (7).

Table (7): Ranking the utility of the effective factors in IPM/FFS educational classes

Educational-promotional courses	Mean	Standard deviation	Changes coefficient	ranking
Location of classes	3.62	0.739	0.204	1
Educational methods used in the project (facilitation and collaboration methods)	3.90	0.951	0.243	2
Usefulness of the workshops on identifying and introducing the plan	3.82	0.983	0.257	3
Facilitating skills	3.76	0.997	0.265	4
Number of classes held on the plan	3.15	0.917	0.291	5
Exchanging information with other farmers in classes	3.40	1.028	0.302	6
Classes time duration	3.33	1.020	0.306	7
To what extent educational aid methods (visiting, consulting with leading farmers, training manuals, radio and Television, internet) have contributed to the effectiveness of this method?	3.13	0.982	0.313	8
Total mean	3.513			

The results of the research show that there is a positive and significant relationship between the utility of IPM/FFS educational courses from the participants' points of view and the local community capability to protect the environment due to training. In other words, as the utility of IPM/FFS educational courses from the participants' points of view increases, the local community capability to protect the environment will increase, too and vice versa. For more accurate understanding of the correlation between the two variables, further investigations were carried out in terms of the rate of capability in four subgroups and for most of the respondents with high level of capability there was a positive correlation between the utility of educational classes with capability and the other studies also confirm the present findings [6,7]. Among the individual characteristics, there was a significant relationship between capability and only the two variables of the village of residence and gender. The capability level at the village of Suteh (with regard to more activity of the villagers in IPM/FFS program) was significantly higher than the other village and the capability level was significantly higher in men than women, as it was emphasized in other studies, too [8,9]. There was no significant relationship between marital status and the number of family members and the capability level which was inconsistent with the findings of previous studies [10]. At the capability level of "very high", there was a positive and significant relationship between the individual characteristic of age and the local community capability to protect the environment due to IPM/FFS implementation which was consistent with the findings of the other researchers [9]. There was a significant relationship between capability and the variables such as the reduction of pesticide consumption, the improvement of product quality, and the effect on attracting the customers which was significant with the findings of the other researchers [11,12,13]. At the capability levels of "average" and

"very high", there was a positive and significant relationship between the "annual agricultural income" and the local community capability to protect the environment; on the other hand, there was a negative significant relationship between "the annual non-agricultural income" and the local community capability at the capability level of "very high". Among the variables related to the rate of familiarity with IPM/FFS project, there was a positive significant relationship with 95% confidence between the number of attended educational courses and individuals' capability which was consistent with the findings of previous studies [14,15]. The study of the causal relationship between the factors affecting the local community capability to protect the environment due to the implementation of IPM/FFS using the stepwise regression model showed that the variables of attitude towards the utility of educational courses, the cultivated land, and the number of courses that were held explained about 76% of the dependent variable changes.

CONCLUSION

In order to manifest the effects of environmental awareness on the local communities, it is necessary to revise the training methods. Methods and procedures like farmers field school (FFS) will improve the availability and the quality of environmental education and will involve the key interventions for long-term changes. According to the research findings, the following main recommendations are offered. Since there is a positive significant relationship between the utility of IPM/FFS educational classes from the participants' points of view and the local community capability to protect the environment due to IPM/FFS implementation, it is suggested to pay more attention to the way the courses are held because the individuals capability to protect the environment through the implementation of IPM/FFS largely depends on the utility of the courses (number of classes held about the plan, time duration of classes, usefulness of the workshops in identifying and introducing the plan, location of classes, teaching methods used in the plan, facilitation skills, teaching aid methods). It is also recommended to direct conventional promotional educations towards collaborative learning, along with practice and testing in local conditions via facilitation style, and emphasis on the collective attendance and activity and combination of new knowledge and the learners' knowledge. Since there was a positive significant relationship with 95% confidence between the number of training courses that were held and the individuals' capability it is recommended to generalize the results of the implementation of this project and its role in protecting the environment particularly the wetland and the birds of the region to the IPM/FFS plan of the other regions with similar circumstances. According to the research findings, it is concluded that the effectiveness of IPM/FFS educational approach for people with greater experience (agricultural activities), higher agricultural income, more education, more capable and also for the male group of the local community has been more useful and the review of the previous studies leads to the conclusion that the essence of IPM/FFS which requires basic awareness, more learning ability, higher economic ability to take more risks has created more capabilities in individuals with the abovementioned characteristics. Therefore, it is recommended to promote this program more and more by simplifying the educational materials, benefiting more and more from the local facilitators, using the cheapest methods non-chemical control methods, and the youth and women's participation in the project. Several operations of farmers field school in an area for improving the local community capability, seeking better cooperation methods of international, national, and non-governmental executive organizations and ultimately improving the farmers' knowledge to create new opportunities for increasing their agricultural income some of the most important recommendations of the present research.

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