

## **ANALYSIS ECOLOGICAL MANAGEMENT OF RICE PRODUCTION PROCESS AS A STRATEGY FOR ENVIRONMENTAL CONSERVATION (CASE STUDY RICE FARMS IN SHOUSHTAR TOWNSHIP, IRAN)**

**Maryam Taji, \*Ahmad Reza Ommani and Azadeh N. Noorivandi**

*Department of Agricultural Management, Shoushtar Branch, Islamic Azad University, Shoushtar, Iran*

*\*Author for Correspondence*

### **ABSTRACT**

The purpose of research was analyzing ecological management of rice production process as a strategy for environmental conservation by reducing the use of chemical fertilizers and pesticides in Shoushtar Township, Khuzestan Province, Iran. This study was carried out by survey during January and September 2014. The method of research was correlative descriptive. The population of research was N=1507. Based on Morgan table the sample size was determined  $n= 351$ . A questionnaire was developed to gather information regarding ecological management of rice production process. Questionnaire reliability was estimated by calculating Cronbach's alpha ( $\alpha=0.734$ ). Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS). Appropriate statistical procedures for description (frequencies, per cent, means, and standard deviations) were used. Based on results there is significant correlation between ecological management of rice production process with work experience, income, Level of education, social status, communication channels, contact with extension workers, participation in extension classes, technical knowledge, attitude to ecological behavior, job skill, land under rice cultivation. The result of regression indicates that 51.5% of the variances in the ecological management of rice production process could be explained by the work experience, social status, communication channels, contact with extension workers, participation in extension classes, attitude to ecological behavior, and land under rice cultivation.

**Keywords:** *Ecological Management, Rice Production Process, Environmental Conservation*

### **INTRODUCTION**

Ecological management is focused on maintaining and enhancing the natural values of land to conserve biological diversity. Land protection alone, however, does little to preserve the character of a natural area if impacts such as the introduction of invasive alien plants, or hydrologic disturbances are not also addressed. With continuing alteration of the land by human activity, many ecosystems have become fragmented or reduced to isolated islands surrounded by agricultural fields or developed areas. Ecological management is the key to successful stewardship (Alonso and Rubio, 2008). Ecological farming is recognized as the high-end objective among the proponents of sustainable agriculture. Ecological farming is not same as organic farming, however there are many similarities and they are not necessarily incompatible. Ecological farming includes all methods, including but not limited to organic, which regenerate ecosystem services like: prevention of soil erosion, water infiltration and retention, carbon sequestration in the form of humus, increased biodiversity etc. Many techniques are used including no till, multispecies cover crops, strip cropping, terrace cultivation, shelter belts, pasture cropping etc (Wikipedia, 2014).

Ecological management options have vital role in reduction of herbicides and pesticides in farms. The best way to reduce pesticide contamination (and the harm it causes) in our environment is for all of us to do our part to use safer, non-chemical pest control (including weed control) methods (Aktar *et al.*, 2009). Farms often use large amounts of herbicides and pesticides, both of which are toxic pollutants. These substances are particularly dangerous to life in rivers, streams and lakes, where toxic substances can build up over a period of time. Farms also frequently use large amounts of chemical fertilizers that are washed into the waterways and damage the water supply and the life within it. Fertilizers can increase the amounts of nitrates and phosphates in the water, which can lead to the process of eutrophication. Fish and

### **Research Article**

other aquatic biota may be harmed by pesticide-contaminated water. Pesticide surface runoff into rivers and streams can be highly lethal to aquatic life, sometimes killing all the fish in a particular stream (Helfrich *et al.*, 1996; Toughill, 1999).

Noorivandi and Ommani (2014), in their research with title of "the effect of fertilizers and pesticides runoff on aquatic ecosystem of Karun River in Khouzestan Province" revealed that the situation of ecological behavior of farmers has not suitable situation. Majority of farmers had not well-performance of the ecological behavior. Approximately, 51% of farmers had high and very high dangerous level. The correlation ( $r=0.378$ ) between favorability of ecological behavior and participation in extension activities at the level of 0.01 was significant. It means that with 99% of confidence, farmers with high participation in extension activities had high favorable ecological behavior. Also the results showed, the correlation ( $r=0.474$ ) between favorability of ecological behavior and educational level at the level of 0.01 was significant. It means that with 99% of confidence, farmers with high level of education had high favorable ecological behavior. Linear regression was used to predict changes in favorability of ecological behavior. Participation in extension activities and educational level may well explain for 37.6% changes in ecological behavior of farmers.

