

# Efficacy of Different Newer Chemicals and Bio-insecticides Against Onion Thrips in *kharif* Season

S.D. PATIL, A.G. CHANDELE, C.B. WAYAL AND B.C. GAME

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## SUMMARY

The present investigation was undertaken to find out the effective and economical control measure for the management of onion thrips, for which ten new insecticides and bio-insecticides were tested *viz.*, *Beauveria bassiana* 4g/lit, Neem seed Kernel Extract 5%, *Verticillium lecanii*  $2 \times 10^8$  cfu 5g/l, methyl demeton 25 EC @ 0.025%, carbosulfan 25 EC @ 0.025%, spinosad 45 SC @ 0.0135%, Deltamethrin 1EC + Triazophos 35EC @ 0.072%, indoxacarb 14.5 SC @ 0.0145%, flufenoxuran 10 DC @ 0.005% and novaluran 10 EC @ 0.01%. The pooled data for consecutive three years (2005-06 to 2007-08) pertaining to efficacy of various insecticides, biological and plant products revealed that all the treatments were significantly effective against control of onion thrips. The treatment with Deltamethrin 1 EC + Triazophos 35 EC @ 0.072% proved to be significantly most effective against onion thrips which recorded minimum number of thrips/plant at 4<sup>th</sup>, 7<sup>th</sup> and 14<sup>th</sup> days after spray. This treatment was statistically at par with the treatments of spinosad 45 SC @ 0.0135% and carbosulfan 25 EC 0.025%, at 4<sup>th</sup>, 7<sup>th</sup> and 14<sup>th</sup> days after spray. The treatment with Deltamethrin 1 EC + Triazophos 35 EC @ 0.072% recorded significantly higher yield of 24.32 t/ha over rest of the treatments and 11.08 t/ha in untreated control. This treatment was at par with the treatments of spinosad 45 SC @ 0.0135% and carbosulfan 25 EC 0.025%. The highest gross monetary returns (Rs.1,35,853/ha), net income (Rs.68,549/ha) and C:B ratio (1 : 2.02) were observed in the treatment with Deltamethrin 1 EC + Triazophos 35 EC @ 0.072%.

See end of the article for authors' affiliations

Correspondence to :

S.D. PATIL

Department of

Entomology,

Agricultural Research

Station, Niphad,

NASIK (M.S.) INDIA

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Among all the vegetables, onion, (*Allium* *Acepa* L.) the biannual bulbous herb, is the most important vegetable crop of India. The important onion growing states are Maharashtra, Karnataka, Gujarat, Uttar Pradesh, Orissa, Tamilnadu, Madhya Pradesh and Bihar. Onion is queen of kitchen (Selvaraj 1976) and is widely used in salad, pickles, chutneys, sauce and for preparation of other products like onion powders and salts. In case of nutritive value, onion has got considerable amount of carbohydrates and it also supplies proteins, vitamin B and vitamin C (Selvaraj, 1976).

Onion crop is attacked by several insects such as onion thrips, *Thrips tabaci* Lindemann; onion fly, *Delia* (*Hylema*) *antique* Meign; cutworm, *Agrotis epsilon* Hufnegel, tobacco leaf eating caterpillar, *Spodoptera litura* Fabricius and gram pod borer, *Helicoverpa* *arnigera* (Hubner). Among the insect pests, onion thrips (*Thrips tabaci*) is a major pest and reported to be most serious on onion by Rahman and Batra (1945) and Vevai and Talgeri (1948).

*Thrips tabaci* causes 40 to 60 per cent foliage injury and 10 to 20 per cent yield losses annually (Hajdu and Nagymre, 1984). Hence, it was thought worthwhile to study some important aspects of thrips management with view to find out effective control measures for reducing the economic losses caused by the thrips in *kharif* season.

## MATERIALS AND METHODS

An experiment was conducted on onion cultivar Baswant-780 during *kharif* 2005-06, 2006-07 and 2007-08 at Onion-Grape Research Station, Pimpalgaon Baswant, Dist: Nasik (Mahatma Phule Krishi Vidyapeeth, Rahuri). Randomized Block Design with three replications and eleven treatments were adopted. The net plot size was 2.40 x 2.10m with 15 x 10cm plant spacing.

Three applications of insecticidal sprays were given at an interval of fifteen days starting from 30 days after transplanting as incidence of thrips was observed with the help of Knapsack sprayer. The observations were recorded on randomly selected five plants. The

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observations were recorded on the basis of number of thrips present per plant. The pre-count of thrips was recorded 24 hours before the treatment application. Post treatment count was recorded on the basis of survival population of thrips on 4<sup>th</sup>, 7<sup>th</sup> and 14<sup>th</sup> days after treatment application. Average thrips population was calculated. Finally yield of each plot was recorded at harvest and estimated per ha. values were calculated. The data was subjected to statistical analysis.

