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Laboratory evaluation of two mycoinsecticides alone and in combination with synthetic insecticides against *Lipaphis erysimi* (Kalt.)

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A laboratory trial was conducted to know the bio-efficacy of *Verticillium lecanii* and *Beauveria bassiana* alone and in combination with reduced dose of two insecticides against third nymphal stage of *Lipaphis erysimi* (Kalt.) at Junagadh Agricultural University, Junagadh during 2005-06. The results showed that the insecticides, imidacloprid 0.005 per cent and acephate 0.05 per cent alone were found most effective, while, application of *V. lecanii* at half concentration with either imidacloprid or acephate at half dose, *i.e.* 0.0025 or 0.025 per cent, respectively, was found as effective as synthetic insecticides alone against *L. erysimi*.

Key words : *Beauveria bassiana*, *Lipaphis erysimi*, Synergistic, *Verticillium lecanii*.

INTRODUCTION

The aphid, *Lipaphis erysimi* (Kalt.) is one of the most serious pest of mustard crop in Saurastra region of Gujarat State. Sufficient work on chemical control against this pest on mustard has been done. Some of these insecticides are highly toxic to pollinating agents, parasitoids and predators. Since biocontrol is the major component in IPM, it was felt necessary to evaluate some bio-pesticides, *V. lecanii* and *B. bassiana* for its efficacy against mustard aphid. causes epizootics in sucking pests of several crops in different parts of the world (Sukhova, 1987). Entomopathogenic fungi are appropriate microbial agents as they infect the insect cuticle directly through contact and do not require to be ingested for infection to set in. In India, pathogenicity of *V. lecanii* has been reported to *L. erysimi* on mustard crop (Rana and Singh, 2002). Hence, present study was carried out to find out the efficacy of *V. lecanii* and *B. bassiana* alone and in combination with the best compatible insecticide against *L. erysimi* in laboratory.

MATERIALS AND METHODS

In order to study the bio-efficacy of *V. lecanii* alone, and inter-specific synergism between *V. lecanii* and reduced amount of insecticides as well as insecticides alone against third nymphal stage of *L. erysimi*, a laboratory experiment was conducted at Department of Entomology, College of Agriculture, Junagadh during 2005-06. The spore counts of 1×10^8 cfu per gram material for *V. lecanii* and 1.72×10^7 conidia per gram material for *B. bassiana* were studied. There were three replications for each treatment in a Completely Randomized Block Design. The uniform sized fresh mustard leaves were sprayed with treatment solution using atomizer and then, air dried for 15 minutes. The cotton plug soaked in water was attached to the cut end of the leaf petiole, to avoid dessication of leaves. The leaves were then placed in Petridishes. The third instar nymphs were starved for six hours prior to its releasing on treated leaves. Twenty-five nymphs were provided into each Petridish from a stock culture using fine hair brush. The nymphs were provided with untreated food after 24 hours of feeding on the treated food. All the tests were carried out in the laboratory at $26 + 2^0$ C and 70 to 80 per cent relative humidity. Mortality counts were recorded at 1, 3, 5, 7 and 10 days after treatment. Nymphs were considered as dead, if they did not respond to the stimulation by touch with camel hairbrush. The data in percentage were transformed into arcsine percentage before analysis. Natural mortality was corrected (Abbott, 1925).

RESULTS AND DISCUSSION

The data (Table 1) revealed that all the treatments were significantly superior compared to untreated control throughout the period of experimentation. Both the synthetic insecticides showed quick knockdown effect against *L. erysimi*. Whereas, fungal bio-pesticides exhibited low rate of mortality in comparison to synthetic insecticides. The treatment of acephate 0.05 per cent gave 70.97 per cent mortality, followed by imidacloprid 0.005 per cent (67.75%). The treatments of *V. lecanii* 1.0 kg/ha + acephate 0.025 per cent, *V. lecanii* 1.0 kg/ha +

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imidacloprid 0.0025 per cent and *B. bassiana* 1.25 kg/ha + acephate 0.025 per cent were found next in mortality by registering 55.93, 53.76 and 52.67 per cent mortality, respectively. The *V. lecanii* @ 2.0 kg/ha and *B. bassiana* @ 2.5 kg/ha showed poor mortality.

At 3rd day of the treatment, the insecticides, acephate and imidacloprid were found equally effective. The treatment of *V. lecanii* 1.0 kg/ha + acephate 0.025 per cent and *V. lecanii* 1.0 kg/ha + imidacloprid 0.0025 per cent were found next best onces, followed by *B. bassiana* 1.25 kg/ha + imidacloprid 0.0025 per cent, *B. bassiana* 1.25 kg/ha + acephate 0.025 per cent and azadirachtin 0.000375 per cent. While, *V. lecanii* @ 2.0 kg/ha and *B. bassiana* @ 2.5 kg/ha were found less effective. Similar trend of mortality was recoded after 5 days of the treatment.

