



# EFFICACY OF BIO- PESTICIDES AGAINST WHITEFLY *BEMESIA TABACI* ON OKRA

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## Abstract

The study was carried out during 2013 and summer 2014 at Orissa University of Agriculture and Technology, Bhubaneswar (Orissa), India on efficacy of biopesticides (*Beauveria bassiana*, *Metarhizium anisopliae*, *Verticillium lecanii* @  $1 \times 10^8$ cfu/g, Neemazol 4% and *C. zastrowi sillemi* at two different doses of 75000 1<sup>st</sup> instar larvae/ha and 100,000 1<sup>st</sup> instar larvae/ha an insecticide check acetamiprid 0.025% against whitefly *Bemisia tabaci*. Maximum reduction was recorded in the schedule with insecticide acetamiprid effectiveness of other biopesticides and bioagents against whitefly followed the trend as *V. lecanii*, Neemazol, *M. anisopliae*, *C. zastrowi sillemi* (1lakh/ha), *B. bassiana* and *C. zastrowi sillemi* (75,000/ha), respectively as reduction in whitefly population.

**Key words** : Bio pesticides, evaluation, okra, whitefly.

## Introduction

Okra is ravaged by as many as 45 species of insect-pests throughout its growth period. Adoptions of Biological integrated pest management strategies ensure safety of environment. In this regard encouragement of natural enemies occupies a central position in integrated pest management because safety to cropping ecosystem (Shivalingaswamy *et al.*, 2002; Telang *et al.*, 2004; Sardana *et al.*, 2005). The effectiveness of bio pesticides like *Beauveria bassiana*, *Verticillium lecanii* and *Metarhizium anisopliae* against okra pests has been reported by Naik and Shekharappa (2009) whereas that of the neem pesticides has been elaborated by Dhanalakshmi and Mallapur (2011). Keeping all these in view, a field experiments were taken up at the Orissa University of Agriculture and Technology, Bhubaneswar to evaluate bio pesticides against whitefly on okra.

## Materials and Methods

The field experiments were taken up in the Central Research Station of Orissa University of Agriculture and Technology (OUAT), Bhubaneswar during *Kharif* 2013 and Summer 2013-14. The experiments were laid in Randomized Block Design (RBD) with three replications and eight treatments (table A).

Two sprays were done 15 and 30 days after germination. Pest population were recorded 1 day before application (DBA) and then 3 and 10 day after treatment (DAT). Observations of whitefly adults were taken from 3 leaves *i.e.*, from top, middle and lower portion of the 10 plants selected at random in each replication.

## Results and Discussion

The population was significantly low in treated plots than control during both years.

During 2013, after 3 days of both application the population was lowest in T<sub>7</sub> *i.e.* on application of acetamiprid. The population in treatments of *V. lecanii*, Neemazol and *B. bassiana* were statistically at par with each other. *M. anisopliae*, *C. zastrowi sillemii* @ 75,000/ha and *C. zastrowi sillemii* @ 1 lakh/ha the whitefly population were statistically at par. The control plots recorded the highest population of whitefly. The difference between treatments in respect of whitefly population was significant.

On 2<sup>nd</sup> observation of both the application, the population of whitefly reduced lowest in *B. bassiana* and acetamiprid the highest. *V. lecanii* and Neemazol treated plots were at par with each other, *M. anisopliae*, *C. zastrowi sillemi* treated plots.

Data in table 2 indicated that, during summer 2013-

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**Table A :** Treatment details.

	Treatment	Dose
T <sub>1</sub>	<i>Beauveria bassiana</i>	1x 10 <sup>8</sup> cfu/g
T <sub>2</sub>	<i>Metarrhizium anisopliae</i>	1x 10 <sup>8</sup> cfu/g
T <sub>3</sub>	<i>Verticillium lecanii</i>	1x 10 <sup>8</sup> cfu/g
T <sub>4</sub>	Neemazal 4%	
T <sub>5</sub>	<i>Chrysoperla zastrowi sillemi</i>	75000 1 <sup>st</sup> instar larvae/ha
T <sub>6</sub>	<i>Chrysoperla zastrowi sillemi</i>	100,000 1 <sup>st</sup> instar larvae/ha
T <sub>7</sub>	Acetamiprid	0.025%
T <sub>8</sub>	Control	Untreated

*sillemi* @ 75,000/ha treated plots showed whitefly population whitefly/plant and were at par in their effectiveness for control of the pest. The control plots recorded the highest population of whitefly.