## RESULTS AND DISCUSSION

The pooled data for consecutive three years (2005-06 to 2007-08) pertaining to effect of various insecticides, biological and plant products on thrips control in onion is depicted in Table 1 to 3. The data indicated significant differences among the treatments. The pooled data indicated that the treatment deltamethrin 1 EC + triazophos 35 EC @ 0.072% proved to be significantly effective against control of thrips, which recorded minimum number of 2.73, 1.59 and 2.07 thrips/plant at 4<sup>th</sup>, 7<sup>th</sup> and 14<sup>th</sup> days after spray (Table 1 and 2). This treatment was statistically at par with the treatments of spinosad 45 SC @ 0.0135%

and carbosulfan 25EC @ 0.025% at 4<sup>th</sup>, 7<sup>th</sup> and 14<sup>th</sup> days after spray, respectively. This was followed by the treatments of flufenoxuron 10 DC @ 0.005%, novaluron 10 EC @ 0.01%, methyl demeton 25 EC @ 0.025%, indoxacarb 14.5 SC @ 0.0145%, neem seed kernel extract 5%, *Verticillium lecanii* @ 5 g/lit and *Beaveria basiana* @ 4g/lit. The untreated control recorded significantly maximum number of 17.68, 28.38 and 35.17 thrips/plant at 4<sup>th</sup>, 7<sup>th</sup> and 14<sup>th</sup> days after spray, respectively. The population of thrips found to be increased after 7<sup>th</sup> days in almost all the treatments. The same trend was also observed during each year under study.

The yield differences (Table 3) due to different insecticidal treatments were observed to be significant during each year under study and the pooled analysis. The treatment deltamethrin 1 EC + triazophos 35 EC @ 0.072% recorded significantly higher yield of 24.32 t/ha over rest of the treatments. This treatment was statistically at par with the treatments of spinosad 45 SC @ 0.0135% and carbosulfan 25EC @ 0.025%. This was followed by the treatments of flufenoxuron 10 DC @ 0.005%, novaluron 10 EC @ 0.01%, methyl demeton 25 EC @

**Table 1: Efficacy of different newer chemicals and bio-insecticides against onion thrips 4 days after spraying**

Sr. No.	Treatments	Dose	Pre-count			Post count 4 days after spraying				
			05-06	06-07	07-08	Pooled	05-06	06-07	07-08	Pooled
1.	<i>Beaveria bassiana</i>	4g/lit.	15.13 (4.01)	20.13 (4.59)	19.33 (4.51)	18.19 (4.37)	8.53 (3.08)	16.53 (4.19)	13.07 (3.75)	12.71 (3.67)
2.	Neem Seed kernel extract	5%	17.93 (4.35)	20.47 (4.63)	18.63 (4.43)	19.01 (4.47)	9.40 (3.22)	12.82 (3.72)	10.85 (3.44)	11.02 (3.46)
3.	<i>Verticillium lecanii</i>	5 g/lit.	17.27 (4.27)	22.47 (4.84)	19.67 (4.55)	19.80 (4.55)	8.20 (3.01)	11.30 (3.74)	11.32 (3.51)	10.84 (3.42)
4.	Methyl demeton 25EC @ 0.025%	1ml/lit	15.47 (4.06)	22.67 (4.86)	17.80 (4.33)	18.65 (4.42)	6.60 (2.75)	12.44 (3.66)	10.72 (3.42)	9.92 (3.28)
5.	Carbosulfan 25EC @ 0.025%	1ml/lit	17.20 (4.26)	22.60 (4.65)	18.27 (4.39)	18.69 (4.43)	3.93 (2.22)	4.69 (2.38)	4.87 (2.41)	4.50 (2.34)
6.	Spinosad 45SC @ 0.0135%	0.3ml/lit	16.87 (4.23)	21.07 (4.70)	19.40 (4.52)	19.11 (4.48)	4.47 (2.33)	4.53 (2.37)	3.39 (2.09)	4.13 (2.26)
7.	Deltamethrin 1EC + Triazophos 35EC @ 0.072%	2ml/lit	15.20 (4.02)	21.87 (4.78)	18.58 (4.42)	18.55 (4.41)	3.47 (2.11)	2.38 (1.84)	2.33 (1.81)	2.73 (1.92)
8.	Indoxacarb 14.5 SC 0.0145%	1ml/lit	16.33 (4.17)	21.93 (4.79)	18.47 (4.41)	18.91 (4.46)	7.40 (2.89)	13.98 (3.88)	11.19 (3.49)	10.86 (3.42)
9.	Flufenoxuron 10 DC @ 0.005%	0.5ml/lit	15.27 (4.03)	20.60 (4.65)	21.47 (4.74)	18.58 (4.47)	4.67 (2.38)	4.93 (2.43)	6.94 (2.81)	5.51 (2.54)
10.	Novaluron 10EC @ 0.01%	1ml/lit	16.60 (4.19)	22.13 (4.81)	20.13 (4.60)	19.62 (4.53)	6.87 (2.80)	11.75 (3.57)	8.51 (3.08)	9.04 (3.15)
11.	Untreated Control.	----	15.87 (4.10)	22.27 (4.82)	20.33 (4.62)	19.49 (4.51)	16.87 (4.23)	36.18 (6.10)	27.64 (5.35)	17.68 (5.23)
	S.E. ±		--	--	--	--	0.13	0.06	0.16	0.20
	C.D. (P=0.05)		--	--	--	--	0.37	0.17	0.48	0.60

