Plant Archives Vol. 18 No. 1, 2018 pp. 288-290 *ISSN 0972-5210*

BIOEFFICACY OF *VERTICILLIUM LECANII* AND *BEAUVERIA BASSIANA* AGAINST MUSTARD APHID, *LIPAPHIS ERYSIMI* UNDER FIELD CONDITIONS

Arun Janu*, G. S. Yadav, H. D. Kaushik and Pritish Jakhar

*Department of Entomology, CCS Haryana Agricultural University, Hisar-125004 (Haryana) India

Abstract

Field studies were carried out in Research area of Department of Entomology CCS HAU, Hisar during 2010-11 to assess the bioefficacy of the entomopathogens, *Verticillium lecanii* and *Beauveria bassiana* against *Lipaphis erysimi.* Where, lab cultured *V. lecanii* with concentration at 2.7×10^6 spores/ml recorded a mortality of 69.86 per cent while the lab cultured *B. bassiana* at concentration 2.4×10^7 spores/ml gave a mortality of 70.59 per cent. However, insecticide oxy-demeton methyl 25 EC 0.025% gave a mortality of 94.97 per cent. The results obtained from the studies revealed that the entomopathogenic fungi were found effective against *L. erysimi.*

Key words: *Beauveria bassiana*, *Lipaphis erysimi*, mustard, *Verticillium lecanii*

Introduction

Rapeseed-mustard is an important crop in oilseed crops which is grown in subtropical and tropical countries in the world. In India, rapeseed-mustard is grown during *Rabi* season under rain-fed as well as irrigated conditions. Which is widely used as edible oil and cattle feed. The mustard aphid, *Lipaphis erysimi* (Kaltenbach) is considered to be the key pest of rapeseed and mustard crops in India. This dreaded pest infests the mustard crop and cause losses ranging from 19-96 per cent and adversely affects the oil production (Rana, 2005). Several bio-control agents have been explored but their potential is yet to be evaluated in the field. The predatory potential of some bio-agents were found to be excellent and prove very effective also in the field condition.

Material and Methods

Verticillium lecanii and *Beauveria bassiana* culture was raised on Sabouraud Dextrose Yeast Extract Medium (SDYE) and Potato Dextrose Agar (PDA) respectively, following the standard method as reported by Vimala Devi (2005). Regular subculture is done for further multiplication and maintenance which was done at 25 ± 2^0C in the BOD incubator. Conidia harvested after 14 days of inoculation from the slants preferred in conical flasks to from aqueous conidial suspension solution. Haemocytometer used to from a suspension of 2.7×10^7 conidia ml^{-1} concentration for *V. lecanii* and 2.4×10^8 conidia ml^{-1} *B. bassiana*. The lower conidial concentrations were prepared from the serial dilutions.

A field experiment was conducted during *Rabi* 2010-11 to evaluate the bioefficacy of *V. lecanii* and *B. bassiana* against *Lipaphis erysimi.* Mustard variety RH-30 was grown with plot size of 4×2.5 m^2 and spacing is 30 × 10 cm. The experiment was carried out in randomized block design with 9 treatments, each replicated thrice.

The mustard aphid infested plants (10 plants/plot) were selected and tagged for further studies. Pre-counting (day before spraying, count of mustard aphid in the upper 10 cm of the central whorl of plant) in each of the ten plants of a plot was taken. Each plot was sprayed as per the treatments using Knapsack Sprayer. Post-spray counting was done 1, 2, 3, 4, 5, 6 and 7 days after treatment. The data was subjected to analysis of variance (ANOVA).

