

## Avoidable losses due to *Lipaphis erysimi* (Kalt.) in mustard

G. M. PARMAR<sup>2\*</sup>, M. N. KAPADIA<sup>1</sup>, N. B. JADAV<sup>2</sup> AND V. J. ZIZALA<sup>2</sup>

<sup>1</sup>Dept. of Entomology, College of Agriculture, Junagadh Agricultural University, JUNAGADH (GUJARAT) INDIA

<sup>2</sup>Krishi Vigyan Kendra, Junagadh Agricultural University, JAMNAGAR (GUJARAT) INDIA

(Accepted : August, 2007)

A field experiments was conducted to estimate the avoidable losses caused by *Lipaphis erysimi* in mustard sprayed with fungal biopesticides alone and in combination with synthetic insecticides. The percentage of avoidable yield losses in mustard seed were found varying from 11 to 68 %. Acephate 0.05 % recorded lowest yield loss of 11 % followed by *Verticillium lecanii* @ 1.0 kg/ha + imidacloprid 0.0025 per cent (14 %) and *V. lecanii* @ 1.0 kg/ha + acephate 0.025 per cent (20 %). Higher avoidable loss (38 to 55 %) observed in the treatment of *V. lecanii* @ 2.0 kg/ha, *Beauveria bassiana* @ 2.5 kg/ha and azadirachtin 0.000375 %.

Key words : *Verticillium lecanii*, *Beauveria bassiana*, Avoidable losses, *Lipaphis erysimi*, Mustard.

### INTRODUCTION

Indian mustard (*Brassica juncea* L.) is one of most important oilseed crops in India. This crop is infested with various insect-pests, and aphid, *Lipaphis erysimi* (Kalt.) is one of them. The estimated loss in yield due to the pest has been reported in the range of 35 to 73 % (Baral *et al.*, 1986) and up to 95 % (Ahmed and Rahman, 1994). However, no information is available about the avoidable losses to mustard by *L. erysimi* in Gujarat. The present studies were conducted to estimate the extent of avoidable yield losses due to *L. erysimi* in mustard sprayed with fungal bio-pesticides and synthetic insecticides under field condition.

### MATERIALS AND METHODS

A Field experiment was conducted at Farm of Agronomy, Junagadh Agricultural University, Junagadh during Rabi 2004-05 and 2005-06. The experiment was laid out in a randomized block design with three replications and ten treatments, including the control. The seeds of mustard variety, GM-2 were sown on first November during both the years in plots measured 5.0 x 2.70 m. Agronomical and cultural practices were followed as per recommendations. The fungal biopesticides used in the experiments were, *V. lecanii* @ 2.0 kg/ha and *B. bassiana* @ 2.5 kg / ha. These biopesticides were used alone and in combination with half doses of synthetic insecticides, imidacloprid 0.0025 and acephate 0.025 %. Imidacloprid 0.005, acephate 0.05 and azadirachtin 0.000375 % were used alone in addition to above

treatments to compare the avoidable loss in individual treatments. First spray was done when aphid population crossed the economic threshold level (ETL=1.5 aphid index/plant). Second application was given at 15 days after first application. Aphid population was recorded on randomly selected 10 plants of each plot prior to 24 hours and after 1, 3, 5, 7 and 10 days of insecticide application by adopting 0 to 5 indexing. The seed yield was recorded from net plot area and converted in quintals per hectare. Data so obtained were statistically analyzed. The avoidable loss in individual treatment was computed by using following formula (Pradhan, 1969).

$$\text{Percentage avoidables loss} = \frac{T - C}{T} \times 100$$

### RESULTS AND DISCUSSION

The aphid population was recorded significantly minimum in the treatment of imidacloprid 0.005 % and it was at par with the acephate 0.05 % (Table 1). The treatmentb of *V. lecanii* @ 1.0 kg/ ha + Imidacloprid 0.0025 %, *V. lecanii* @ 1.0 kg/ ha + acephate 0.025 %, *B. bassiana* @ 1.25 kg/ha + imidacloprid 0.0025 % and *B. bassiana* @ 1.25 kg/ha + acephate 0.025 % were found moderately effective in reducing the aphid population below the ETL. Whereas, treatments of *B. bassiana* @ 2.5 kg/ha, *V. lecanii* 2.0 kg/ha and azadirachtin 0.000375 % were found least effective to reduce the aphid population.

The yield data indicated that all the treatments were significantly superior (4.60 to 9.04 q/ha) to untreated control (2.86 q/ha). The treatment of imidacloprid 0.005 % gave the highest seed yield (9.04 q/ha) and was at par

\* Author for Correspondence

Table 1 : Effect of bio pesticide and insecticide on mustard seed yield and avoidable losses due to *L. erysimi* (Pooled of 2004-05 and 2005-06).