\* Figures in parentheses are  $\sqrt{n+1}$  values

**Table 2: Efficacy of different newer chemicals and bio-insecticides against onion thrips 7 and 14 days after spraying**

Sr. No.	Treatments	Dose	Post count 7 days after spraying				Post count 14 days after spraying			
			05-06	06-07	07-08	Pooled	05-06	06-07	07-08	Pooled
1.	<i>Beaveria bassiana</i>	4g/lit.	5.47 (2.54)	13.91 (3.86)	9.77 (3.28)	9.72 (3.23)	8.73 (3.12)	19.04 (4.48)	14.85 (3.98)	14.21 (3.86)
2.	Neem Seed kernel extract	5%	7.67 (2.94)	10.02 (3.32)	8.20 (3.03)	8.63 (3.10)	8.07 (3.01)	15.46 (4.06)	13.17 (3.77)	12.23 (3.61)
3.	<i>Verticillium lecanii</i>	5 g/lit.	6.87 (2.80)	10.58 (3.41)	8.51 (3.08)	8.65 (3.10)	9.40 (3.22)	17.07 (4.25)	13.66 (3.83)	13.37 (3.77)
4.	Methyl demeton 25 EC @ 0.025%	1ml/lit.	4.53 (2.35)	10.40 (3.38)	6.99 (2.82)	7.31 (2.85)	5.07 (2.46)	17.64 (4.31)	9.08 (3.17)	10.60 (3.31)
5.	Carbosulfan 25EC @ 0.025%	1ml/lit.	4.27 (2.29)	2.62 (1.90)	2.25 (1.80)	3.05 (1.99)	3.27 (2.06)	5.73 (2.59)	5.59 (2.56)	4.86 (2.41)
6.	Spinosad 45 SC @ 0.0135%	0.3ml/lit	3.67 (2.16)	1.16 (1.47)	1.47 (1.56)	2.10 (1.73)	4.20 (2.27)	3.93 (2.22)	3.78 (2.18)	3.97 (2.22)
7.	Deltamethrin 1EC + Triazophos 35EC @ 0.072%	2ml/lit.	3.00 (2.00)	0.89 (1.37)	0.83 (1.35)	1.59 (1.57)	2.00 (1.73)	2.16 (1.78)	2.04 (1.73)	2.07 (1.75)
8.	Indoxacarb 14.5 SC @ 0.0145%	1ml/lit.	3.87 (2.62)	11.13 (3.48)	7.22 (2.86)	7.41 (2.99)	6.00 (2.65)	17.24 (4.27)	11.38 (3.52)	11.54 (3.48)
9.	Flufenoxuron 10 DC @ 0.005%	0.5ml/lit	3.73 (2.17)	3.07 (2.01)	4.39 (2.32)	3.73 (2.17)	3.33 (2.08)	4.65 (2.37)	6.68 (2.77)	4.89 (2.41)
10.	Novaluron 10EC @ 0.01%	1ml/lit.	5.40 (2.53)	10.35 (3.37)	5.27 (2.50)	7.01 (2.80)	5.47 (2.54)	15.29 (4.03)	7.42 (2.90)	9.39 (3.16)
11.	Untreated Control.	----	18.27 (4.39)	38.44 (6.28)	30.42 (5.60)	28.38 (5.42)	21.40 (4.73)	51.60 (7.25)	32.33 (5.77)	35.17 (5.92)
	S.E.±		0.04	0.04	0.17	0.19	0.06	0.05	0.16	0.26
	C.D. (P=0.05)		0.13	0.13	0.51	0.57	0.17	0.16	0.48	0.78