After 25 DAG again observation was taken which showed that acetamiprid was most effective followed by *V. lecanii*, Neemazol and *B. bassiana*. All three were similar in their effectiveness *C.zastrowi sillemi* 75,000/ha and 1 lakh/ha treatments were also effective. The reduction was highest in T<sub>7</sub> (94.31%) and least in T<sub>6</sub> at

**Table 1 :** Effect of different biopesticides on whitefly population (2013).

Treatment	1 <sup>st</sup> Application			Reduction over control (%)	2 <sup>nd</sup> Application			Reduction over control (%)
	DBA	18DAG	25DAG		DBA	33DAG	40DAG	
T <sub>1</sub>	1.53(1.23)	1.08(1.03)	0.93(0.96)	47.15	3.28(1.81)	2.56(1.60)	2.39(1.54)	65.36
T <sub>2</sub>	1.48(1.21)	1.20(1.09)	1.16(1.07)	34.10	3.74(1.93)	3.06(1.74)	2.00(1.41)	71.02
T <sub>3</sub>	1.47(1.21)	1.01(1.00)	0.86(0.92)	51.14	2.12(1.45)	1.96(1.40)	1.52(1.23)	77.97
T <sub>4</sub>	1.50(1.22)	1.03(1.01)	0.91(0.93)	48.30	2.31(1.51)	1.89(1.37)	1.73(1.31)	74.93
T <sub>5</sub>	1.49(1.22)	1.42(1.19)	1.23(1.10)	30.12	3.86(1.96)	2.49(1.57)	2.12(1.45)	69.28
T <sub>6</sub>	1.47(1.21)	1.38(1.17)	1.18(1.08)	32.96	3.52(1.87)	2.17(1.47)	2.07(1.43)	70.00
T <sub>7</sub>	1.51(1.22)	0.32(0.56)	1.10(0.31)	94.31	0.92(0.95)	0.27(0.51)	0.10(0.31)	98.55
T <sub>8</sub>	1.50(1.22)	2.70(1.64)	3.10(1.76)	-	4.28(2.08)	5.32(2.30)	6.90(2.62)	-
SE(m)±	NS	0.32	0.36		0.39	0.39	0.60	
CD(0.05)	NS	0.95	1.07		0.98	1.16	1.80	

Figures in parentheses are  $\sqrt{x}$  values.

**Table 2 :** Effect of different BIPM schedules on the whitefly population during summer 2013-14 at Bhubaneswar.

Treatment	1 <sup>st</sup> Application			Reduction over control (%)	2 <sup>nd</sup> Application			Reduction over control (%)
	DBA	18DAG	25DAG		DBA	33DAG	40DAG	
T <sub>1</sub>	3.33(1.82)	2.98(1.72)	2.75(1.65)	53.55	3.92(1.97)	3.33(1.82)	2.78(1.66)	77.59
T <sub>2</sub>	3.29(1.81)	2.62(1.61)	2.15(1.46)	63.68	3.06(1.74)	2.97(1.72)	2.12(1.45)	82.91
T <sub>3</sub>	3.19(1.78)	2.01(1.41)	2.63(1.27)	72.46	2.61(1.61)	2.08(1.44)	1.96(1.40)	84.20
T <sub>4</sub>	3.28(1.81)	2.27(1.50)	1.98(1.40)	66.55	2.78(1.66)	2.53(1.59)	2.30(1.51)	81.96
T <sub>5</sub>	3.31(1.81)	2.98(1.72)	2.68(1.63)	54.73	3.39(1.84)	3.10(1.76)	2.97(1.72)	76.06
T <sub>6</sub>	3.30(1.81)	2.26(1.50)	2.15(1.46)	63.68	3.16(1.77)	2.90(1.70)	2.70(1.64)	78.23
T <sub>7</sub>	3.13(1.96)	1.08(1.03)	0.29(0.53)	75.10	1.18(1.08)	0.73(0.85)	0.21(0.45)	98.30
T <sub>8</sub>	3.22(1.71)	3.78(1.44)	5.92(2.43)	-	6.73(2.59)	9.39(3.06)	12.40(3.52)	-
CD(0.05)	NS	0.62	1.12		1.01	1.78	2.11	

Figures in parentheses are  $\sqrt{x}$  values.

