Indian Journal of Applied Entomology **24**(2) : 98-100 (2010)

FIELD EFFICACY OF BIO-PESTICIDES AGAINST *THRIPS TABACI* (LINDEMAN) IN ONION

U.S. JOSHI, M.N. KAPADIA AND G.M. PARMAR

Department of Entomology, College of Agriculture
Junagadh Agricultural University
Junagadh - 362001

ABSTRACT

Studies on the effect of three fungal and one bacterial bio-pesticide against onion thrips, *T. tabaci* were conducted at Agronomy Farm, Junagadh Agricultural University, Junagadh during 2006-07. Spinosad (0.009%), endosulfan (0.07%) and spinosad (0.0045%) + endosulfan (0.035%) were the most effective in reducing the population of thrips. Combinations of *B. bassiana* @ 1.0 kg/ha + endosulfan (0.035%) and *V. lecanii* @ 1.0 kg/ha + endosulfan (0.035%) were next in order of efficacy, whereas, *V. lecanii* @ 2.0 kg/ha, *B. bassiana* @ 2.0 kg/ha and *P. fumusoroseus* @ 2.0 kg/ha alone were least effective in reducing the population of thrips.

Key words: Onion Thrips, *Verticillium lecanii, Beauveria bassiana, Paecilomyces fumosoroseus,* biopesticides

INTRODUCTION

Onion is an important vegetable crop cultivated in the world in about 20 lakh hectares. Among the various factors causing reduction in crop yield, insect pests are considered as the major constraint. The crop is infested by the thrips, *Thrips tabaci* (Lindeman) causing considerable damage to the crop. Chemical insecticides have been recommended to manage thrips in onion; however, restricted use of insecticides in crop ecosystem is required for export quality onions. For sucking insects, entomopathogenic fungi are appropriate microbial agents, which infect the insect cuticle directly through contact. Fungal pathogens, *Verticillium lecanii, Beauveria bassiana* and *Paecilomyces fumosoroseus* have been reported pathogenic to *T. tabaci* (Vestgaard *et al.*, 1997). Hence, the investigation was carried out to determine the bioefficacy of bio-pesticides against *T. tabaci* as an alternate strategy for its management.

MATERIALS AND METHODS

To find out a suitable and effective management for *T. tabaci* an experiment was conducted during *rabi* 2006-07 at Agronomy Farm, Junagadh Agricultural University, Junagadh. The experiment was laid out in Randomized Block Design with three replications and ten treatments. The crop was transplanted in plots of 4.0 × 2.10 m with a spacing of 15 × 10 cm. All recommended agronomical practices were followed. Four bio-pesticides *viz.*, *V. lecanii* @ 2.0 kg/ha, *B. bassiana* @ 2.0 kg/ha, *P. fumosoroseus* @ 2.0 kg/ha and spinosad 0.009% and, combinations of these bio-pesticides at half recommended doses with endosulfan 0.035% were evaluated and compared with recommended endosulfan @ 0.07% against *T. tabaci*. The spray was applied when the pest population crossed the economic threshold level (15 thrips/leaf), whereas the subsequent spray was given after one month of 1st spray. Spray of bio-pesticides was done with the help of knapsack sprayer using 500 litres of water per hectare. Observations on population were recorded from five randomly selected tagged plants in each plot one day before spray and after 3, 5, 7 and 10 days of spraying. Three inner leaves of each of the selected plants were observed to count the number of thrips. The data were corrected using abbot's formula (Abbot, 1925). The data expressed as percentage were transformed into arc sine values and analyzed statistically. The yield of onion bulbs from each plot was recorded separately and data were subjected to statistical analysis.

RESULTS AND DISCUSSION

The per cent mortality of thrips after first spray (Table 1) recorded at 3rd day after spraying revealed that spinosad 0.0045 per cent + endosulfan 0.035 per cent proved significantly superior and most effective treatment (81.94% mortality). However, it was statistically at par with spinosad 0.009 per cent and endosulfan 0.07 per cent which also registered 77.08 and 75.59 per cent mortality, respectively. The treatments of *B. bassiana* @ 1.0 kg/ha +

