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Virulence of the Different Microbial Pesticides against *Spodoptera litura*

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A B S T R A C T

Efficacy of different microbial pesticides was assessed in laboratory bioassays on third instar larvae of *S. litura*. Results revealed that 12 days after treatment, *B. bassiana* showed the highest virulence of 96.00 per cent against *S. litura* followed by *M. anisopliae* with 80.00 per cent and the lowest virulence was recorded in *L. lecanii* with 60.00 per cent and 20.00 per cent mortality in control.

Introduction

The tobacco caterpillar, *Spodoptera litura* Fabricus, is an important polyphagus pest distributed throughout south and eastern world tropics infesting 112 species of plants belonging to 44 families of which 40 are known from India (Chari and Patel, 1983). It has developed resistance to some of the commonly used insecticides like carbaryl, endosulfan and monocrotophos (Ramakrishnan *et al.*, 1983), because of which management of this polyphagus pest has became a challenge to entomologists both in India and abroad.

Farmers are adopting chemical control measures in most of the crops by using insecticides against the insect pests. However, due to indiscriminate and continuous use of insecticides the pest has developed resistance and the residual effect of chemical insecticides has led to change in crop protection pattern from past few years that has given a way for the use of biocontrol agents such as myco-insecticides (Mohammed Sarfraz *et al.*, 2005).

Many of the researchers who are working on eco-friendly alternatives to chemical pesticides are hopeful that it is now feasible to replace many of the highly toxic synthetic pesticide by microbial pesticides which are safe to natural enemies and environment. As the microbial biocontrol agents have complex mode of action, it's very difficult for a pest to develop resistance against biopesticides. The present group of biopesticides include viruses, bacteria, fungi and nematodes and they are

used throughout the world as an alternative to chemical pesticides. Among them, biocontrol agents are the most important among all the microbial pesticides due to easy delivery, improved formulations, good number of pathogenic strains known and over-expression of endogenous proteins or exo-genous toxins (St. Leger and Wang, 2009).

The deleterious effects of insecticidal usage and promising nature of biopesticides without any adverse effects made it imperative to search for alternative methods for the management of *S. litura*. The generation of information in this regard is need of the hour. This type of situation makes it imperative to workout virulence of commonly recommended and used biopesticides.

Materials and Methods

The present investigations on "Compatibility and Virulence studies of Microbial pesticides commonly used in Telangana" were carried out at AICRP on Biological Control, Agricultural Research Institute, Rajendranagar, and Hyderabad during 2017-18. The materials used and the methods employed in these investigations are furnished here under. Completely Randomized Design (CRD) with 5 replications was followed for analyzing the data in experiment. The data was subjected to angular transformation as per the requirement to improve homogeneity of error variances (Gomez, 1984).

Maintenance of test insect culture Tobacco caterpillar, *S. litura*

Larvae of *S. litura* collected from field were taken as the initial culture. Castor leaves were taken from the field to serve as source for culturing of *S. litura*. Rearing jars of 20×15 cm size were used for maintenance of *S. litura* culture. Jars and leaves were disinfected with 10 per cent formaldehyde, before usage. The larvae were maintained in those jars by daily cleaning and changing. The mature larvae were transferred to oviposition jars for pupation and adult emergence.

The oviposition jars were provided with cotton swabs that are dipped in 10 per cent sugar solution, folded papers for resting and also to facilitate oviposition by the mated female. Egg masses laid on the papers were collected and were placed in rearing jars with fresh castor leaves. The newly hatched larvae were allowed to feed on fresh leaves and then transferred to fresh jars for further rearing and pupation, thereby maintaining cultures for experimental purposes (Rajnikanth, 2007).

Virulence studies

To test the virulence of the entomopathogenic test biopesticides (@5 gL^{-1}) against *S. litura* larvae were evaluated. The test cultures takenup for the study include:

T_1 - *Beauveria bassiana*
T_2 - *Lecanicillium lecanii*
T_3 - *Metarhizium anisopliae*
T_4 - Untreated control

Larval Bioassay

The amount of 5 g of powder formulations of different test cultures were individually weighed and dissolved in 1000 ml of water by thoroughly mixing.

