The Pharma Innovation Journal 2021; SP-10(12): 2047-2052

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(12): 2047-2052

www.thepharmajournal.com
Received: 22-10-2021
Accepted: 24-11-2021

Sujay Pandey
Assistant Director (Entomology), RRS, National Horticultural Research and Development Foundation, Nashik, Maharashtra, India

MK Pathak
Technical Officer (Entomology), RRS, National Horticultural Research and Development Foundation, Karnal, Haryana, India

MK Pandey
Technical Officer (Plant Pathology), RRS, National Horticultural Research and Development Foundation, Nashik, Maharashtra, India

Ashok Tailor
Technical Officer (Statistics), RRS, National Horticultural Research and Development Foundation, Nashik, Maharashtra, India

PK Gupta
Director (Acting), National Horticultural Research and Development Foundation, New Delhi, India

Corresponding Author
Sujay Pandey
Assistant Director (Entomology), RRS, National Horticultural Research and Development Foundation, Nashik, Maharashtra, India

Evaluation of new insecticides against onion thrips

Sujay Pandey, MK Pathak, MK Pandey, Ashok Tailor and PK Gupta

Abstract
Onion thrips (*Thrips tabaci* L.) is a serious pest of onion crop and losses are reported to be as high as 90% (Mote, 1977, Gupta *et al*., 1984 and Srivastava *et al*., 1997). Thrips in onion are difficult to control because of succulent nature of leaves, which prevents spray solution reaching the pests and also due to hiding habit of thrips in central axis near the bulb (Shitole *et al*., 2002). Considering the above problems field trials were conducted in three consecutive years during *rabi* 2015-16, 2016-17 and 2017-18 seasons on onion variety NHRDF Red to evaluate the efficacy of new insecticides against thrips in onion at NHRDF, Regional Research Station, Karnal (Haryana). A total of 6 treatments with 4 replications in Randomized Block Design were arranged. The application of treatments was started just after appearance of thrips and total 4 sprays were given at 10 days interval. The treatments were T_1-Chlorantaniliprole @ 0.30ml/L., T_2-Emmamectin Benzoate @ 0.40 g/L., T_3-Buprofezin 25 EC @ 1.0ml/L., T_4-Spinosad @ 0.3 ml/L., T_5-Fenpropathrin 30 EC @ 0.6ml/L. and T_6-Control. The thrips population (Nymphs/plant) was counted visually with the help of hand lens on 10 plants selected randomly in each treatment at ten days interval after appearance. The combined data revealed that spray of Spinosad @ 0.3 ml/L. started at 60 days after transplanting (just after appearance of thrips) and subsequently at 10 days intervals performed superior with lowest thrips population (7.65 nymphs/plant). The significantly highest gross yield (292.71 q/ha) were recorded in Spinosad @ 0.3 ml/L. The lowest gross yield (256.80q/ha) were recorded in untreated control. The highest cost benefit ratio (1:7.78) was recorded in Fenpropathrin 30 EC @ 0.6 ml/L. due to lower rate of insecticide.