***Author for correspondence :** E-mail : januhau@gmail.com

Results and Discussion

With the idea of exploring the bioefficacy of the fungus in comparison with oxy-demeton methyl and nimbecidine, the present study revealed that the insecticide oxy-demeton methyl 25 EC @ 0.025 % recorded a highest mortality of *L. erysimi* (94.97%) at 7DAT under field conditions, the second being the formulation of *V. lecanii* (2.7×10^7 spores/ml) with 75.24 per cent mortality of *L. erysimi* and two another concentrations 2.7×10^5 and 2.7×10^6 spores/ml of the laboratory cultured *V. lecanii* showed a mortality of 68.24 and 69.86 per cent, respectively (table 1). The formulation of *B. bassiana* (2.4×10^8 spores/ml) recorded 74.06 per cent and two another concentrations of laboratory cultured fungus *viz.,* $2.4 \times 10^6$and 2.4×10^7 spores/ml recorded a mortality of 65.51 and 70.59 per cent, respectively. In case of nimbecidine treatment a considerable mortality of 44.00 per cent was obtained on 7 DAT. The present findings are in close agreement with Singh *et al.* (2008) on the entomopathogenic fungi against the mustard aphid, *L. erysimi* and they reported that *V. lecanii* @ 10^8 spores/ ml dose was effective in controlling the aphid population to 75.79 per cent. While, Kadam *et al.* (2008) showed that the *V. lecanii* @ 6×10^5 cfu/ml 0.3 per cent reduce the initial population of whitefly, *Trialeurodes vaporarium* (Westwood), aphid, *Myzus persicae* (Sulzer), thrips, *Thripstabaci* (Lindemann) and red spider mite *Tetranychu surticae* (Koch) by 95.45, 93.44, 91.62 and 82.40 per cent, respectively. Palande and Pokharkar (2005) reported that the biological activity of *V. lecanii* against *Brevicoryne brassicae* with mortality ranged from 16.3 to 93.3 per cent with the concentration of 1×10^3 to 1×10^9 cfu/ml.

Saranya and Ushakumari (2011) evaluated the efficiency of *Pochonia (Verticillium) lecanii* and *Fusarium pallidoroseum* against cowpea aphid. *P. lecanii* @ 10^8 spores/ml and *Fusarium pallidoroseum* @ 7×10^6 spores/ml exhibited 100 per cent mortality and were found to be highly efficient for controlling the aphid population. Similar field trial were carried out by Poprawski *et al.* (1999) reported that the *B. bassiana* based myco-insecticide Mycotrol ES against brown citrus aphid, *Toxoptera citricida* and they revealed that Mycotrol ES provide relatively rapid kill of 94.4 and 79.8 per cent with 5×10^{13} and 2.5×10^{13} conidia per hectare, respectively. Rosalind *et al.* (1995) showed that aphid derived strain of *B. bassiana* (1×10^{15} spores/ml) reduced pea aphid population upto 97.9 per cent under field conditions. Khajuria *et al.* (2007) to evaluate the efficacy of biorational insecticides *viz. B. bassiana*, *M. anisopliae*, cow urine, cow dung and laboratory wash

Table 1: Bioefficacy of fungi against *Lipaphis erysimi* under field conditions.