The 3rd instar larvae of *S. litura* were separated from culture stock and kept starving for 4 hours. The leaf discs of cotton were dipped in all the culture concentrations of the test biopesticides, allowed to dry and then kept in a petriplates. Each treatment were replicated five times with 5 larvae as unit size for each replicate. Water sprayed leaves was maintained as control. The experiment was conducted under laboratory conditions with

room temperature of 25±50˚C. The experiment was laid out under CRD for analysis purpose.

Five larvae of *S. litura* were released in petriplates individually in each treatment by a soft camel hair brush and allowed to feed on treated leaves for one day and on fresh untreated leaves from next day onwards. Daily observations were taken for larval mortality and cumulative larval mortality worked out by Abbot's formula (Abbott, 1925).

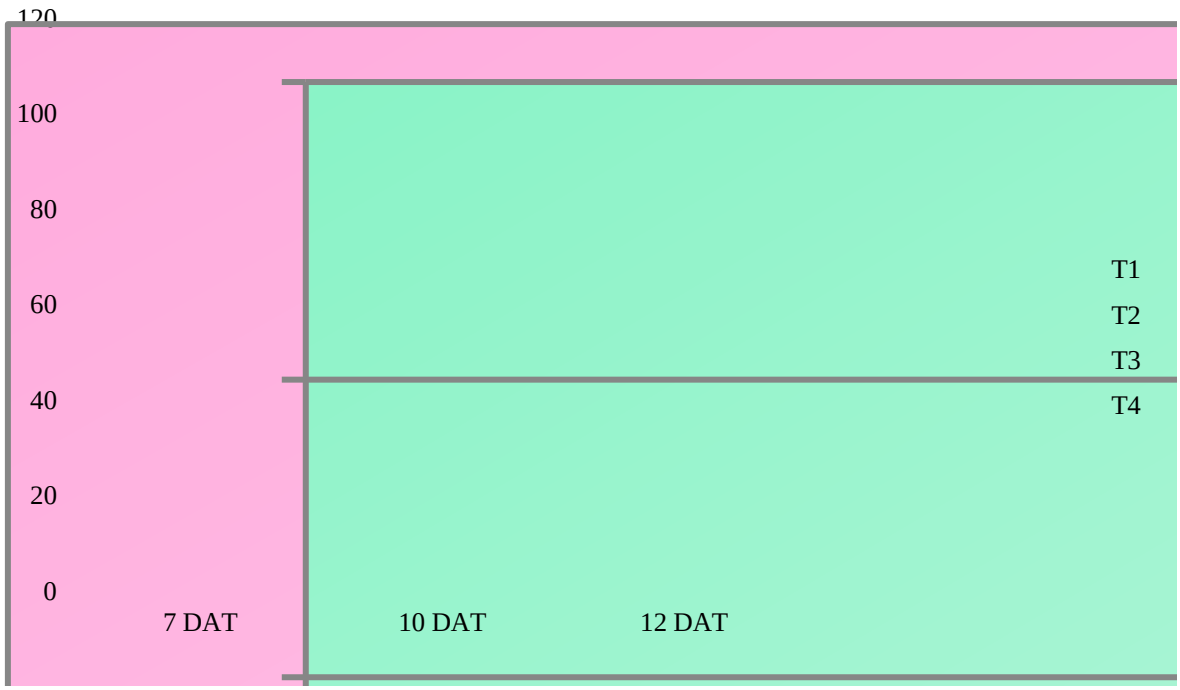
Results and Discussion

Bioassay studies were carried out to determine the pathogenicity of different microbial pesticides against *S. litura*.

Perusal of the virulence data (Table 1, Figure 1) showed that, all treatments were found significantly superior over control in reducing the pest population. Seven days after treatment, *Beauveria bassiana* was found to be more promising with highest per cent virulence of 36.00, compared to untreated (0.00 per cent) which was on par with other treatments like *Metarhizium anisopliae* (24.00 per cent) and *Lecanicillium lecanii* (20.00 per cent).

Similar trend was observed at ten days after treatment recording 76.00, 56.00 and 40.00 per cent mortality by *B. bassiana*, *M. anisopliae* and *L. lecanii*, respectively which were on par with each other and significantly superior over control(4.00 per cent). Among the treatments at twelve days after treatment, *B. bassiana* has recorded maximum per cent mortality of 96.00 per cent followed by *M. anisopliae* (80.00 per cent) that remained on par with each other and significantly superior over *L. lecanii* (60.00 per cent), as against 20.00 per cent mortality in control.