### **MATERIALS AND METHODS**

The purpose of research was analyzing ecological management of rice production process as a strategy for environmental conservation by reducing the use of chemical fertilizers and pesticides in Shoushtar Township, Khouzestan Province, Iran. This study was carried out by survey during January and September 2014. The method of research was correlative descriptive. The population of research was  $N=1507$ . Based on Morgan table the sample size was determined  $n= 351$ . A questionnaire was developed to gather information regarding ecological management of rice production process. Questionnaire reliability was estimated by calculating Cronbach's alpha ( $\alpha=0.734$ ). Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS). Appropriate statistical procedures for description (frequencies, per cent, means, and standard deviations) were used.

### **RESULTS AND DISCUSSION**

#### **Results**

#### **Demographic Profile**

In the first section, has been described rice farmers' demographic profile in Shoushtar Township, Khouzestan Province of Iran.

Approximately, 38.4% of respondents were between 34 to 45 years of age (Table 1). Majority of respondents (39.3%) reported work experience between 1 to 10 years. Also, most of rice farmers (62.4%) had 1-15 hectare of land under rice cultivation. About 39.6% of rice farmers had high school educational level. Based on the results of the study, the income of 38.7% of them was between 190 to 290 million Rials in year (Table 1).

#### **Analyzing ecological management of rice production process as a strategy for environmental conservation:**

The dependent variable of research was ecological management of rice production process in Shoushtar Township, Khouzestan province, Iran. Ecological management options provide farmers with a thorough and applied understanding of ecological principles in the management and conservation of biological resources and ecosystems. The dependent variable was assessment with a Likert scale (1=Very low, 2=low, 3=Moderate, 4=High, 5= Very high). Based on the table 2, the overall mean of ecological behavior of rice farmers was moderate ( $M= 2.876$ ). Thus, rice farmers need to educate regarding environmental conservation and options of ecological behavior in rice production. Also farmers were stratified to five strata. The results indicated 48.1% of farmers had moderate ecological management regarding environmental conservation in agriculture (Table3). Based on results, farmers need to educate regarding all items of ecological management that noted in this research.

**Research Article**

**Table 1: Personal, Social and Economical Characteristics of Rice Farmers**

Characteristics	Frequenc y	Percent	Cumulative Percent
<b>Age</b>			
24-34	94	26.8	26.8
34-45	122	34.8	61.5
45-54	103	29.3	90.9
55-66	32	9.1	100
Total	351	100	
<b>Work experience (year)</b>			
1-10	138	39.3	39.3
11-20	116	33	72.4
21-30	67	19.1	91.5
31-40	25	7.1	98.6
41-50	5	1.4	100
Total	351	100	
<b>Land under rice cultivation (ha)</b>			
1-15	219	62.4	62.4
15-30	82	23.4	85.8
30-45	37	10.5	96.3
45-62	13	3.7	100
Total	351	100	
<b>Income in year(Million Rials)</b>			
90-190	129	36.8	36.8
190-290	136	38.7	75.5
290-390	61	17.4	92.9
390-490	6	1.7	94.6
No answer	19	5.4	100
Total	351	100	
<b>Level of education</b>			
Illiterate	12	3.4	3.4
Elementary	48	13.7	17.1
High School	139	39.6	56.7
Diploma	90	25.6	82.3
University education	62	17.7	100
Total	351	100	

**Research Article**

**Table 2: Frequency of Rice Farmers Regarding Behavior about Options of Ecological Management for Reducing the Use of Chemical Fertilizers and Pesticides (n=351)**

