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Evaluation of the effect Profenofos (EC 50%) on cotton bollworm *Helicoverpa armigera* (Hub.) in Golestan province

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ABSTRACT: In order to compare the effect of commercial formulations of insecticides on the control of *Helicoverpa armigera* cotton bollworm, a field experiment was conducted in Hashemabad cotton research station Golestan province on 2018 year. This experiment was used in the form of a randomized complete block design with 9 treatments and 4 replications including 9 formulations of perfenofos from different companies along with the control on the cotton plant as spraying application.Sampling of larvae mortality statistics were determined 3, 7 and 14 days after spraying application and corrected according to Henderson-Tilton formula and analyzed by SAS software. Mean treatments were also compared with Duncan's multiple range test. According to the results of comparing the average in the Golestan province showed that in 3 days after spraying Profenofos, Rahandish Kavan Company with 65.7% and Shimy Keshavarz Company with 65.2% had the most impact. Percentage of the effect of Profenofos toxin in 7 days after spraying the formulation of Raha Andish Kavan Company with 81.9% and Profenofos Chemist Keshavarz with 81.2%, the highest percentage of effect in group a, and Profenofos of Raja Shimy Company with 77.5 % and Kimia Bahar with 70.5% were in the next group.

Keywords: Insecticides, Profenofos, *Helicoverpa armigera* , cotton and Golestan province.

INTRODUCTION

Cotton Boll Worm, *Helicoverpa armigera* an important pest of cotton in Iran In some areas, causing yield losses and billions of rials to cotton growers bring harm. The most common way to control this pest is the use of chemical pesticides. In a review on common pesticides against cotton pests in Golestan provice, carbaril and avant in comparison with larval and endosulfan had the greatest effect on the control of cotton bollworm (Mojeni,2005). New tested toxins in cotton fields in Golestan province, toxin Karvin, with a dose of 1.5 liters per hectare, had more than 90% exposure to bollworm (Mojeni,2015). In a mortality study in the first instar larvae of *Phethorima operculella*, on the potato treated with Lufenorun were very high in comparison with the control (more than 90%) most of the larval mortality was observed during the first age of ecdysis (Edmvanden,*etal.,* 2000). In order to investigate the susceptibility of bollworm to some common toxins in the Moghan area and to determine the contact toxicity of these toxins, a study was conducted and chlorpyrifos, atrymphus, proheno-fos and endosulfan were superior (Alhayary, 1998). In Khorasan province toxine avant, 300cc per hectare had a modest effect on control of sugar beet leaf worm in comparison with other toxins (Hosseini,2003). In a toxin test, Moghan, Endosulfan and Thiodicarb had the most effect on cotton bollworm (Taghizadeh, 2000).

Studies have shown that the observed symptoms are the common effects of insecticides of benzoyl phenylureas derivatives. Also, the cause of mortality in larvae of the first age of potato *Phethorima operculella* may be due to the

prevention of Lufenorun insecticide by producing hormone ecdysis or blocking the synthesis of kethin in larvae(Mulder and Gijswijt,2006) .

There was no significant difference in the treatment of potato *Phethorima operculella* eggs with Lufenorun insecticide at hatching rate between the control and check treatment was higher than 90%(Edmvanden,*etal.*, 2000). Some researchers reported the low contact and low embryo activity Lufenorun activity and stated that the characteristics of the egg wall affect the penetration of insecticides of benzoylphenyl urea derivatives.(Grousscurt and Jongsma, 1987). Laboratory studies were conducted on the effects of various growth regulators on the third instar larvae of *Helicoverpa armigera*. Six different concentrations were prepared and mortality percent were recorded after 48, 72, 96 and 120 hours. The results showed that 50% of the deaths of larvae of age third *H. armigera* after 120 hours were induced by various Lufenorun, fluofenoxuron, chloroflurosarone and dipflobenzuron concentrations. The results also showed that all insect growth regulators are effective in controlling *H. armigera* pests. However, Lufenorun and fluofenoxuron had the greatest impact (Khatri, *etal.*, 2014) .To determine the effects of pesticides in cotton fields, a study was done on natural enemies and pesticides Zolon and Larvin least negative impact on the Trichogramma(Zomorodi,1987).

