Decline of Pesticides Application by Using Biological Control: the Case Study in North of Iran

Seyyed Ali Noorhosseini Niyaki

Young Researchers Club, Islamic Azad University, Rasht Branch, Rasht, Iran

Abstract: Pests and diseases destroy considerable proportion of rice crop every year. Among the agricultural crops, rice has had the largest share in pesticide use. Most of the losses are caused by the attack of *Chilo Suppressalis*. Nowadays, pest management systems include the biological control due to the increase of implementation problems of chemical control methods. This study was accomplished for scrutiny the effect of adoption of *Chilo Suppressalis* biological control and decreasing of Diazinon in Tavalesh region, Guilan province, North of Iran. A survey study was conducted using a stratified random sampling to collect data from farmers of selected rural in Tavalesh region. Totally 184 farmers were studied for effective factors. Results show that there was a significant difference between the two groups of adopters and non-adopters of biological control regarding the application of Diazinon pesticide ($p<0.05$). In general, despite the consumption of chemical pesticides among the farmers who adopt the biological control has not be completely stopped but it shows a salient reduction in comparison with the farmers who don't use this technology.

Key word: Biological control · *Chilo suppressalis* · *Trichogramma* spp · Diazinon pesticide · Farmers · North of Iran

INTRODUCTION

Rice cereal stands in second place in terms of food consumption in Iran and has a variety of pests and diseases [1]. Pests and diseases destroy considerable proportion of rice crop every year. Among the agricultural crops, rice has had the largest share in pesticide use. Most of the losses are caused by the attack of *Chilo Suppressalis* [2]. More than 60% of chemical pesticides of Iran country used at Guilan, Mazandaran and Golestan provinces. The most important insecticide that used for *Chilo suppressalis* is Diazinon. Nowadays, pest management systems include the biological control method due to the increase of implementation problems of chemical control methods [3]. *Trichogramma* are natural enemies of the *Chilo Suppressalis* that parasite the eggs of this moth [1]. Biological control is considered and emphasized as an alternative technology by the government of Iran to overcome these problems [2]. During Recent years there have been efforts for biological control (use of *Trichogramma*) against *Chilo Suppressalis* [4]. For example, training courses approach for adoption of biological control is one of these emprises.

Results of research Dinpanah *et al.* [5] in the city of Sari show that 63.9 % of the farmers who take part in training courses, adopt the use of *Trichogramma* very much. Also, many studies have been done for identification of effective factors on adoption of biological control of *Chilo Suppressalis* that can be noted to researches of Pezeshkirad and Masaeli [1], Pezeshkirad *et al.* [6] and Hosseini and Niknami [4]. All results indicate that the factors of social, economic and agricultural aspects are effective for adoption of using *Trichogramma* for *Chilo Suppressalis* control. Based on it they present suitable patterns to adopt this technology. Although adoption of these new technologies can be considered stable and important but the circumstance of this initiative promotion in order to reach the objectives are more important. One of the main goals of this technology is decreasing consumption of chemical pesticides rate among adopters is essential. In this context, Mahdavi and Fahimi [3] during their studies reported that plan of usage rate reduction of chemical pesticides by methods of biological control, especially *Trichogramma* in Northern provinces of Iran has been relatively successful and it follows about 60 percent of decreasing consumption of chemical

---

Corresponding Author: Seyyed Ali Noorhosseini Niyaki, Young Researchers Club, Islamic Azad University, Rasht Branch, Rasht, Iran. E-mail: seyyedalinoorhosseini@yahoo.com.

Middle-East J. Sci. Res., 6 (2): 166-169, 2010

pesticides. Also, Salami and Khaledi [2] during their study in Mazandaran province of Iran concluded that there has been negative and significant relationship between the acceptance of new technology to combat pests and use of chemical pesticides against pests. Their results showed that the average consumption of pesticides in a hectare of rice for adopters was less than non adopters of biological control of *Chilo suppressalis*. This study was accomplished to monitoring Diazinon application in field using biological control in Tavalesh region, Guilan province, North of Iran.

MATERIALS AND METHODS

Location of Studied Area: 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 North of Iran (Figure 1).

Survey and Data Collection: The main tool for collecting data was questionnaire. Target population were farmers of Tavalesh region in North of Iran. Respondent farmers who selected from rural area were categorized into adopters and non adopters of Biological Control agent for control *Chilo Suppressalis*. Totally 184 farmers were selected by random sample using the table for determining the sample from given population developed by Bartlett *et al.* [7] that including 33 adopters and 151 non adopters for answering the questionnaire (Table 1).