Keywords: onion, thrips, *Thrips tabaci*, management, new insecticides

Introduction
Onion (*Allium cepa* L.) is an important export oriented vegetable crop among the cultivated *Allium* in India. It is grown in *rabi*, *kharif* and late *kharif* season in India with the maximum area under cultivation is covered in *rabi* season. India is the second largest onion producing country in the world with approximately 14.31 lacks ha onion growing area with an annual production of 260.91 lacks tonnes during 2019-20 (Source: NHRDF).
Thrips (*Thrips tabaci*, Lindeman) is a regular and potential pest of onion and cause considerable losses as high as 90% in quality and yield (Gupta *et al*., 1984; Darmasena; 1998 and Sudharma & Nair, 1999) [3, 2, 19]. Thrips attacks onion at all the stages of crop growth, but their count increases from bulb initiation and remain high up to bulb development and maturity. Both nymphs and adults cause damage directly through feeding and indirectly through the transmission of lethal plant viruses. Shiberu and Negeri (2014) [14] recorded that onion thrips cause loss in yield as 23-85%. Asghar *et al.* (2018) [7] reported that the bifenthrin (10 EC) and dimethoate (40 EC) proved to be significantly effective against onion thrips. It is difficult to control this pest with insecticides because of its small size and cryptic habits (Lewis, 1997) [5]. Failure to control this pest by timely and effective means causes considerable damage and results in immense economic losses by remarkably reducing yield (Anonymous, 2000; Juan Anciso, 2002) [1, 4].
To find out the suitable management of thrips and avoid the losses caused by thrips in onion, a field experiment was conducted at Regional Research Station, NHRDF, Karnal (Haryana) during three consecutive years in *rabi* 2015-16, 2016-17 and 2017-18 on onion variety NHRDF Red to evaluate the efficacy of new insecticides against thrips in onion.

Materials and Methods
The field experiment was conducted at Regional Research Station, Karnal during *rabi*, 2015-16, 2016-17 and 2017-18 seasons. Seedlings of onion were transplanted in a bed size of 3.0m x 1.2m at 15cm X 10cm spacing in Randomized Block Design with 3 replications was followed.

The treatments evaluated were T_1 (Chlorantraniliprole @ 0.30 ml/L.), T_2 (Emamectin Benzoate @ 0.40 g/L.), T_3 (Buprofezin 25 EC @ 1.0 ml/L.), T_4 (Spinosad @ 0.3ml/L.), T_5 (Fenpropathrin 30 EC @ 0.6 ml/L.) and T_6 (control). The application of treatments was started at appearance of the thrips and a total of 4 sprays were given at 10 days interval. Silicon based sticker @ 0.5ml/L. was invariably mixed in each spray solution as sticky agent. All other agronomical practices were performed as per need in all the treatments. The crop was harvested after attaining the maturity. The data on thrips (nymph) population were counted at the inner most leaves in 10 plant marked randomly in each treatment at 10 days interval. The recorded data of three consecutive years i.e. *rabi* 2015-16, 2016-17and 2017-18 were combined, analyzed statistically and presented in table and figure-1, 2, 3 and 4.

Results

Rabi, 2015-16

Data presented in table-1 revealed that thrips population varies from 0.85 to 1.45 nymphs/plant among treatments just appearance at 60 days after transplanting. The data on thrips number was found significantly lowest in T_5 (fenpropathrin 30 EC @ 0.6 ml/L.) before 2nd (0.43 thrips/plant) and 3rd (5.65 thrips/plant) spray and significantly lowest thrips number recorded in T_4 (spinosad @ 0.3ml/L.), before 4th spray (6.93 thrips/plant) and again significantly lowest thrips numbers (22.23 and 6.65 thrips/plant) were recorded at 10 days after 4th spray and on overall average of all observations in same treatment, respectively. The data further revealed that significantly highest gross yield (315.84 q/ha) was recorded in T_4 (spinosad @0.3 ml/L.) and it was found at par with T_1 (chlorantraniliprole @0.30 ml/L. i.e. 311.87q/ha) and T_2 (emamectin benzoate @0.40 g/L. i.e. 310.41q/ha).

Table 1: Evaluation of new insecticides for management of onion thrips during *rabi*, 2015-16

Treatments	Average number of thrips/plant					Overall average of thrips number	Gross yield (q/ha)
	60 DAP (1st spray)	70 DAP (2nd spray)	80 DAP (3rd spray)	90 DAP (4th spray)	100 DAP		
T_1	0.98	1.63	12.83	12.13	23.23	8.46	311.87
T_2	0.85	1.10	11.10	19.73	31.13	10.65	310.41
T_3	1.45	0.93	13.13	22.35	33.03	11.81	301.87
T_4	1.43	0.78	8.53	6.93	22.23	6.65	315.84
T_5	1.30	0.43	5.65	19.90	34.70	10.33	302.15
T_6	1.20	2.63	18.93	39.13	41.48	17.23	299.65
S.Em±	0.1	0.13	1.10	1.62	1.39	0.23	3.78
CD at 5%	0.21	0.28	2.34	3.45	2.96	0.49	8.06
CV %	12.28	14.36	13.34	11.43	6.34	3.02	1.74

