World Journal of Fish and Marine Sciences 2 (4): 322-326, 2010
ISSN 2078-4589

Factors Influencing the Adoption of Rice-Fish Farming System in Talesh Region, Iran

[1]Seyyed Ali Noorhosseini Niyaki and [2]Mohammad Sadegh Allahyari

[1]Young Researcher's Club, Islamic Azad University, Rasht Branch, Rasht, Iran
[2]Department of Agricultural Management, College of Agriculture,
Islamic Azad University, Rasht Branch, Rasht, Iran

Abstract: As aquaculture techniques for poor people are largely in place, greater emphasis should be given to more effective extension of low cost technologies and appropriate management practices and securing their right of access to and control of resources, rather than technical research. Rice-fish farming is the most appropriate technology in recent times. Recognition of effective factors for adoption of rice-fish farming could help planning more effective extension program. For this purpose a method of survey research was used that questionnaire was used as the main tool to collect data. Target population were farmers of Tavalesh region in north of Iran. Farmers were divided into two groups; adopters and non-adopters. Totally 184 (61 adopters and 123 non-adopters) of rice-fish farming were studied for effective factors. Results showed that kind of fertilizers in rice field, method of weeds control, method of pests control and number of plows were the most important farming factors among the adopters of rice-fish farming.

Key word: Adoption · Rice-fish farming · Sustainable agriculture · Farmers

INTRODUCTION

Currently, increase of food production is the most challenge of new century, especially in developing country due to population explosion. Moreover, the world shows extensive worries on the destructive effects of advanced agricultural technologies on the environment, natural resources and long-term sustainability of agronomy systems. Soil degradation, erosion, water pollution, excessive use of chemicals, waste of water, decreasing ground water tables, destruction of natural habitats for wildlife and insects and pests resistance against insecticide and pesticide are only a few of the concerns expressed by environmentalists, ecologists, agricultural professionals, policy makers, farmers and public [1, 2]. Rice-fish farming system can be considered as a conservation technology to protected environment. There is an estimated 81 million ha of irrigated rice lands worldwide, with an additional 11 million ha of flood prone land under rice cultivation [3]. Irrigated rice areas with appropriate infrastructure can potentially be used for concurrent fish production [4]. Rice-fish farming under either capture systems or culture systems is a low-cost sustainable practice to obtain high value protein food and minerals [3, 5]. At the farm level, rice-fish integration reduces use of chemical fertilizers [3,5-9], pesticides and herbicides [3,4,7,10] in the field. Such reduction of costs lowers farmer's economic load and increases their additional income from fish sale [3] and higher rice yields [3,4,9,11]. With such savings and additional income, the net productivity from rice-fish farming is reported to be higher than rice monoculture [3]. This type of integrated production can optimize resource use through the complementary utilization of land and irrigation water. Moreover, it has the benefit of supplying rice as a source of carbohydrates and fish as a source of high quality protein. This aspect may be particularly relevant in rural areas of less developed countries in the tropics [4]. Hence, rice-fish farming is the most appropriate technology in recent times [3].

Corresponding Author: Mohammad Sadegh Allahyari , Department of Agricultural Management, College of Agriculture, Islamic Azad University, Rasht Branch, Rasht, Iran. E-mail: allahyari@iaurasht.ac.ir.

Table 1: Total sample size used in the study area

	Talesh	Masal	Rezvanshahr	Total
Adopters Population	31	31	17	79
Adopters Sample Size	19	28	14	61
Non-adopters Sample Size	38	56	29	123

Rice-fish farming activities have been reported from China, Egypt, India, Indonesia, Thailand, Vietnam, the Philippines, Bangladesh, Malaysia, Cambodia, Republic of Korea, Madagascar and other countries [3,4]. In the semi-deep waters of the Vietnamese Mekong Delta, rice-fish farming with hatchery produced (introduced) fingerlings differed mainly from rice monoculture by a higher fertilizer and water requirement and less pesticide use [12]. As regards that there has been paid so much money for the promotion of integrated rice-fish farming system, in many countries, it seems needful to study the accessibility of such system. The main purpose of this study was to investigate some important factors of rice planters who adopted rice-fish farming and discernment of adopters of this technology.