14, the population of whitefly difference between treatments in respect of whitefly population was nonsignificant. The whitefly population was lowest in T<sub>7</sub> (i.e. acetamiprid application) whitefly/plant. The whitefly population in treatments of *V. lecanii*, Neemazol and *C. zastrowi sillemi* @ 1 lakh/ha were which were equally effective. *B. bassiana*, *M. anisopliae* and *C. zastrowi*

32.96%. *B. bassiana*, *M. anisopliae*, *C. zastrowi sillemi* @ 75,000/ha and *C. zastrowi sillemi* @ 1 lakh/ha showed percentage population reduction as 53.55%, 63.68, 54.73, 63.68% reduction, which were statistically at par.

After 30 DAG similar trend was observed whitefly population DBA whitefly population ranged from 1.18 in T<sub>7</sub> to 6.73 in T<sub>8</sub>, when the observations taken the

**Table 3** : Effect of different BIPM schedules on the whitefly population at Bhubaneswar (pooled over *Kharif* 2013 and summer 2013-14).

Treatment	DBA	18 DAG 33 DAG	25 DAG 40 DAG	Reduction in (%)
T <sub>1</sub>	3.01 (1.76)	2.43 (1.55)	2.21 (1.48)	68.70
T <sub>2</sub>	2.89 (1.70)	2.46 (1.56)	1.85 (1.36)	73.80
T <sub>3</sub>	2.34 (1.52)	1.76 (1.32)	1.49 (1.22)	78.90
T <sub>4</sub>	2.46 (1.56)	1.93 (1.38)	1.73 (1.31)	75.50
T <sub>5</sub>	3.01 (1.23)	2.44 (1.57)	2.24 (1.49)	68.28
T <sub>6</sub>	2.86 (1.69)	2.17 (1.47)	2.01 (1.91)	71.53
T <sub>7</sub>	1.68 (1.29)	0.59 (0.76)	0.17 (0.41)	97.59
T <sub>8</sub>	3.93 (1.98)	5.29 (2.30)	7.06 (2.65)	-
SE(m)±	NS	0.07	0.07	
CD(0.05)	NS	0.21	0.22	

difference between treatments in respect of whitefly plant was significant. After 33 DAG 2<sup>nd</sup> application was done in the same dose. After 3 days as applying treatment *i.e.* at the 33 DAA the population of whitefly ranged between 9.39 in T<sub>8</sub> to 0.73 in T<sub>7</sub>. The white fly plant was lowest in T<sub>7</sub> (0.73 whitefly/plant) *i.e.* application of acetamiprid. *V. lecanii* and Neemazol recorded 2.08 and 2.53 whitefly/plant, which were statistically at par with each other. *B. bassiana*, *M. anisopliae*, *C. zastrowi sillemi* treatments recorded 3.33, 2.97 and 2.90 whitefly/plant, respectively and were effective in that order.

After 7 days observation was taken again at 40 DAG. The reduction of population varied from 98.30% to 76.06% having acetamiprid being the most effective and *C. zastrowi sillemi* @ 75,000/ha least effective. *B. bassiana* and *C. zastrowi sillemi* @ 1 lakh/ha showed 77.59% and 78.23% whitefly reduction, which were equal in their efficiency. *M. anisopliae*, *V. lecanii*, Neemazol recorded 82.91%, 84.20% and 81.46% whitefly population reduction and were not different significantly as regard to their efficiently.

Over the two seasons (table 3) the mean whitefly population before application of treatments was not significant. Acetamiprid application reduced the population of whitefly in three days time in 7 days the population

reduction was significant. It was followed by *V. lecanii* Neemazol was also found to be effective against the whiteflies and population reduction *M. anisopliae* was the next best biopesticide recording and 73.80% mean reduction.

*B. bassiana* recorded 2.43 and 2.21 whiteflies/plant at 3 and 7 day after application respectively and reduced the population by 68.70%.

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