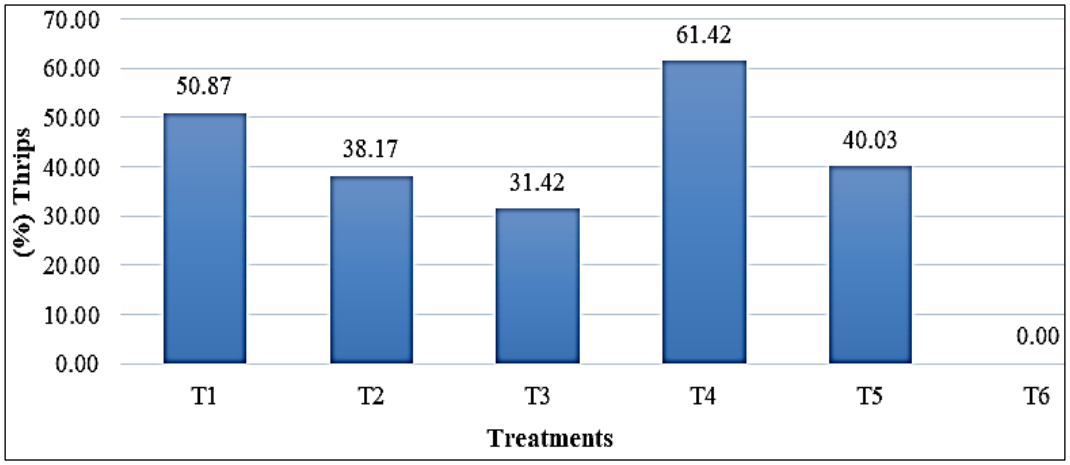

Fig 1: Percent (%) thrips control during *rabi*, 2015-16

Percent thrips control: Data shown in figure-1 revealed that maximum thrips control (61.42%) was recorded in the treatment spinosad @ 0.3 ml/L. as compare to control treatment during 1st year trial.

Rabi, 2016-17

Data presented in table-2 revealed that thrips population varies from 1.55 to 1.85 nymphs/plant among treatments just appearance at 60 days after transplanting. The data on thrips number was found significantly lowest in T_4 (spinosad @ 0.3 ml/L.) before 2nd (0.93 nymphs/plant), 3rd (5.28 nymphs/plant), 4th (6.78 nymphs/plant) spray and again significantly lowest thrips numbers (15.48 and 5.03 nymphs/plant) were recorded at ten days after 4th spray (100 DAP) and on overall average of all observations in same treatment. The data further revealed that significantly highest gross yield (326.25 q/ha) was also recorded in same treatment (T_4).

Table 2: Evaluation of new insecticides for management of onion thrips during r*abi*, 2016-17

Treatments	Average number of nypmhs/plant					Overall average of nymphs number	Gross yield (q/ha)
	60 DAP (1st spray)	70 DAP (2nd spray)	80 DAP (3rd spray)	90 DAP (4th spray)	100 DAP		
T1	1.55	1.43	12.10	12.53	20.58	8.03	294.03
T2	1.60	1.55	10.80	19.93	21.70	9.26	292.36
T3	1.70	1.40	13.63	22.63	23.45	10.47	299.72
T4	1.73	0.93	5.28	6.78	15.48	5.03	326.25
T5	1.73	1.25	8.38	15.85	25.70	8.82	292.36
T6	1.85	4.55	28.55	36.05	44.13	19.19	244.03
S.Em±	0.08	0.14	0.65	1.23	0.90	0.25	3.54
CD at 5%	0.17	0.30	1.39	2.62	1.92	0.53	7.55
CV %	7.06	10.92	7.03	9.15	5.06	3.47	1.72

