Pest Management in Horticultural Ecosystems
Vol. 24, No.2 pp 177-180 (2018)

RESEARCH NOTE

Efficacy of bio-rational insecticides for the management of sword lily thrips

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ABSTRACT: Some commonly used bio-rational insecticides were evaluated against the sword lily thrips. Seven treatment schedules were evaluated comprising two spray applications at an interval of 15 days. The treatment schedule comprising two applications of acetamiprid 20 SP (0.02%) was most effective in reducing the population of thrips with 47.22 and 61.60 per cent population reduction 1 and 3 days after spray, respectively whereas, seven days after spray, treatment schedule *neem* oil (1%) followed by emamectin benzoate 5G (0.02%) was most effective in reducing the population of thrips (53.49%). The treatment schedules comprising two applications of *neem* oil was least effective with 28.20, 50.99 and 47.31 per cent population reduction at 1, 3 and 7 days after spray, respectively.

Keywords: Bio-rational, manegement, sword lily, thrips

Floriculture has assumed a definite commercial status in recent times and it has emerged as an important agri-business venture. In this regard gladiolus has gained much importance as it is known as the “queen of bulbous flowers”. Gladiolus is very much liked for its majestic spikes, which contain attractive, elegant and delicate florets.Spikes of sword lily have good keeping quality and can be transported over long distances (Arora *et al*., 2002); however, several factors are responsible for low productivity of sword lily; among which climate, cultivar, nutrient management, diseases and pests are important.Among the insect pests, the sap sucking insect pests are considered to be more important that comprise thrips (*Taeniothrips simplex* Morison), mites (*Tetranychus acuatorius*) and mealy bugs (*Ferrisia virgeta* Cockerell).

Thrips feed by puncturing the plant cells and sucking the contents; these cells become filled with air and give the creamy silvery appearance to the damaged leaves and cause the bleached flecks on the flowers of gladiolus. With severe infestations the flowers may fail to open or the leaves and flower spike may bleach to a golden-brown colour and then wither. Red and purple varieties are considered to be the most susceptible; white and early varieties often escape serious attack (Gratwick, 1992). At the end of the growing season many thrips perish, but survivors move down the plant and invade the corm where their feeding causes dried grey-brown rash-like patches. When infested corms are replanted the new growth is soon invaded. Despite the use of conventional insecticides, flower growers have not been able to manage thrips.

Proper information on bionomics and population dynamics of key pests becomes necessary to manage them. Synthetic insecticides are used frequently to control thrips in greenhouses, and populations of some thrips species have developed resistance to different groups of insecticides (Schreiber *et al*., 1989, 1990; Immaraju *et al*., 1992; Zhao *et al.,* 1995). Fortunately, bio-pesticides have been gaining interest among those concerned with developing environmentally friendly and safe integrated crop management systems with compatible approaches and tactics for pest management (Copping and Menn, 2000). Literature is available for the control of thrips with synthetic pesticides and bio-insecticides; however, their judicious use and effects are lacking in floriculture. Keeping these points in view some bio-rational insecticide molecules with novel mode of action were evaluated to find out a viable option for sustainable management of thrips of sword lily.

The present investigation was carried out during rabi, 2016-17 in collaboration with the Principal Investigator of AICRP on Floriculture at the Horticulture Farm and the laboratory of Department of Entomology, Rajasthan College of Agriculture, Udaipur. The seed material was procured from AICRP on floriculture.

A field trial was conducted to evaluate the efficacy of bio-rational insecticides for the management of thrips infesting the sword lily variety Punjab Dawn with spacing of 30×10 cm in a randomized block design with 7 treatments and 3 replications.

Table 1. Comparative efficacy of different bio-rational insecticides against thrips infesting sword lily during 2016-17

Traetment		Mean Population Reduction (%)							
		First spray				Second spray			
1st Spray	2nd Spray	PTP	1-day	3-day	7-day	PTP	1-day	3-day	7-day
Neem Oil (1%)	Neem Oil (1%)	11.93	38.48[ab] (38.71)	55.88[a] (68.53)	51.78 (61.72)	15.07	28.20[a] (22.33)	50.99[a] (60.37)	47.31 (54.02)
Spinosad (0.07%)	Spinosad (0.07%)	13.13	42.94[b] (46.40)	62.13[b] (78.14)	52.14 (62.33)	14.20	33.66[a] (30.72)	54.53[a] (66.32)	49.68 (58.13)
E. benzoate (0.02%)	E. benzoate (0.02%)	10.87	53.93[c] (65.33)	68.05[c] (86.02)	57.76 (71.54)	13.33	44.12[b] (48.46)	59.07[b] (73.58)	53.16 (64.05)
Neem Oil (1%)	Spinosad (0.07%)	13.13	35.23[a] (33.27)	54.13[a] (65.66)	50.67 (59.83)	14.60	31.30[a] (26.99)	53.06[a] (63.88)	50.61 (59.72)
Neem Oil (1%)	E. benzoate (0.02%)	9.87	39.70[ab] (40.80)	60.81[b] (76.21)	49.70 (58.16)	15.00	43.36[b] (47.13)	59.15[b] (73.70)	53.49 (64.60)
Acetamiprid (0.02%)	Acetamiprid (0.02%)	11.40	60.28[c] (75.42)	69.03[c] (87.19)	60.81 (76.21)	13.20	47.22[b] (53.87)	61.60[b] (77.37)	53.35 (64.36)
Water spray	Water spray	12.00	-	-	-	16.13	-	-	-
S. Em. ±		**0.62**	**2.31**	**0.89**	**1.57**	**0.51**	**2.45**	**1.23**	**1.22**
CD (P=0.05)		**NS**	**7.26**	**2.81**	**NS**	**NS**	**7.75**	**3.89**	**NS**