MATERIAL AND METHODS

This study was carried out by survey method from July-August 2009. Studied area including Talesh, Rezvanshahr and Masal set in Tavalesh region of Guilan province, near Caspian Sea in Iran (Figure 1). Respondent farmers who selected from rural area were categorized into adopters and non-adopters of rice-fish farming (Figure 1). Totally 184 farmers were selected by random sampling using the table for determining the sample from given population developed by Bartlett *et al*. [14] that including 61 adopters and 123 non adopters for answering to questionnaire (Table 1).

The questionnaire was pre-tested by interviewing 15 farmers. After some changes, 10 farmers were tested again for completed questionnaire. Dependent variable was adoption of rice-fish farming among farmers of Tavalesh region of Guilan province.

Frequency, percent, mean and standard deviation were used for the statistical analysis. Chi square, t-test, Mann-Whitney, were used for data analysis by SPSS (16) software.

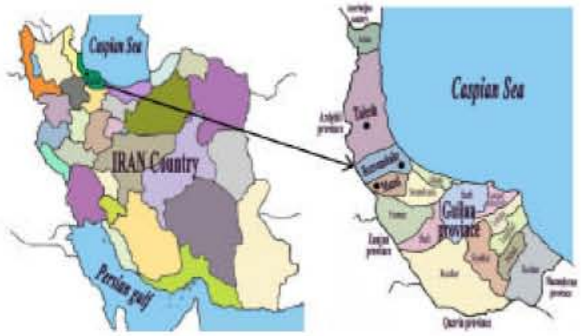

Fig. 1: Site of study

Fig. 2: Field of integrated rice-fish farming

RESULTS AND DISCUSSION

Kind of Fertilizers in Rice Field: The frequency distribution indicated that number of farmers who using organic fertilizers were further more in rice-fish farming system (21.3%) rather than rice monoculture system (5.7%). In addition, Chi square test showed that there was a significant ($p<0.05$) relation between adoption of rice-fish farming and kind of fertilizers in rice field (Table 2). In this study, results showed that there was a significant ($p<0.01$) difference between adopters and non-adopters groups of rice-fish farming regarding the kind of fertilizers in rice field variable (Table 4). In other words, consumption of chemical fertilizers will be reduced with

Table 2: farming factors of respondent farmers

	Adopters		Non-Adopters		Total			
Factors	f	%	f	%	f	%	Chi-square	Sig.
Fertilizers in Rice field								
Chemical Fertilizers	48	78.7	116	94.3	164	89.1	11.498**	0.003
Organic Fertilizers	2	3.3	0	0	2	1.1		
Chemical and Organic	11	18.0	7	5.7	18	9.8		
Total	61	100.0	123	100.0	184	100.0		
Quantity of using chemical fertilizers (Kg/hectare)								
250>	34	55.7	73	59.3	107	58.2	0.273^{ns}	0.873
251-500	21	34.4	40	32.5	61	33.2		
500<	6	9.8	10	8.1	16	8.7		
Total	61	100.0	123	100.0	184	100.0		
Weeds control								
Chemical control	0	0	1	0.8	1	0.5	8.700*	0.013
Mechanical and Cultural	4	6.6	0	0	4	2.2		
Chemical, Mechanical and Cultural	57	93.4	122	99.2	179	97.3		
Total	61	100.0	123	100.0	184	100.0		
Pests control								
Non control	8	13.1	12	9.8	20	10.9	10.727*	0.013
Chemical control	35	57.4	96	78.0	131	71.2		
Biological control	9	14.8	10	8.1	19	10.3		
Chemical and Biological	9	14.8	5	4.1	14	7.6		
Total	61	100.0	123	100.0	184	100.0		
Number of Plows								
2	19	31.1	20	16.3	39	21.2	5.437^{ns}	0.066
3	41	67.2	101	82.1	142	77.2		
4	1	1.6	2	1.6	3	1.6		
Total	61	100.0	123	100.0	184	100.0		
Accessibility to Water Supply for Irrigation								
Very little	7	11.5	9	7.3	16	8.7	7.730^{ns}	0.102
Little	13	21.3	27	22.0	40	21.7		
Intermediate	9	14.8	36	29.3	45	24.5		
Much	28	45.9	49	39.8	77	41.8		
Very mach	4	6.6	2	1.6	6	3.3		
Total	61	100.0	123	100.0	184	100.0		