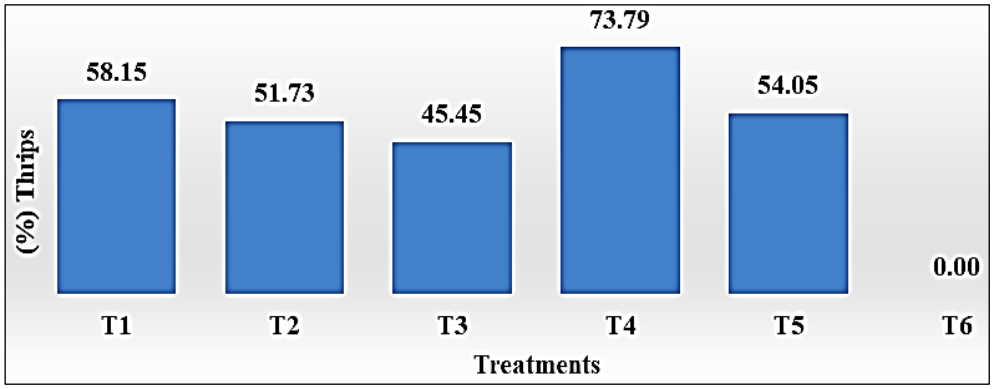

Fig 2: Percent (%) Thrips control during rabi, 2016-17

Percent thrips control: Data shown in figure-2 revealed that maximum thrips control (73.79%) was recorded in the treatment spinosad @ 0.3 ml/L. as compare to control during 2nd year trial.

Rabi, 2017-18

Data presented in table-3 revealed that thrips population varies from 0.13 to 0.55 nymphs/plant among treatments just appearance at 30 days after transplanting. The data on thrips number did not differ significantly from first spray (30 DAP) up to ten days after 4th spray (70 DAP), while significantly lowest thrips number (17.13 nymphs/plant) was recorded in T_3 (Buprofezin 25 EC @ 1.0 ml/L.) at twenty days after 4th spray (80 DAP). The data on overall average of thrips number was found significantly lowest (10.76 nymphs/plant) in T_3, which was found at par with all other treatments except control. The data further revealed that significantly highest gross yield (247.36 q/ha) was also recorded in same treatment (T_3), which was found at par with all other treatments except T_4 (spinosad @ 0.3 ml/L.) and control.

Table 3: Evaluation of new insecticides for management of onion thrips during *rabi*, 2017-18

Treatments	Thrips (Nymphs/plant)						Overall average of thrips number	Gross yield (q/ha)
	30 DAP (1st spray)	40 DAP (2nd spray)	50 DAP (3rd spray)	60 DAP (4th spray)	70 DAP	80 DAP		
T1	0.25	6.25	15.08	17.43	21.25	22.15	11.77	237.91
T2	0.40	6.15	13.88	18.13	19.60	18.73	10.98	241.73
T3	0.30	5.73	14.30	17.13	20.75	17.13	10.76	247.36
T4	0.33	6.40	14.18	17.68	22.65	17.55	11.25	236.04
T5	0.13	6.03	14.80	16.33	21.25	22.23	11.54	237.29
T6	0.55	6.90	15.63	20.78	22.85	22.98	12.81	226.73
S.Em±	0.07	0.14	0.11	0.18	0.18	0.16	0.49	4.84
CD at 5%	NS	NS	NS	NS	NS	0.34	1.04	10.32
CV %	11.28	7.59	3.85	5.92	5.45	5.09	5.96	2.88