Material and Methods:

This experiment was performed in Golestan province as a randomized complete block design with 9 treatments in 4 replications. In each plot, 6 rows of 10 meters with a distance of plants between and on the rows of 80 and 20 cm, the distance of plots from each other was 1 meter and repetitions were 2 meters. For spraying, motor rear atomizer sprayer was used. Before spraying, calibration and water consumption were calculated based on 400 liters per hectare. When the pest population reached 3 first instar larvae or 5 eggs per 25 plants, spraying was performed (Razaq, *etal.,* 2005). To sample the larval stage, 10 plants were randomly selected from each plot, all buds, flowers and bolls of each plant were examined and the number of larvae and age stage were counted. A performance toxin was modified according to Henderson- Tilton formula (Bozsik, 1996). Data analysis was performed using SAS software and the mean of treatments was compared with Duncan's multiple range tests.

Results and discussion:

After data analysis, the results showed that 3, 7 and 14 days after spraying there was a significant difference between treatments. According to the results of comparing the average in the Golestan province showed that in 3 days after spraying Profenofos, Rahandish Kavan Company with 65.7% and Shimy Keshavarz Company with 65.2% had the most impact. Percentage of the effect of Profenofos toxin in 7 days after spraying the formulation of Raha Andish Kavan Company with 81.9% and Profenofos Chemist Keshavarz with 81.2%, the highest percentage of effect in group a, and Profenofos of Raja Shimy Company with 77.5 % and Kimia Bahar with 70.5% were in the next group (table,1,2) .

Table 1. Results of analysis of variance of Profenofos efficiency percentage of different companies on cotton bollworm in days 3, and 7 days after spraying in Golestan province in 2018

p	F	S.S	df	Sources of changes	The days after spraying
0.001	3.51**	160.60	8	Treat.	3 days
Cv= 12.76		64.85	24	Erro.	
1.32	4.92**	252.52	8	Treat.	7 days
Cv=19.47		83.82	24	Erro.	

Table 2. Comparison of the average percentage of cotton bollworm population mortality in different Profenofos treatments in Golestan province in 2018

Mse. 7 days after spraying	Mse. 3days after spraying	Treat.Profenofos(EC 50%)
81.9±8.4a	65.7±9.7a	Rahaandish kavan
81.2±6.5a	65.2±5.2a	Shimiy Keshavarz
77.5±4.8ab	46.5±9.6c	Raja Shimiy
70.5±5.2b	57.5±10.9ab	Kimiya Bahar
69.0±3.4bc	53.2±3.4bc	Ghazal Shimiy
69.2±5.2bc	59.5±10.1ab	Aksir Yazd
65.5±6.6bc	59.5±9.4ab	Ara Shimiy
57.7±7.1c	56.0±4.4b	Oksien Shimiy
57.2±4.5c	53.5±9.8bc	Sazegan

Based on the results of the 2016 experiment, the analysis of variance showed that there was a significant difference among the treatments tested. The results are as follows: On the 3rd day after spraying, Lufenorun was 1.5 liters with 59.75% and avent 0.5 Lit with 58% had the greatest effect on bollworm and placed at 5% level in group a (Mojeni,2019).

On the 7th day after spraying, the karvina toxin treatment was 1.5 liters with 86.75% and Lufenorun 1.5 liters with 81.75% and Lufenorun 2 liters with 77.25% had the highest effect on the pest and at 5% Were in group a (Mojeni, 2019).

At the time of 14 days after spraying, Lufenorun treatment was 1.5 liters (86.75%) and karvina (1.5 lit), 86.85% and Lufenorun (2.9 l) with 85.75% had the greatest effect on cotton bollworm at 5% level in group a (Mojeni, 2019).

Some researchers reported the low contact and low embryo activity Lufenorun activity and stated that the characteristics of the egg wall affect the penetration of insecticides of benzoylphenyl urea derivatives.(Grousscurt and Jongsma, 1987).

The poison treatment Karvin 1 liter in two tests combined analysis significant differences were observed in 5% and the best of its effect in 10 days after spraying on pest bollworm with an average of 68.75 percent and in group **a** was. In treatment Karvin 1.5 liters in two trials a significant difference was observed and the best of its mortality on pesticide spraying after 10 days and 7 days after spraying with mean 100% of the pest in group **a** were 81.25 %(Mojeni,2019) . This is necessary because conventional pesticides bollworm stretch in the province for many years taken in order to avoid the possible resistance of the pest in the future can be accommodated.

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