Options of Ecological Management	1		2		3		4		5		Mea n	sd	CV
	f	%	f	%	f	%	f	%	f	%			
The use of biofertilizers	3	1	1	4	1	4	5	1.4	9	2.6	2.43	0.8	0.3
	9	1.	4	1.	5	3.					0	07	32
			1	5	3	3	6						
The use of green manure	5	1	6	1	1	4	8	22.	0	0	2.72	0.9	0.3
	4	5.	8	9.	4	2.	0	8			6	83	60
			4	4	9	5							
The use of animal manure	1	4.	1	3	1	5	3	9.4	0	0	2.66	0.7	0.2
	6	6	1	3.	8	2.	3				3	09	66
			9	9	3	1							
The use of IPM	8	2.	1	4.	1	3	1	44.	4	12	3.59	0.8	0.2
		3	7	8	2	6.	5	7	2		2	46	35
				7	2	7							
The use of IWM	8	2.	3	8.	1	3	1	44.	3	8.5	3.48	0.8	0.2
		3	0	5	2	6.	5	4	0		4	54	45
				7	2	6							
Hand weeding	2	5.	1	4	1	4	4	11.	0	0	2.58	0.7	0.2
	0	7	4	1.	4	1.	0	4			6	65	95
			5	3	6	6							
Efficient use of herbicides and pesticides	0	0	4	1	1	3	1	43.	3	10	3.51	0.8	0.2
			3	2.	2	4.	5	3	5			34	37
				3	1	5	2						
Efficient use of chemical fertilizers	1	4.	9	2	2	6	2	7.4	0	0	2.72	0.6	0.2
	6	6	2	6.	1	1.	6				0	64	44
				2	7	8							
Nutrition management for weed control	8	2.	4	1	1	4	1	29.	2	6.8	3.25	0.8	0.2
		3	5	2.	7	8.	0	3	4		6	5	61
				8	1	7	3						
The use of pest resistant varieties	4	1.	3	9.	1	4	1	41.	1	4	3.37	0.7	0.2
		1	3	4	5	4.	4	3	4		6	56	24
				5	2	5							
Avoid spreading the seeds of weeds in the rice farm	1	4.	5	1	1	3	1	42.	0	0	3.17	0.8	0.2
	7	8	2	4.	3	7.	4	5			9	58	69
				8	3	9	9						
Use a soil test to determine soil organic matter and mineral	2	8	8	2	1	5	5	14.	0	0	3.17	0.8	0.2
	8		3	3.	9	4.	0	2			9	58	69
				6	0	1							
Waterlogging method to weed control	8	2.	2	7.	2	5	1	30.	2	0.6	3.19	0.6	0.2
		3	7	7	0	9	0	5			3	77	12
				7	7								
The use of machine weeding to weed control	2	6.	1	4	8	2	7	21.	4	1.1	2.62	0.9	0.3
	3	6	6	7.	2	3.	4	1			3	26	53
			8	9	4								
Leveling of land to reduce soil erosion	4	1.	3	1	1	4	1	41.	1	2.8	3.34	0.7	0.2
		1	8	0.	5	3.	4	6	0		1	53	25
				8	3	6	6						

(1=Very low, 2=Low, 3=Moderate, 4=High, 5= Very high, Mean= 2.876, SD=0.863)

**Research Article**

**Table 3: Level of Ecological Management of Rice Production Process (n=351)**

Level of Ecological Management	Frequency	Percent	Cumulative Percent
Very low	8	2.28	2.28
Low	108	30.77	33.05
Moderate	174	49.57	82.62
High	46	13.11	95.73
Very high	15	4.27	100.00
Total	351	100	

**Correlation Study**

Table 4 displays the results which show that there is a relationship between ecological management of rice production process and independent variables. Spearman coefficient was employed for measurement of relationships between independent variables and dependent variable.

Based on the results there is significant correlation between ecological management of rice production process with work experience, income, Level of education, social status, communication channels, contact with extension workers, participation in extension classes, technical knowledge, attitude to ecological behavior, job skill, land under rice cultivation.