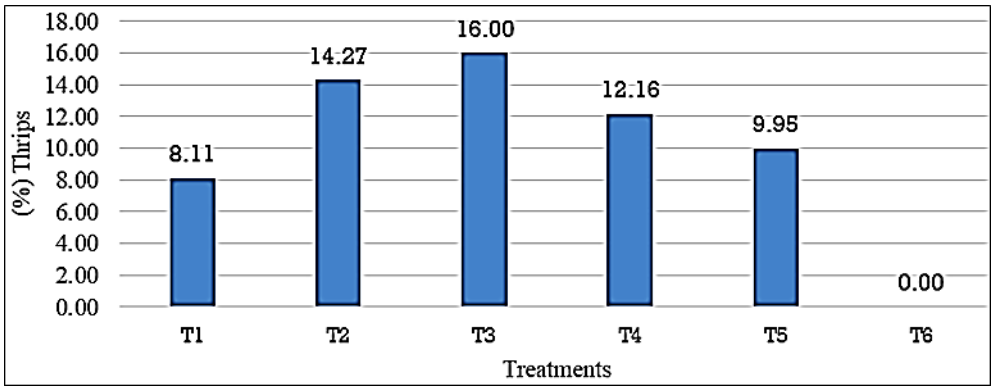

Fig 3: Percent (%) Thrips control during *Rabi*, 2017-18

Percent thrips control: Data shown in figure-3 revealed that maximum thrips control (16.00%) was recorded in the treatment Buprofezin 25 EC @ 1.0ml/L. (T_3) as compare to control during 3rd year trial.

Combined data of *rabi*, 2015-16, 2016-17 and 2017-18

Year wise impact of thrips numbers

Thrips were appeared sixty days after transplanting in experimental plot during *rabi*, 2015-16 (Y_1) and *rabi*, 2016-17 (Y_2), while thirty days after transplanting during *rabi*, 2017-18 (Y_3). The data revealed that significantly overall lowest mean thrips numbers (10.13 nymphs/plant) was recorded during the *rabi*, 2016-17 (Y_2), while overall highest mean thrips numbers (11.52 nymphs/plant) was recorded during the *rabi*, 2017-18 (Y_3).

Insecticide efficacy on thrips, yield and cost benefit ratio

The combined data presented in table-4 revealed that significantly overall lowest mean thrips numbers (7.65 nymphs/plant) was recorded in treatment spinosad @ 0.3 ml/L. (T_4), however highest mean thrips number (16.41 nymphs/plant) was recorded in control. The data further revealed that significantly highest gross yield (292.71 q/ha) were recorded in T_4 (spinosad @ 0.3 ml/L.), however lowest gross yield (256.80q/ha) were recorded in control. The highest C: B ratio 1:7.78 was recorded in T_5 due to less price (Rs.780/-per lit.) of fenpropathrin as compared to the rates of other insecticides. The variation in benefit cost was found due to variation in rates of treatments (insecticides). The market rates of different insecticides are as under:

The market rates of different insecticides are as under:

Treatment	Name of insecticide	Dose/L.	Market price (Rs/L. or kg)
T_1	Chlorantraniliprole 18.5 SC	0.3 ml	15000.00
T_2	Emamectin Benzoate 5 SG	0.4 gm	5560.00
T_3	Buprofezin 25 EC	1.0 ml	936.00
T_4	Spinosad 45 SC	0.3 ml	22106.00
T_5	Fenpropathrin 30 EC @	0.6 ml	780.00

Interaction (TxY): Data presented in table-4 revealed that significantly overall average lowest thrips number (5.03 nymphs/plant) and highest gross yield (326.25q/ha) was recorded in treatment spinosad 45 SC @ 0.3ml/L. during the year *rabi*, 2016-17.