Table 1: Total sample size used in the study area

	Talesh	Masal	Rezvanshahr	Total
Adopters Sample Size	14	6	13	33
Non-adopters Sample Size	43	78	30	151
Total	57	84	43	184

Source: Survey Results, 2009

Statistical Analysis: In this study, dependent variable was adoption of Biological Control agent for control *Chilo Suppressalis* among farmers of Tavalesh region in North of Iran. The dependent variable was dichotomized with a value 1 if a farmer was an adopter of biological control and 0 if non-adopter. Also, Independent variable was application quantity of Diazinon pesticide. Frequency, percent, mean and standard deviation were used for the descriptive analysis of data. Chi square, Mann-Whitney, and t-test were used for inferential analysis of data by SPSS (16) software.

RESULTS AND DISCUSSION

In this study, results showed that 87.41 percent of farmers non-adopters of biological control of *Chilo Suppressalis* by *Trichogramma* spp were used pesticides, while only 45.45 percent of adopters alongside biological control were used chemical pesticides (Table 2). Also results inferential analysis of data in Table 4 show that there was a significant relation between adoption of biological control and Application of Pesticide variable
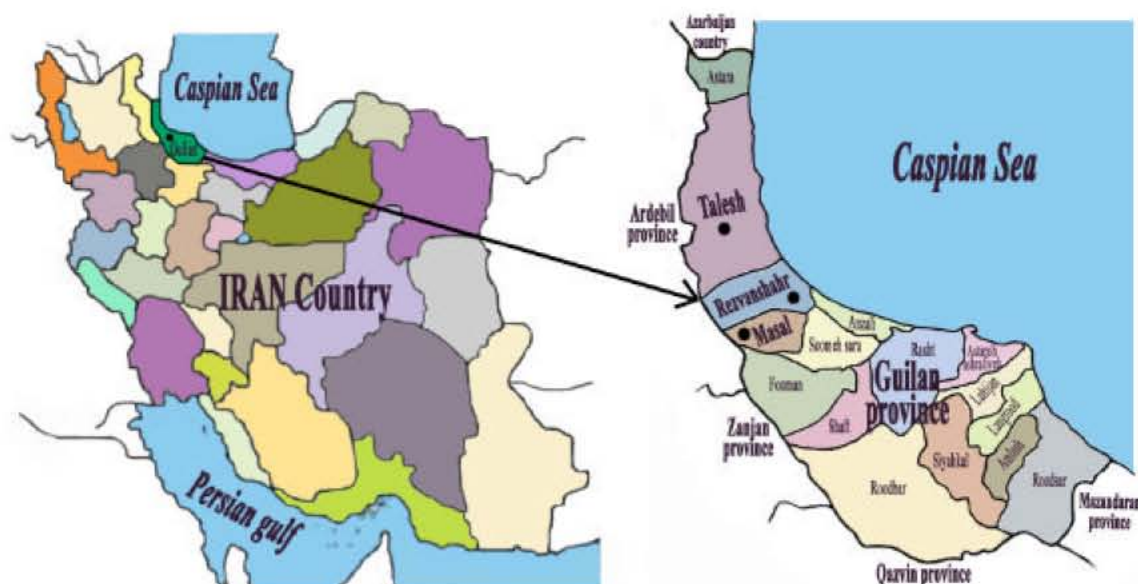

Fig. 1: Site of study

167

Table 2: Frequency percent of Pesticide use and no use by responder farmers

| Groups | Application of Pesticide | Noorhosseini, 2009* | | Salami and Khaledi, 2001 |
		Frequency	Percent	Frequency percent
Adopters of Biocontrol	Yes	15	45.45	53
	No	18	54.55	47
	Total	33	100	100
Non-Adopters of Biocontrol	Yes	132	87.41	81
	No	19	12.51	19
	Total	151	100	100

*Source: Results of this study, 2009

Total 3: Mean of Diazinon Application by responder farmers

| Independent Variable | Groups | Noorhosseini, 2009* | | | Salami and Khaledi, 2001 | |
		N	Mean	S. D	N	Mean
Quantity of Diazinon use (Kg per ha)	Adopters	33	10.19	13.74	-	17.14
	Non-adopters	151	23.16	36.06	-	31.14
	Total	184	20.83	33.52	270	-

*Source: Results of this study, 2009

Table 4: Inferential Analysis of Data

Independent Variables	Test	x^2	z	x^2	t	Sig.
Pesticide use and no use	Chi-square	29.684**				0.000
	Mann-Whitney		5.433**			0.000
Application quantity of Diazinon	Chi-square			12.958*		0.011
	t-test				2.031*	0.044

*Significant at $P<0.05$ and **Significant at $P<0.01$

Source: Results of this study, 2009

(x^2=29.684, p<0.01) and a significant difference between the two groups of adopters and non-adopters of biological control regarding the Application of Pesticide variable (z=5.433, p<0.01).