Fig.1 Variations in per cent virulency of different microbial pesticides against *S. litura*



T_1: *Beauveria bassiana*, T_2: *Lecanicillium lecanii*, T_3: *Metarrhizium anisopliae*, T_4: Untreated
DAT- Days after treatment

Table.1 Variations in per cent virulency of different microbial pesticides against *S. litura*

Treatments	Days after treatment					
	7		10		12	
	Per cent mortality	Corrected mortality	Per cent mortality	Corrected mortality	Per cent mortality	Corrected mortality
Beauveria bassiana	36.00[a] (36.68)	33.32[a] (35.00)	76.00[a] (60.87)	74.99[a] (60.20)	96.00[a] (84.68)	95.000[a] (83.99)
Lecanicillium lecanii	20.00[bc] (26.55)	16.60[bc] (24.03)	40.00[c] (39.21)	37.50[c] (37.74)	60.00[c] (50.74)	50.00[c] (44.98)
Metarrhizium anisopliae	24.00[b] (29.08)	20.78[b] (26.77)	56.00[b] (48.44)	54.16[b] (47.36)	80.00[b] (63.40)	75.00[b] (59.97)
Untreated	4.000[d] (5.31)	3.32[d] (4.80)	4.00[d] (5.31)	0.00[d] (0.00)	20.00[d] (26.55)	0.00[d] (0.00)
SE(m)±	3.20	3.08	3.16	1.77	2.65	3.00
CD (0.05%)	9.68	9.33	9.55	5.36	8.04	9.07

Values given in parentheses are angular transformed values
Figures indicated by same letter are not significantly different from one another as per DMRT

The results obtained were in accordance with findings of Sahab *et al.*, (2011) reported that the pink boll worm, *Pectinophora gossypiella* and the cotton leaf worm, *Spodoptera littoralis* were susceptible to the fungi; *Beauveria bassiana*, *Metarrhizium anisopliae*, *Paecilomyces fumosoroseus* and *Verticillium lecanii*.

Similarly, Petlamul *et al.*, (2012) who studied the efficacy of the entomopathogenic fungi *Metarhizium anisopliae* and *Beauveria bassiana* against *S. litura* and found that *B. bassiana* showed the most virulence on mortality of *S. litura* larvae (80% mortality) than *Metarhizium anisopliae.*

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References

Abbott, W.S. 1925. Method of computing effectiveness of an insecticide. *Journal of Economic Entomology*. 18: 265-267.

Chari, M.S and Patel, N.G. 1983. Cotton leaf worm *Spodoptera litura* its biology and integrated control measures. *Cotton Development*. 13: 7–8.

Gomez, K.A. and Gomez, A.A. 1984. Statistical procedure for agricultural research., pub. by John Wiley and sons, New York: 643-644.

Mohammed sarfraz, Andrew, B.K and Lloyd, D.M. 2005. Biological control of the diamond back moth, *P.xylostella*. *Biocontrol Science and Technology*. 15(8): 763- 789.

Petlamul, W and Prasertsan, P. 2012. Evaluation of Strains of *Metarhizium anisopliae* and *Beauveria bassiana* against *Spodoptera litura* on the Basis of Their Virulence, Germination Rate, Conidia Production, Radial Growth and Enzyme Activity. *Mycobiology*. 40(2): 111-116.

Rajanikanth, P. 2007. Evaluation of strains of *Beaveria bassiana* Vuillemin to certain production parameters and virulence against Spodoptera litura Fabricius. *Ph. D Thesis*. Acharya N G Ranga Agricultural University, Hyderabad, India.

Ramakrishnan, N., Saxena, V.S and Dhingra, S. 1983. Insecticide resistance in the population of *Spodoptera litura* in Andhra Pradesh. *Pestic*. 18: 23-27.

Sahab, A.F. and Sabbour, M.M. 2011. Virulence of four entomopathogenic fungi on some cotton pests with special reference to impact of some pesticides, nutritional and environmental factors on fungal growth. *Journal of biological sciences*. 21(1): 61-67.

St Leger, R.J., Wang, C. 2009. Entomopathogenic fungi and the genomic era, In: Stock S.P., Vandenberg J., Glazer I., and Boemare N. (eds.), Insect Pathogens: Molecular Approaches and Techniques. CABI, Wallingford, UK. 366-400.

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