^{ns}Non significant, *significant at P<0.05 and **significant at P<0.01

Table 3: comparison of some farming factors of adopter and non-adopter of rice-fish farming using t-test

Factors	N	Mean	S.D	t	Sig.
Quantity of using chemical fertilizers					
Adopters	61	301.81	166.11	0.297^{ns}	0.767
Non Adopters	123	309.59	167.87		
Number of Plows					
Adopters	61	2.70	0.49	2.042*	0.044
Non Adopters	123	2.85	0.39		

^{ns}Non significant, *significant at p<0.05 and **significant at p<0.01

adoption of rice-fish farming. Use of alternative organic fertilizers or along with chemical fertilizers by adopters of rice-fish farming means going towards sustainable agriculture.

Quantity of Using Chemical Fertilizers: The consumption mean of chemical fertilizers among adopters was about 300 kg per ha and about 310 kg per ha among non-adopters. Also, Chi square test showed that there

Table 4: comparison of some farming factors of adopter and non adopter of rice-fish farming using Mann-Whitney test

Factors	N	Mean Rank	Sum of Ranks	Z	Sig.
Fertilizers in Rice field					
Adopters	61	102.22	6235.50	3.232**	0.001
Non Adopters	123	87.68	10784.50		
Weeds control					
Adopters	61	97.00	5917.00	2.866*	0.004
Non Adopters	123	90.27	11103.00		
Pests control					
Adopters	61	104.29	6361.50	2.665*	0.008
Non Adopters	123	86.65	10658.50		
Accessibility to Water Supply for Irrigation					
Adopters	61	96.57	5891.00	0.770^{ns}	0.441
Non Adopters	123	90.48	11129.00		

^{ns}Non significant, *significant at $p<0.05$ and **significant at $p<0.01$

was no significant relation between adoption of rice-fish farming and quantity of using chemical fertilizers variable (Table 2). In this study, results showed that there was no significant difference between the two groups of adopters and non-adopters of rice-fish farming (Table 3).

Method of Weeds Control: The frequency distribution showed that number of farmers using herbicides was further more in rice monoculture system (100%) rather than rice-fish farming system (93.4%). These results were similar to Frei and Becker, Salehi and Momen Nia and Kathiresan findings [5, 7, 10]. Also, Chi square test showed that there was a significant ($p<0.05$) relation between adoption of rice-fish farming and method of weeds control variable (Table 2). In this study, results showed that there was a significant ($p<0.01$) difference between the two groups of adopters and non-adopters of rice-fish farming regarding the method of weeds control variable (Table 4). In other words, the adoption of rice-fish farming reduced the use of chemical control methods that is light reason of rice-fish farming system sustainability. These results are consistent with Saikia and Das, Cheng-fang *et al.* and Yong *et al.* [3,8,9].

Method of Pests' Control: according to results, number of farmers using pesticides was further more in rice monoculture system (82.1%) rather than rice-fish farming system (72.2%) in studied location. These results were similar to Rothuis *et al.* findings [12]. Also, Chi square test showed that there was a significant ($p<0.05$) relation between adoption of rice-fish farming and method of pests control variable (Table 2). The use of chemical control methods reduced with adoption of rice-fish farming which is also compatible with sustainable agriculture.

Number of Plows: As shown in Table 2, most of respondents (77.2 %) plowed farming land during the three stages. In addition, Chi square test showed that there was no significant relation between adoption of rice-fish farming and number of plows (Table 2). However, in this study, t-test results showed that there was a significant ($p<0.05$) difference between adopters and non-adopters groups of rice-fish farming regarding the number of plows (Table 3). According to results, by adoption of rice-fish farming, number of plows was reduced. It seems that the decrease of tillage frequency among adopters, caused by farms occupied by fishes is the time dimension.