In this study, results of Chi square test in Table 4 show that there was a significant relation between adoption of biological control by *Trichogramma* and application of Diazinon (x^2=12.958, p<0.05). Also, results of t-test in Table 4 show that there was a significant difference between the two groups of adopters and non-adopters of biological control regarding the mean application of Diazinon variable (t=2.031, p<0.05). The mean average in Table 3 show that most consumption of Diazinon was related to non-adopters (Mean=23.16 Kg/ha) and lowest consumption was related to adopters (10.19 kg/ ha) In other words, accepting biological control of Chilo Suppressalis, the amount of pesticide Diazinon by farmers is reduced in the studied area.

These results are in agreement with those obtained by Salami and Khaledi [2] in the province Mazandaran. The results of their research had shown that 81 % of the rice farmers, who have not adopted biological technology for the pest control, have used pesticide against the *Chilo suppressalis*, whereas this percentage for the adopter of the new technology was 53 %. Furthermore comparing the consumption of pesticides in the two groups of farmers shows that average consumption of pesticides for the adopter of new technology is 17.14 kilogram per hectare and 31.14 kilogram for the non-adopter. Statistical analysis of the results showed a negative and significant relationship between the adoption of new technology of pest control and chemical application.

CONCLUSIONS AND RECOMMENDATION

In general, it can be derived that despite the consumption of chemical pesticides among the farmers

who adopt the biological control has not be completely stopped but it shows a salient reduction in comparison with the farmers who don't use this technology. In other words, the utilization of the *Trichogramma* spp for biological control of the *Chilo Suppressalis* is a suitable and effective action in order to reduce the use of chemical pesticides like Diazinon on rice fields that can prevent natural resources pollution and lessen a large number of dangers and threats suffering health and social life of human societies. Nonetheless firstly more support for researchers is recommended so as to access to better results and more widespread researches. It should use their proficiency by value and accomplished studies should be available for farmers. Secondly the knowledge of using biological control should be disposed of farmers to adopt it more consciously and with a positive viewpoint. Finally the promotion of biological control of the *Chilo Suppressalis* should be paid more attention for following enormous numbers of adopters of this technology.

ACKNOWLEDGMENTS

REFERENCES

1. Pezeshkirad, Gh. R. and M. Masaeli, 2002. The study of the effective economic factors on adoption of integrated control in control of rice stem borer (*Chilo suppressalis*) in Isfahan province. Journal of Sciences and technology of agricultural and Natural Resources, 6(4): 53-64 (Persian in one Iranian journal)

2. Salami, H.A. and M. Khaledi, 2001. Impact of Biological Technology of *Chilo suppressalis* Control on Pesticides Use: Case Study in Mazandaran Province. Eqtesad-E Keshavarzi Va Towse'e, 9(1(33)): 247-270.

3. Mahdavi, A. and Gh. R. Fahimi F, 2001. Biological Control of *Chilo suppressalis* in Rice Fields and Its Role in Pesticide Reduction in North of Iran. Journal of Environmental Science and Technology, 9: 31-40.

4. Hosseini, S.M. and M. Niknami, 2001. Factors Affecting the Adoption of Trichogramma Application in Controlling *Chilo suppressalis* by Rice Growers in Amol. Journal of Agricultural Sciences, 7(1): 95-110.

5. Dinpanah, Gh. R., S.M. Mirdamadi, M. Chizari and S.V. Alavi, 2009. An Analysis of the Effect of Farmer Field School Approach on Adoption of Biological Control by Rice Farmers in Sari County, Iran. Iranian Journal of Agricultural Economics and Development Research, 40(1): 75-84.

6. Pezeshkirad, Gh. R., M. Masaeli and J. Yaghoubi, 2006. A study of the effective factors involved in adoption of integrated pest management of rice stem borer (*Chilo suppressalis*), Isfahan, Iran. Iranian Journal of Agricultural Sciences, 37-2(1): 27-33.

7. 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 Journal, 19(1): 43-50.