\* Figures in parentheses are  $\sqrt{n+1}$  values

**Table 3 : Efficacy of different newer chemicals and bio-insecticides on yield**

Sr. No.	Treatments	Dose	Yield t/ha			
			05-06	06-07	07-08	Pooled
1.	<i>Beaveria bassiana</i> 4 g/lit.	4g/lit.	15.88	14.96	16.71	15.85
2.	Neem Seed kernel extract 5 %	5%	17.21	15.87	18.41	17.16
3.	<i>Verticillium lecanii</i> 5g/lit	5 g/lit.	16.70	15.43	17.90	16.68
4.	Methyl demeton 25EC @ 0.025%	1ml/lit	20.47	18.15	21.33	19.98
5.	Carbosulfan 25EC @ 0.025%	1ml/lit	23.66	21.52	24.12	23.10
6.	Spinosad 45SC @ 0.0135%	0.3ml/lit	24.30	22.38	24.76	23.81
7.	Deltamethrin 1EC+Triazophos 35EC @ 0.072%	2ml/lit	24.81	22.96	25.20	24.32
8.	Indoxacarb 14.5 SC @ 0.0145%	1ml/lit	19.53	17.69	20.47	19.23
9.	Flufenoxuron 10 DC @ 0.005%	0.5ml/lit	22.38	20.51	23.30	21.62
10.	Novaluron 10 EC @ 0.01%	1ml/lit	21.14	19.37	21.98	20.83
11.	Untreated Control.	---	11.02	10.27	11.95	11.08
	S.E.±		0.50	0.46	0.54	1.40
	C.D. (P=0.05)		1.48	1.34	1.62	3.96

0.025%, indoxacarb 14.5 SC @ 0.0145%, neem seed kernel extract 5%, *Verticillium lecanii* @ 5 g/lit and *Beaveria basiana* @ 4g/lit. The untreated control recorded significantly lowest yield of 11.08 t/ha.

The data regarding monetary returns (Table 4) revealed that the highest gross monetary returns (Rs.

1,35853/ ha), net income (Rs.68549 /ha) and C: B ratio (1:2.02) were observed in the treatment of deltamethrin 1EC + triazophos 35 EC @ 0.072%.

In present investigation, the treatment with deltamethrin 1 EC + triazophos 35 EC @ 0.072 % was found to be most effective in reducing thrips population is

**Table 4 : Effect of various treatments on monetary returns and C: B ratio**

Tr. No.	Treatments	Monetary returns (Rs./ha.)	Additional income over control		Cost of cultivation with plant protection (Rs./ha)	Net income (Rs./ha)	C:B ratio
			(Rs.)	%			
1.	<i>Beaveria bassiana</i> 4 g/lit.	88469	26758	43.36	58365	30105	1:1.51
2.	Neem Seed kernel extract 5 %	95595	33884	54.91	58715	36880	1:1.63
3.	<i>Verticillium lecanii</i> 5g/lit	92886	31175	50.52	60425	32461	1:1.54
4.	Methyl demeton 25EC @ 0.025%	111181	49470	80.16	62001	49179	1:1.79
5.	Carbosulfan 25EC @ 0.025%	128860	67149	108.81	66626	62233	1:1.93
6.	Spinosad 45SC @ 0.0135%	132944	71233	115.43	70787	62454	1:1.88
7.	Deltamethrin 1EC+Triazophos 35EC @ 0.072%	135853	74142	120.14	67304	68549	1:2.02
8.	Indoxacarb 14.5 SC @ 0.0145%	107097	45386	73.55	67157	39940	1:1.59
9.	Flufenoxuron 10 DC @ 0.005%	123006	61295	99.33	65625	57369	1:1.87
10.	Novaluron 10 EC @ 0.01%	116136	54425	88.19	68433	47683	1:1.70
11.	Untreated Control.	61711	0	0	49087	12622	1:1.26

Note: The price for onion Rs. 5.62/kg is the average of onion prices in the month of December from Pimpalgaon Baswant, Niphad and Nasik market vide NHRDF.com  
Average price for onion Rs. 5.62 /kg (Average of 2005-06 Rs. 5.38/kg , 2006-07 Rs. 6.68, 2007-08 Rs. 4.79)

in conformity with Chandrakar and Srivastava (2001) against *Caliothrips indicus*. The effectiveness of deltamethrin at 7.5 g.a.i/ha was also reported in onion againsts thrips (Gupta and Sharma, 1988). Khan *et al.* (1995) reported efficacy of triazophos 35 EC (80ml /100 lit water) against onion thrips. The results in respect of Spinosad 45 SC and carbosulfan against onion thrips are in agreement with these of Holloway and Forrester (1988) in cotton and Shitole *et al.* (2002).

#### Authors' affiliations:

**A.G. CHANDELE**, Department of Entomology, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

**C.B. WAYAL**, Department of Entomology, Onion-Grape Research Station, Pimpalgaon, Baswant, NASIK (M.S.) INDIA

**B.C. GAME**, Department of Plant Pathology, Agricultural Research Station, Pimpalgaon, Baswant, NASIK (M.S.) INDIA

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