Table 4: Evaluation of new insecticides for management of onion thrips at RRS, Karnal (Combined *rabi*, 2015-16, 2016-17 & 2017-18)

Treatments	Thrips population (Nymphs/plant)			Gross yield (q/ha)	Overall average mean thrips number	B: C ratio
	60 DAT	70 DAT	80 DAT			
Year						
Y_1	1.20 (1.30)	1.25 (1.29)	11.69 (3.43)	306.97	10.86	-
Y_2	1.69 (1.48)	1.85 (1.49)	13.12 (3.57)	291.46	10.13	-
Y_3	17.91 (4.28)	21.39 (4.67)	20.13 (4.53)	237.84	11.52	-
S.E.m±	- 0.04	- 0.05	- 0.06	1.67	0.14	-
CD at 5%	- 0.09	- 0.09	- 0.11	3.36	0.28	-
Treatment						
T_1	6.65 (2.29)	8.10 (2.50)	15.69 (3.98)	281.27	9.42	1.77:1
T_2	6.86 (2.30)	7.42 (2.39)	13.54 (3.71)	281.50	10.30	4.74:1
T_3	6.76 (2.36)	7.69 (2.39)	14.63 (3.88)	282.98	11.01	6.19:1
T_4	6.94 (2.38)	8.12 (2.37)	10.45 (3.22)	292.71	7.65	1.91:1
T_5	6.45 (2.31)	7.64 (2.31)	12.08 (3.41)	277.26	10.23	7.78:1
T_6	7.94 (2.48)	10.01 (2.95)	23.48 (4.88)	256.80	16.41	-
S.E.m±	- 0.06	- 0.06	- 0.08	2.36	0.20	-
CD at 5%	- 0.12	- 0.13	- 0.16	4.76	0.40	-
Interaction (T*Y)						
T_1Y_1	0.98 (1.21)	1.63 (1.46)	12.83 (3.64)	311.87	8.46	-
T_1Y_2	1.55 (1.43)	1.43 (1.39)	12.10 (3.55)	294.03	8.03	-
T_1Y_3	17.43 (4.22)	21.25 (4.66)	22.15 (4.76)	237.91	11.77	-
T_2Y_1	0.85 (1.16)	1.10 (1.26)	11.10 (3.39)	310.41	10.65	-
T_2Y_2	1.60 (1.45)	1.55 (1.43)	10.80 (3.36)	292.36	9.26	-
T_2Y_3	18.13 (4.30)	19.60 (4.48)	18.73 (4.39)	241.73	10.98	-
T_3Y_1	1.45 (1.40)	0.93 (1.19)	13.13 (3.68)	301.87	11.81	-

T_3Y_2	1.70 (1.48)	1.40 (1.38)	13.63 (3.76)	299.72	10.47	-
T_3Y_3	17.13 (4.19)	20.75 (4.61)	17.13 (4.20)	247.36	10.76	-
T_4Y_1	1.43 (1.39)	0.78 (1.13)	8.53 (3.00)	315.84	6.65	-
T_4Y_2	1.73 (1.49)	0.93 (1.19)	5.28 (2.40)	326.25	5.03	-
T_4Y_3	17.68 (4.26)	22.65 (4.81)	17.55 (4.24)	236.04	11.26	-
T_5Y_1	1.30 (1.34)	0.43 (0.96)	5.65 (2.48)	302.15	10.33	-
T_5Y_2	1.73 (1.49)	1.25 (1.32)	8.38 (2.98)	292.36	8.82	-
T_5Y_3	16.33 (4.10)	21.25 (4.65)	22.23 (4.77)	237.29	11.54	-
T_6Y_1	1.20 (1.30)	2.63 (1.77)	18.93 (4.40)	299.65	17.23	-
T_6Y_2	1.85 (1.54)	4.55 (2.25)	28.55 (5.39)	244.03	19.19	-
T_6Y_3	20.78 (4.61)	22.85 (4.83)	22.98 (4.84)	226.73	12.81	-
S.Em±	- 0.11	- 0.11	- 0.14	4.09	0.34	-
CD at 5%	- 0.22	- 0.23	- 0.28	8.24	0.69	-

Note: Data in the parenthesis shows Square root transformed values.