Accessibility to Water Supply for Irrigation: The frequency distribution revealed that accessibility of about 30 percent of respondents to irrigation water resources was low and very low. Chi square test showed that there was no significant relation between adoption of rice-fish farming and accessibility to water supply for irrigation variable (Table 2). Fish farming in rice fields requires existence of sufficient water. This study suggested that both groups of adopters and non-adopters of rice-fish farming in terms of access to water sources is desirable and there is no much restriction about it. Therefore, this factor cannot be an

effective factor on the denial of rice-fish farming in the studied area.

CONCLUSION AND RECOMMENDATION

In general, results of this research show that the farmers who adopter of rice-fish farming used less chemical materials in order to control pests and weed plants, besides they use more organic fertilizers and reduces the number of plows. Furthermore, society health and environment sustainability will be saved and they reach more profit that is economical. Also, since aquaculture requires resources such as pond, land, water and other inputs, poor farmers cannot afford the requirements. As a target to understand and meet their needs and to access the common water resources available in their rice-fields, rice-fish farming is the most appropriate technology in recent times. Referring to results of this study for increasing the income of rural families and decreasing the pollutions caused by agricultural activities, it should promote integrated systems such rice-fish farming system more impressively and present suitable solution to adopt this kind of technologies among farmers.

ACKNOWLEDGMENT

The authors greatly acknowledge the Young Researchers' Club of Islamic Azad University, Rasht Branch for facilitating and supporting the study. Fisheries Organization of Guilan Province specially mentioned cities for its noticeable help. All the farmers are being thanked for their patience in answering our questions.

REFERENCES

1. Allahyari, M.S., M. Chizari and M. Homaee, 2008. Perceptions of Iranian Agricultural Extension Professionals toward Sustainable Agriculture Concepts. J. Agriculture and Social Sci., 4: 101-106.
2. Allahyari, M.S., 2009. Agricultural sustainability: Implications for extension systems. African J. Agric. Res., 4: 781 -786.
3. Saikia, S.K. and D.N. Das, 2008. Rice-Fish Culture and its Potential in Rural Development: A Lesson from Apatani Farmers, Arunachal Pradesh, India. J Agric. Rural. Dev., 6: 125-131.
4. Frei, M. and K. Becker, 2005. Integrated rice-fish production and methane emission under greenhouse conditions. Agriculture, Ecosystems and Environ., 107: 51-56.
5. Frei, M. and K. Becker, 2005. Integrated rice-fish culture: Coupled production saves resources. Natural Resources Forum, 29: 135-143.
6. Frei, M. and K. Becker, 2005. A greenhouse experiment on growth and yield effects in integrated rice-fish culture. Aquacul., 244: 119-128.
7. Salehi, H. and M. Momen Nia, 2006. The benefits of fish and rice integrated culture in Iran. Iranian J. Fish. Sci., 15: 97-108.
8. Cheng-fang, L.C. W. Cou-gui, Z. Jin-ping, Y. Ming, Wei-ling and S. Ahmad, 2008. Nitrogen losses from integrated rice-duck and rice-fish ecosystems in southern China. Plant Soil, 307: 207-217.
9. Yong, Y.Z. Hong-cheng, H. Xiao-jun, D. Qi-gen and Z. Yang-jiang, 2006. Characteristics of Growth and Yield Formation of Rice in Rice-Fish Farming System. Agricultural Sciences in China, 5: 103-110.
10. Kathiresan, R.M., 2007. Integration of elements of a farming system for sustainable weed and pest management in the tropics. Crop Protection, 26: 424-429.
11. Das, D.N., 2002. Fish Farming In Rice Environments of North Eastern India. April-June, pp: 2-2.
12. Rothuis, A.J., D.K. Nhan, C.J.J. Richter and F. Ollevier, 1998. Rice with fish culture in the semi-deep waters of the Mekong Delta, Vietnam: interaction of rice culture and fish husbandry management on fish production. Aquaculture Res., 29: 59-66.
13. Bartlett, J.E., J.W. Kotrlik and C.C. Higgins, 2001. Organizational Research: Determining Appropriate Sample Size in Survey Research. Information Technology, Learning and Performance J., 19: 43 - 50.