S. No.	Treatments	Aphid index/plant	Mustard seed yield (q/ha)	Increase in yield over control (%)	Avoidable losse (%)
1.	<i>V. lecanii</i> 2.0 kg/ha	1.26* (1.59)	5.58	95	38
2.	<i>B. bassiana</i> 2.5 kg/ha	1.27 (1.62)	4.05	42	55
3.	Imidacloprid 0.005 %	1.05 (1.10)	9.04	216	00
4.	Acephate 0.05 %	1.06 (1.13)	8.07	182	11
5.	<i>V. lecanii</i> 1.0 kg/ha + Imidacloprid 0.0025 %	1.14 (1.30)	7.82	173	14
6.	<i>V. lecanii</i> 1.0 kg/ha + Acephate 0.025 %	1.15 (1.32)	7.26	154	20
7.	<i>B. bassiana</i> 1.25 kg/ha + Imidacloprid 0.0025 %	1.17 (1.36)	6.48	127	28
8.	<i>B. bassiana</i> 1.25 kg/ha + Acephate 0.025 %	1.17 (1.37)	6.26	119	31
9.	Azadirachtin 0.00375 %	1.26 (1.58)	4.60	60	49
10.	Untreated control	1.46 (2.12)	2.86	--	68
T	S.Em.±	0.08	42.31		
	C.D. at 5 %	0.23	120.61		
	C.V. %	8.38	16.41		
Y	S.Em.±	0.02	18.43		
	C.D. at 5 %	NS	NS		
Y	S.Em.±	0.08	58.27		
× T	C.D. at 5 %	0.22	NS		

+ $\sqrt{x + 0.5}$  transformation

Figures in parentheses are retransformed value

with acephate 0.05 % (8.07 q/ha) and *V. lecanii* @ 1.0 kg/ha + imidacloprid 0.0025 % (7.82 q/ha). The combination of *V. lecanii* @ 1.0 kg/ha + acephate 0.025 % (7.26 q/ha), *B. bassiana* @ 1.25 kg/ha + imidacloprid 0.0025 % (6.48 q/ha) and *B. bassiana* @ 1.25 kg/ha + acephate 0.025 % (6.26 q/ha) were next in order of producing yield of mustard seeds, while *B. bassiana* @ 2.5 kg/ha alone recorded less yield (4.05 q/ha) and it was at par with azadirachtin 0.000375 % (4.60 q/ha) and *V. lecanii* @ 2.0 kg/ha (5.58 q/ha). In the present study, combinations of *V. lecanii* with the half doses of insecticides, imidacloprid and acephate were found as economical as the recommended insecticides against *L. erysimi* and consequently gave the maximum yield of

mustard seeds. Gour and Pareek (2003) reported that imidacloprid and acephate were found most effective against *L. erysimi* and gave the highest seed yield of mustard.

The data on increase in seed yield over control due to the control of mustard aphid, *L. erysimi* in different treatments showed that yield increased from 42 to 216 %. The highest increase in yield over control was obtained with imidacloprid 0.005 per cent (216 %) followed by acephate 0.05 per cent (182 %) and *V. lecanii* @ 1.0 kg/ha + imidacloprid 0.0025 per cent (173 %). These combinations of fungal biopesticides with the half doses of insecticides resulted in higher seed yield than either of them applied alone.

The percentage avoidable losses in mustard yield were found varying from 11 to 68 %. The maximum yield was recorded with the spray of imidacloprid 0.005 %. The per cent avoidable loss in yield was obtained lowest (11 %) in the plots treated with acephate 0.05 %. The plots treated with *V. lecanii* @ 1.0 kg/ha in combination with imidacloprid 0.0025 % and acephate 0.025 % showed the avoidable loss of 14 to 20 %. Whereas, the plots treated with *B. bassiana* @ 1.25 kg/ha in combination with imidacloprid 0.0025 % and acephate 0.025 % showed the avoidable loss of 28 to 31 %. The higher avoidable loss (38 to 55 %) was seen in the plots treated with *V. lecanii* @ 2.0 kg/ha and *B. bassiana* @ 2.5 kg/ha as well as azadirachtin 0.000375 %. Whereas, in unsprayed plots the avoidable loss was recorded 68 %.

It can be concluded that the treatments of imidacloprid 0.005 % and acephate 0.05 % were found equal effective in reducing the aphid population. Application of fungal biopesticides at half the concentration with either of the insecticides at half the recommended concentration were found as effective as

the recommended insecticides against *L. erysimi* in increasing the mustard seed yield as well as minimizing the avoidable loss.

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