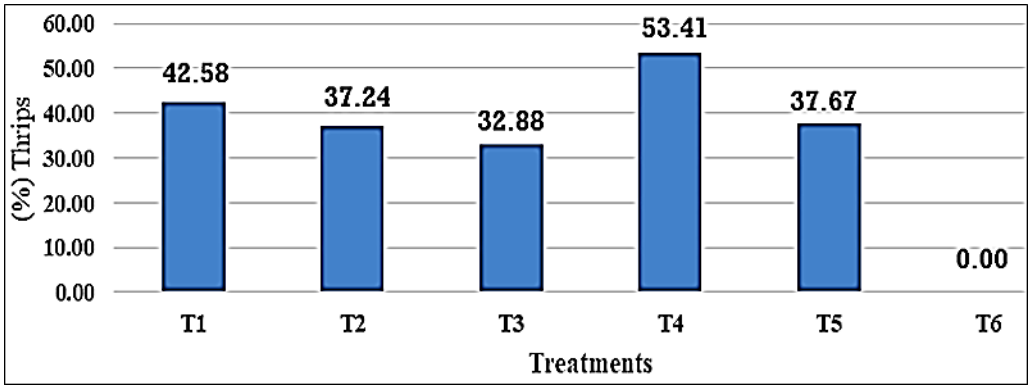

Fig 4: Percent thrips control at RRS, Karnal (Combined 2015-16, 2016-17 and 2017-18)

Percent thrips control: Data shown in figure-4 revealed that based on the combined data of three years, maximum thrips control (53.41%) was recorded in the treatment spinosad 45 SC @ 0.3 ml/L. as compare to control.

Discussion

The present study is in conformity with the result obtained by Pandey *et al*. (2014) [10] and Singh *et al*. (2011) [16] who reported that spinosad at 10 days interval was effective for managing onion thrips. Similarly, Ullah *et al.* (2010) [20] reported that the insecticides thiodan, imidacloprid and spinosad were more effective against onion thrips as compared to control. Patil *et al*. (2009) [11] reported that spray of deltamethrin + triazophos and spinosad reduced the thrips population as well as increased yield. Seal *et al*. (2006) [13], Srinivas *et al*. (2007) [17], Prasad and Ahmed, (2009) [12] also advocated that spinosad is an effective insecticide against thrips. In small plot onion studies in 2005 (Nault and Hessney 2006) [8] and 2007 (Nault and Hessney 2008b) [9], potential and currently registered insecticides were evaluated against onion thrips, and the following insecticides were shown to reduce the *T. tabaci* infestation by a wide range of values relative to the untreated control: lambda-cyhalothrin by only 20% (2005), acetamiprid by 50% (2005) and 38% (2007), oxydemeton-methyl by 54% (2007), methomyl by 59% (2005) and 68% (2007), spinosad by 84% (2005) and formetanate hydrochloride by 98% (2005) and 97% (2007). Spinosad, the only highly effective registered insecticide, reduced the population by 95% (2005) and 97% (2007) relative to the untreated control. This also confirms our study with respect to percent control of thrips in onion.

Conclusions

Three years' studies conducted at Regional Research Station, Karnal (Haryana) during *rabi*, 2015-16, 2016-17 and 2017-18 revealed that foliar spray of spinosad @ 0.3 ml/L. at thrips appearance and subsequently at 10 day's intervals performed superior for thrips management and increased the yield of onion and it is also recommended to the onion farmers of respective area. The result also showed a significance effect in reducing the number of onion thrips, which saves the farmers yield and its value appreciably.