Table 1: Mortality of *T. tabaci* in different treatments during *rabi* 2006-07

S. No.	Treatment	Percent corrected mortality										Onion bulb yield (kg/ha)
		First Spray					Second Spray					
		3 DAS	5 DAS	7 DAS	10 DAS	Mean	3 DAS	5 DAS	7 DAS	10 DAS	Mean	
1.	*Beauveria bassiana* @ 2.0 kg/ha	40.61 (42.37)	42.17 (45.08)	43.12 (46.72)	44.74 (49.55)	42.66 (46.03)	43.32 (47.06)	44.99 (49.97)	45.72 (51.26)	47.21 (53.85)	45.31 (50.54)	34286
2.	*Verticillium lecanii* @ 2.0 kg/ha	42.97 (46.71)	44.70 (49.48)	47.77 (54.82)	50.72 (59.92)	46.54 (52.67)	43.94 (48.15)	45.78 (51.35)	47.92 (55.08)	50.29 (59.18)	46.98 (53.44)	33571
3.	*Paecilomyces fumosoroseus* @ 2.0 kg/ha	37.91 (37.75)	39.81 (41.00)	41.56 (44.01)	43.61 (47.57)	40.72 (42.58)	38.88 (39.39)	40.47 (42.13)	43.65 (47.65)	45.27 (50.47)	42.07 (44.91)	32857
4.	Spinosad 0.009%	61.40 (77.08)	62.48 (78.64)	63.50 (80.09)	63.84 (80.56)	62.81 (79.09)	62.60 (78.82)	62.88 (79.22)	63.28 (79.79)	64.62 (81.63)	63.35 (79.87)	42857
5.	Endosulfan 0.07%	0.40 (75.59)	60.45 (75.68)	61.56 (77.72)	61.81 (77.69)	61.06 (76.57)	60.33 (75.50)	61.67 (77.48)	62.38 (78.51)	63.42 (79.99)	61.95 (77.87)	37141
6.	*Beauveria bassiana* @ 1.0 kg/ha + Endosulfan 0.035%	49.40 (57.65)	50.14 (58.93)	51.98 (62.06)	53.70 (64.96)	51.31 (60.90)	49.02 (56.99)	50.42 (59.41)	52.75 (63.36)	54.58 (66.41)	51.69 (61.54)	35000
7.	*Verticillium lecanii* @ 1.0 kg/ha + Endosulfan 0.035%	48.15 (55.48)	50.14 (58.92)	50.73 (59.92)	51.44 (61.15)	50.11 (58.87)	46.42 (52.47)	48.04 (55.30)	51.79 (61.74)	52.92 (63.64)	49.79 (58.29)	33714
8.	*Paecilomyces fumosoroseus* @ 1.0 kg/ha + Endosulfan 0.035%	45.85 (51.48)	46.42 (52.48)	47.66 (54.64)	48.44 (55.98)	47.09 (53.65)	45.13 (50.23)	47.44 (54.25)	48.37 (55.86)	49.33 (57.33)	47.57 (54.47)	32143
9.	Spinosad 0.0045% + Endosulfan 0.035%	64.85 (81.94)	65.18 (82.38)	65.50 (82.80)	65.39 (82.65)	65.23 (82.44)	63.70 (80.36)	64.83 (81.92)	66.72 (84.38)	66.88 (84.58)	65.53 (82.81)	41429
10.	Control (Water spray)	6.20 (1.17)	6.99 (1.48)	6.96 (1.47)	7.8 (1.84)	6.99 (1.49)	7.02 (1.49)	6.85 (1.42)	7.23 (1.58)	7.62 (1.76)	7.18 (1.56)	29286
	S. Em ±	2.13	2.21	2.39	2.43	–	1.99	2.21	2.39	2.31	–	1136
	C.D. at 5%	6.32	6.56	7.11	7.22	–	5.92	6.58	7.11	6.85	–	3298
	C.V. %	8.04	8.16	8.62	8.56	–	7.50	8.10	8.46	7.95	–	8.60

Figure in the parentheses are retransformed values, DAS = Days after spraying endosulfan 0.035 per cent, *V. lecanii* @ 1.0 kg/ha + endosulfan 0.035 per cent and *P. fumosoroseus* @ 1.0 kg/ha + endosulfan 0.035 per cent were the next effective treatments, showing 57.65, 55.48 and 51.48 per cent mortality, respectively. The entomopathogenic fungi, *(V. lecanii)* registered the highest mortality 46.47 per cent, followed by *B. bassiana* (42.37%) *P. fumosoroseus* (37.75%). A similar trend of mortality was also recorded at 5th, 7th and 10th day after first spraying. Similar results were obtained at 3rd, 5th, 7th and 10th day after second spray. The results showed that nymphal mortality in chemical insecticides alone were quick *i.e.* one day after treatment. Fungal bio-pesticides initially were less effective but later on slowly increased and caused considerable mortality. The effectiveness of endosulfan (0.0035%) against *T. tabaci* has been reported by Butani and Kapadia (1999). However, Mustaq *et al.* (2001) and Zezlina and Blazic (2003) have reported the superiority of spinosad to control *T. tabaci*. Gindin *et al.* (1996) indicated that *T. tabaci* was found susceptible to *V. lecanii*, *B. bassiana*, *P. fumosoroseus* and *Metarhizium anisopliae*. Similarly, *T. tabaci* was susceptible to *V. lecanii* (Trujillo *et al.*, 2003) and *B. bassina* (Castineiras *et al.*, 1996).

The yield of onion bulbs in different treatments varied from 29286 to 42857 kg/ha and were significantly superior over the control. The highest yield of onion bulbs (42857 kg/ha) was recorded in the treatment with spinosad 0.009%. However, it was statistically at par with spinosad 0.0045% + endosulfan 0.035% (41429 kg/ha). Moderate yield of onion bulb was obtained from the treatments of endosulfan 0.07% (37143 kg/ha), *B. bassiana* @ 1.0 kg/ha + endosulfan 0.035% (35000 kg/ha), *B. bassiana* @ 2.0 kg/ha (34286 kg/ha), *V. lecanii* @ 1.0 kg/ha + endosulfan 0.035% (33714 kg/ha) and *V. lecanii* @ 2.0 kg/ha (33571 kg/ha). Whereas, low yields were recorded from the treatments of *P. fumosoroseus* @ 2.0 kg/ha (32857 kg/ha) and *P. fumosoroseus* 1.0 kg/ha + endosulfan 0.035% (32143 kg/ha).

Application of *B. bassiana* or *V. lecanii* @ 1 kg/ha combined with endosulfan 0.035% was more effective in controlling *T. tabaci.* The reason for obtaining the higher mortality may be attributed to the increased susceptibility of insects to fungal infection when exposed to insecticides. Hence, joint action of fungal pathogens and insecticides is practically useful to narrow down the complete dependence on synthetic compounds and also useful in decreasing environmental pollution.

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