**Table 4: Correlation Measures between Ecological Management of Rice Production Process and Independent Variables**

Variable 1	Variable 1	r	p
Land ownership	Ecological Management of	0.025	0.308
Age	Rice Production Process	0.013	0.403
Work experience		0.243*	0.037
Income		0.095*	0.033
Level of education		0.163**	0.001
Social Participation		0.024	0.328
Social status		0.089*	0.048
Communication channels		0.228**	0.000
Contact with extension workers		0.218**	0.000
Participation in extension classes		0.198**	0.000
Technical knowledge		0.105*	0.027
Attitude to ecological behavior		0.110*	0.020
Job skill		0.170**	0.001
Land under rice cultivation		0.055*	0.040
Crop yield		0.027	0.307

\* $p < 0.05$ ; \*\* $p < 0.01$

**Table 5: Multivariate regression analysis**

Multivariate regression analysis	B	SE B	Beta	T	Sig
Constant	2.317	0.217	--	10.676	0.000
Contact with extension workers	0.270	0.066	0.335	4.084	0.000
Participation in extension classes	0.284	0.077	0.308	3.681	0.000
Land under rice cultivation	0.818	0.002	0.286	3.315	0.001
Social status	0.217	0.072	0.228	2.974	0.003
Communication channels	0.152	0.058	0.246	2.623	0.009
Work experience	0.950	0.004	0.260	2.587	0.01
Attitude to ecological behavior	0.263	0.106	0.242	2.486	0.014

$R^2=0.515$ ,  $F=10.922$  Sig=0.000

$$Y=2.317+0.270X_1+0.284X_2+0.818X_3+0.217X_4+0.152X_5+0.950X_6+0.263X_7$$

### **Research Article**

#### **Regression Analysis**

Table 5 shows the result for regression analysis by stepwise method. Predictor variables that were significantly related to the ecological management of rice production process were entered. The result indicates that 51.5% of the variances in the ecological management of rice production process could be explained by the work experience, social status, communication channels, contact with extension workers, participation in extension classes, attitude to ecological behavior, and land under rice cultivation.

#### **Conclusion and Recommendations**

The overall mean of ecological behavior of rice farmers was moderate (M= 2.876). Thus, rice farmers need to educate regarding environmental conservation and options of ecological behavior in rice production. Also farmers were stratified to five strata. The results indicated 48.1% of farmers had moderate ecological management regarding environmental conservation in agriculture. Based on results, farmers need to educate regarding all items of ecological management that noted in this research.

Based on the results there is significant correlation between ecological management of rice production process with work experience, income, Level of education, social status, communication channels, contact with extension workers, participation in extension classes, technical knowledge, attitude to ecological behavior, job skill, and land under rice cultivation.

The result of regression indicates that 51.5% of the variances in the ecological management of rice production process could be explained by the work experience, social status, communication channels, contact with extension workers, participation in extension classes, attitude to ecological behavior, land under rice cultivation.

#### **ACKNOWLEDGMENT**

This paper is part of MSc thesis of Maryam Taji graduate student of agricultural management department, Shoushtar branch, Islamic Azad University, Shoushtar, Iran. Thus, appreciate of professors and lectures of this department.

#### **REFERENCES**

- Aktar MW, Sengupta D and Chowdhury A (2009)**. Impact of pesticides use in agriculture: their benefits and hazards. *Interdisciplinary Toxicology* 2(1) 1–12.
- Alonso MS and Rubio IM (2008)**. *Ecological Management: New Research* (Nova Science Publishers Inc.) [ISBN 978-1-60456-786-1](https://doi.org/10.1080/978-1-60456-786-1).
- Helfrich LA, Weigmann DL, Hipkins P and Stinson ER (1996)**. Pesticides and aquatic animals: A guide to reducing impacts on aquatic systems. Virginia Cooperative Extension.
- Noorivandi A and Ommani AR (2014)**. The effect of fertilizers and pesticides runoff on aquatic ecosystem of Karun river in Khuzestan province (case study: ecological behavior of wheat farmers in Ahwaz township). *Indian Journal of Fundamental and Applied Life Sciences* 4(S3) 1755-1762.
- Toughill K (1999)**. The summer the rivers died: Toxic runoff from potato farms is poisoning P.E.I. Originally published in Toronto Star Atlantic Canada Bureau. Retrieved on September 17, 2007.