References

1. Anonymous. Annual Report: National Research Centre for Onion and Garlic, 2000, 63-64.
2. Darmasena CMD. Present Status of Managing Leaf Curl Complex in the North Central Province of Sri-Lanka. Trop. Agric. Res. and Exten. 1998;1(2):154-158.
3. Gupta RP, Srivastava VK, Bhardwaj BS, Pandey UB. Chemical Control of *Thrips tabaci* L. Infesting Onion Crop J Ent. Res. 1984;8(2):196-198.
4. Juan Anciso. Onion World. 2002;18(3):10.
5. Lewis. Pest thrips in perspective.-In: Lewis T. (ed.): Thrips as Crop Pest. CAB International, Wallingford, UK, 1997, 1-14.
6. Mote UN. Efficacy of different insecticides against onion thrips (*Thrips tabaci* L.) J Maharashtra Agric. Univ. 1977;2:69-70.
7. Muhammad Asghar, Mirza Muhammad Qaddeer Baig, Muhammad Afjal, Naeem Faisal. Evaluation of Different Insecticides for the Management of Onion Thrips (*Thrips tabaci* Lindeman) on Onion Crop. Polish Journal of Entomology. 2018;87:165-176.
8. Nault BA, Hessney ML. Onion Thrips Control in Onion, 2005. Arthropod Manag. Tests. 2006;31:E39.
9. Nault BA, Hessney ML. Onion Thrips Control in Onion, 2006. Arthropod Manag. Tests. 2008b;33:E19.
10. Pandey Sujay, Mishra RK, Upadhyay RK, Gupta RP. Management of Onion Thrips through Botanicals and

Biopesticides. Hort. Flora Research Spectrum. 2014;3(1):81-84.
11. Patil SD, Chandele AG, Wayal CB, Game BC. Efficacy of Different Newer Chemical and Bio-Pesticides against Onion Thrips in *kharif* Season. International Journal of Plant Protection. 2009;2(2):227-230.
12. Prasad NVVSD, Ahmed K. Efficacy of Spinosad 45 SC against Thrips, Scirtothrips Dorsalis Hood and Pod borer, *Spodoptera exigua* (Hubner) on Chillies. Pesticide Research Journal. 2009;21(1):49-51.
13. Seal DR, Cimperlikb M, Richardsc ML, Klassena W. Comparative Effectiveness of Chemical Insecticides against the Chilli Thrips, *Scirtothrips dorsalis* Hood on Pepper and Their Compatibility with Natural Enemies. Crop Production. 2006;25:949-955.
14. Shiberu T, Negeri M. Evaluation of Insecticides and Botanical against Onion Thrips, *Thrips tabaci* (L). Entomology and Applied Science. 2014;1(2):26-30.
15. Shitole DM, Shankar G, Mithyantha MS. Evolution of Certain New Pesticides against Thrips (*T. tabaci*). Pestol. 2002;26(2):49-52.
16. Singh BK, Pandey JG, Gupta RP, Abraham Verghese. Efficacy of Entomopathogenic Fungi for the Management of Onion *Thrips tabaci* Lind. Pest Management in Horticultural Ecosystems. 2011;17(2):92-98.
17. Srinivas AG, Nargund VB, Sushila Nadagouda AM, Amresh YS. Efficacy of Spinosad (Tracer 45SC) against the Thrips and Fruit Borers in Chilli (*Capsicum annuum* L.) under Irrigated Conditions. Pest-Management and Economic Zoology. 2007;15(1):41-44.
18. Srivastava PK, Srivastava KJ, Tiwari BK. Effect of New Insecticides/Biopesticides for the Control of Onion Thrips (*Thrips tabaci* L.) NHRDF Newsletter. 1977;17:6-9.
19. Sudharma K, Nair GM. Assessment of Loss Caused by *Polyphagotarsonemus latus* (Banks) on Chilli. Entomon. 1999;24(1):1997-98.
20. Ullah Farman, Maraj-ul-Mulak, Abid Farid, Muhammad Q, Asid Saeed, Shahid Sattar. Population Dynamics and Chemical Control of Onion Thrips (*Thrips tabaci*, Lindeman). Pakistan Journal of Zoology. 2010;42(4):401-406.