	Treatments	PTC+	Cumulative corrected mortality (%)						
			1 DAT*	2 DAT	3 DAT	4 DAT	5 DAT	6 DAT	7 DAT
T_1	*V. lecanii* 2.7 x 10^6 spores/ml	74.73 (60.74)	2.64 (10.99)	7.74 (17.18)	26.68 (31.73)	44.07 (42.15)	55.36 (48.64)	63.58 (53.46)	69.86 (57.31)
T_2	*V. lecanii* 2.7 x 10^7 spores/ml	69.50 (57.13)	3.20 (11.81)	7.93 (17.38)	29.73 (33.65)	45.95 (43.24)	56.76 (49.44)	65.75 (54.77)	75.24 (60.80)
T_3	*V. lecanii* 2.7 x 10^5 spores/ml	76.10 (61.41)	2.06 (10.07)	6.62 (16.01)	26.5 (31.61)	40.27 (39.96)	49.84 (45.46)	59.71 (51.17)	68.28 (56.30)
T_4	*B. bassiana* 2.4 x 10^7 spores/ml	70.53 (58.02)	3.14 (11.72)	8.20 (17.65)	28.28 (32.75)	40.62 (40.16)	50.39 (45.78)	63.53 (53.46)	70.59 (57.77)
T_5	*B. bassiana* 2.4 x 10^8 spores/ml	71.87 (59.11)	3.64 (12.43)	8.13 (17.58)	31.99 (35.04)	45.50 (42.97)	55.62 (48.78)	64.33 (53.91)	74.06 (60.10)
T_6	*B. bassiana* 2.4 x 10^6 spores/ml	72.27 (59.33)	2.41 (10.63)	5.47 (14.73)	24.27 (30.16)	34.76 (36.71)	45.82 (43.16)	56.13 (49.08)	65.51 (54.62)
T_7	Oxy-demeton methyl 0.025 %	77.37 (62.45)	53.59 (47.62)	64.58 (54.06)	74.05 (60.02)	80.84 (64.76)	86.01 (68.86)	90.72 (73.27)	94.97 (78.43)
T_8	Nimbecidine (5 ml/L water)	69.07 (57.17)	39.18 (39.32)	45.39 (42.91)	54.21 (47.97)	58.53 (50.47)	60.84 (51.83)	54.26 (48.00)	44.00 (42.11)
T_9	Control	71.20 (58.20)	1.41 (8.93)	0.00 (5.74)	0.00 (5.74)	0.00 (5.74)	0.00 (5.74)	0.00 (5.74)	0.00 (5.74)
	S.Em.±	(3.80)	(0.22)	(0.24)	(0.26)	(0.41)	(0.44)	(0.72)	(0.43)
	CD (P=0.05)	N.S.	(0.66)	(0.73)	(0.77)	(1.22)	(1.32)	(2.16)	(1.29)

+Pre-treatment count(s) *Day(s) after treatment Values in parentheses are arc sine transformations

against green peach aphid, *M. persicae* infesting potato. The myco-insecticide, *B. bassiana* @ 5 g/L with water appeared to be comparatively more effective against the insects in field followed by *M. anisopliae*.

References

Kadam, J.R., P.V. Mahajan and A.P. Chavan (2008). Studies on potential of *Verticillium lecanii* (Zimmermann) Viegas against sucking pests of gerbera. *J. Maharashtra Agric. Univ.*, **33(2)**: 214-217.

Khajuria, S., K. Malik and J.L. Yadav (2007). Potential of biorational insecticides against aphid, *Myzus persicae* (Sulzer) infesting potato crop in plains of western indo gangetic region. *J. Exp. Zool. India*, **10(2)**: 491-492.

Palande, P.R. and D.S. Pokharkar (2005). Evaluation of *Verticillium lecanii* against *Brevicoryne brassicae* on cole crops. *Ann. Plant Protect. Sci*., **13(1)**: 213-269.

Poprawski, T.J., P E. Parker and J.H. Tsai (1999). Laboratory and field evaluation of Hyphomycetes insect pathogenic fungi for control of brown citrus aphid (Homoptera: Aphididae). *Environ. Entomol*., **92**: 315-321.

Rana, J. (2005). Performance of *Lipaphis erysimi* (Homoptera: Aphididae) on different Brassica species in a tropical environment. *J. Pestic. Sci*., **78**:155-160.

Rosalind, R., T. Brenda and B. Crott (1995). Field evaluation of *B. bassiana,* its persistence and effects on the pea aphid. *Biocontrol Sci. Techn*., **5(4)**: 425-438.

Saranya, S. and R. Ushakumari (2011). Evaluation of pure cultures and formulations of entomopathogenic fungi against cowpea aphid, *Aphis craccivora* (Koch.). *Ann. Plant Protect. Sci*., **19**(1): 88-92.

Singh, Y.P., H.P. Meghwal and S. P. Singh (2008). Evaluation of bioagents against mustard aphid, *Lipaphis erysimi* (Kaltenbach) (Homoptera: Aphididae) under net covered conditions in field. *J. Biol. Contr*., **22(2)**: 321-326.

Vimla Devi, P.S. (2005). Role of entomopathogenic fungi in insect pest management. In: Winter School on Biointensive Integrated management of Insect Pests and Diseases of crops. Directorate of Oilseeds Research, Hyderabad. pp. 49-54.