Note: Numbers followed by the same letter in each column are not significantly different at 5%; Figures in parentheses are retransformed per cent values; NS: Non-Significant; PTP: Pre treatment Population (Mean/Plant)

The proposed treatments were applied twice using manually operated hand sprayer during the evening hours (6:00 pm). First spray of insecticides was made at initiation of flowering on 25th February, 2017 and the second was given after 15 days of first spray i.e. on 12th March, 2017. Observations for the population of thrips were taken 1 day before the treatments and 1, 3 and 7 days after the treatments.

The data obtained on population of thrips before and after the treatments were converted to per cent population reduction by using the method suggested by Henderson and Tilton (1955) and later analyzed using suitable statistical tools to evaluate the efficacy of the treatments.

It is evident from Table (1) that all bio-rational insecticide treatments were significantly superior over control (water spray) in reducing the population of thrips. The maximum per cent reduction of thrips was recorded in treatment schedule acetamiprid followed by acetamiprid (47.22%), followed by the treatment schedule comprising two applications of emamectin benzoate, which showed a population reduction of 44.12 per cent, that was statistically at par with acetamiprid; while, schedule comprising two applications of *neem* oil (1.0%) proved least effective against thrips and resulted in only 28.20 per cent reduction in population of thrips that was statistically at par with treatment schedule *neem* oil followed by spinosad (31.30%).

After three days of spray all the treatments were significantly superior over control (water spray) in reducing thrips population. The data indicate that the maximum per cent reduction was found in the schedule of two sprays of acetamiprid (61.60%), followed by treatment schedule *neem* oil followed by emamectin benzoate (59.15%), which were statistically at par. While minimum reduction was found in treatment schedule of two sprays of *neem* oil (50.99%), which was least effective against thrips as compared to other treatment schedules.

After seven days of spray the treatments did not significantly differ; however, it was revealed that among all the treatment schedules compared the maximum per cent reduction of thrips population was recorded approximately equal in three treatment schedules *neem* oil followed by emamectin benzoate (53.49%), acetamiprid followed by acetamiprid (53.35%) and emamectin benzoate followed by emamectin benzoate (53.16%).While the minimum per cent reduction of thrips population was recorded for *neem* oil (47.31%); however, the treatment schedules two sprays of spinosad and *neem* oil followed by spinosad were also effective against thrips and resulted in 50.61 per cent and 49.68 per cent reduction of population of thrips.

In the present investigation, it was observed that the per cent population reduction of thrips in the treatment schedules was significantly superior over control, after 1 day and 3 days of spray, but after 7 days of spray the per cent reduction of thrips was non-significant among the treatments and with control. The maximum per cent reduction of thrips population 1 day after spray was recorded in treatment schedule comprising two sprays of acetamiprid (47.22%), followed by the treatment schedule comprising two sprays of emamectin benzoate with 41.12 per cent reduction of thrips population. Three days after spray the maximum per cent reduction was found in treatment schedule comprising two applications of acetamiprid (61.60%), followed by treatment schedule comprising application of *neem* oil followed by emamectin benzoate (59.15%). The treatment schedule with two sprays of *neem* oil was least effective with minimum per cent reduction of thrips population after 1 and 3 days of spray.

The results are similar to those of Kadri *et al.* (2004), who found acetamiprid to be the most effective treatment with maximum mortality, 87 per cent of onion thrips population after 24 hours of application.The results are also similar to those of Bokan *et al.* (2016), who found acetamiprid 20 SP @ 10 g/ha and spinosad 45 SC @ 135 g/ha to be effective in reducing thrips, *Scirtothrips dorsalis* in chilli. Acetamaprid 20 SP @ 10 g/ha also gave the highest yield (51.30 g/ha) followed by spinosad 45 SC @ 135 g/ha (48.40 q/ha). Patil*et al.*, (2013) reported that among different treatments, fipronil, flupyradifurone, acetamiprid, imidacloprid and thiamethoxam were most effective in reducing the population of mulberry thrips, *Pseudodendrothrips mori* (niwa) with 0.97, 0.99, 1.03, 1.05 to 1.08 thrips population per top three leaves respectively, at 5 DAS as compared to 15.31 thrips per three leaves in control.

ACKNOWLEDGEMENT

The authors are grateful to the Head, Department of Entomology, Department of Horticulture and Dean, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan, India for providing necessary research facilities.

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MS Received 10 February 2018
MS Accepted 23 April 2018