Efficacy at 7 days after treatment, *V. lecanii* 2.0 kg/ha caused maximum mortality (60.54 %) as compared to *B. bassiana* 2.5 kg/ha (42.25 %). The treatment of imidacloprid 0.005 per cent gave 81.94 per cent mortality and it was *at par* with acephate 0.05 per cent (80.81 %). The treatments of *V. lecanii* 1.0 kg/ha + imidacloprid 0.0025 per cent (72.14 %) and *V. lecanii* 1.0 kg/ha + acephate 0.025 per cent (70.02 %) were found next best in mortality. The *B. bassiana* 1.25 kg/ha + imidacloprid 0.0025 per cent, *B. bassiana* 1.25 kg/ha + acephate 0.025 per cent and azadirachtin 0.000375 per cent were found less effective.

After 10 days of treatment nymphal mortality in *V. lecanii* 2.0 kg/ha increased up to 68.44 per cent, which is significantly higher than *B. bassiana* 2.5 kg/ha. Treatment of imidacloprid 0.005 per cent proved most effective, followed by acephate 0.05 per cent, *V. lecanii* 1.0 kg/ha + imidacloprid 0.0025 per cent, *V. lecanii* 1.0 kg/ha + acephate 0.025 per cent, *B. bassiana* 1.25 kg/ha + imidacloprid 0.0025 per cent and *B. bassiana* 1.25 kg/ha + acephate 0.025 per cent. Neem based insecticide; azadirachtin 0.000375 per cent was proved least effective.

The results showed that the nymphal mortality in chemical insecticides alone was attributed immediately. Fungal bio-pesticides were initially less effective; their efficacy slowly increased and caused considerable mortality. The present findings are supported by the reports of Muhammad *et al*. (2002), Rohilla *et al*. (2004)

Table 1 : Nymphal mortality of *L. erysimi* in biopesticides alone and its combination with insecticides

Treatment	Nymphal mortality (%)				
	1 DAT	3 DAT	5 DAT	7 DAT	10 DAT
V. lecanii 2.0 Kg/ha	24.41* (16.16)	28.22 (22.43)	40.38 (41.98)	51.12 (60.54)	55.73 (68.44)
B. bassiana 2.5 Kg/ha	25.99 (19.24)	30.54 (25.84)	34.97 (32.93)	40.53 (42.25)	43.47 (47.38)
Imidacloprid 0.005 %	55.41 (67.75)	58.77 (73.07)	62.42 (78.49)	64.88 (81.94)	66.57 (84.19)
Acephate 0.05 %	57.41 (70.97)	60.21 (75.30)	61.55 (77.20)	64.07 (80.81)	65.63 (82.94)
V. lecanii 1.0 Kg/ha + Imidacloprid 0.0025 %	47.16 (53.76)	49.84 (58.40)	55.70 (68.20)	58.21 (72.12)	62.73 (78.85)
V. lecanii 1.0 Kg/ha + Acephate 0.025 %	48.41 (55.93)	51.81 (61.76)	54.98 (67.01)	56.85 (70.02)	60.00 (74.82)
B. bassiana 1.25 Kg/ha + Imidacloprid 0.0025 %	43.47 (47.48)	49.21 (57.31)	51.51 (61.17)	55.23 (67.40)	59.98 (74.90)
B. bassiana 1.25 Kg/ha + Acephate 0.025 %	46.53 (52.67)	48.55 (56.18)	51.53 (61.27)	54.54 (66.33)	56.65 (69.77)
Azadirachtin 0.000375 %	42.81 (46.20)	48.53 (56.13)	49.58 (57.96)	51.57 (61.33)	51.89 (61.86)
Untreated control	5.74 (0.00)	5.74 (0.00)	5.74 (0.00)	5.74 (0.00)	5.74 (0.00)
S.E..±	0.79	0.81	1.28	1.31	1.52
C.D. (P=0.05)	2.27	2.34	2.68	3.79	4.39
C.V. %	3.94	3.75	5.45	5.28	5.82

* Angular transformation Figures in parentheses are original values
DAT= Days after treatment

and Jat and Singh (2005). Whereas, *V. lecanii* 1.0 kg/ha combined with half dose of imidacloprid (0.0025%) or acephate (0.025%) was found effective.

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