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Bio-efficacy of newer insecticides against pomegranate thrips, *Scirtothrips dorsalis* Hood in Hasta bahar

RY Khandare, DR Kadam and NE Jayewar

Abstract
The field investigations were carried out to evaluate the bio-efficacy of seven newer insecticide molecules *viz.*, cyantraniliprole 10.26 OD @ 75 g a.i./ha, buprofezin 25 SC @ 250 g a.i./ha, spinosad 45 SC @ 73 g a.i./ha, lambda cyhalothrin 5 EC @ 15 g a.i./ha, fipronil 5 SC @ 75 g a.i./ha, flonicamid 50 WG @ 75 g a.i./ha and thiamethoxam 25 WG @ 50 g a.i./ha against thrips on pomegranate during Hasta bahar 2016 and 2017. The results revealed that all the insecticidal treatments were significantly effective against thrips over untreated control. Spinosad 45 SC @ 73 g a.i./ha was most effective treatment followed by cyantraniliprole 10.26 OD @ 75 g a.i./ha and fipronil 5 SC @ 75 g a.i./ha which were at par with each other.

Keywords: Bio-efficacy, pomegranate thrips, hasta bahar, *Scirtothrips dorsalis*, spinosad, cyantraniliprole, fipronil

1. Introduction

Pomegranate (*Punica granatum* L.) is one of the most adaptable subtropical minor fruit crop belongs to Punicaceae. Pomegranate is native to Iran, where it was first cultivated around 2000 BC and spread to the Mediterranean countries [4]. In India, it is cultivated on 208.73 thousand ha area with a production of 2442.39 thousand MT and the productivity is 11.70 MT per ha. Maharashtra ranks first in area 136.75 thousand ha with a production of 1578.04 thousand MT and productivity of 11.54 MT per ha [1]. Through scanning of literature revealed a total of 91 insects, 6 mites and 1 snail pest feeding on pomegranate crop in India. Pomegranate thrips, *Scirtothrips dorsalis* (H.) occur during the flowering and fruiting stage of the crop and thereby reduce the vigour of the plant in addition to excretion of honeydew on the leaves and development of sooty mould on leaves and fruits [2]. The sucking pests cause severe damage to flowers, fruits, twigs and leaves by desapping, which results in loss of quality of fruits and reduction in yield [8]. Globally thrips is considered as a potential pest in pomegranate as it deteriorates the fruit quality significantly [9]. Among the various insect pest attacking pomegranate *S. dorsalis* is one of the most important pests [5]. To overcome resistance problems, reduce doses of insecticides with selective mode of action and persistence against target pest. The present study evaluates the field bio-efficacy of the newer insecticides for the effective management of pomegranate thrips.

2. Materials and Methods

The field experiment was conducted on the farm of pomology, Department of Horticulture, College of Agriculture, VNMKV, Parbhani during Hasta bahar 2016 and 2017 in order to study the bio-efficacy of newer insecticides against pomegranate thrips, *S. dorsalis*.

2.1 Experimental details

Bahar and Yea: Hasta bahar 2016 and 2017
Variety: Bhagwa
Design: Randomized Block Design
Replications: Three
Treatments: Eight
Spacing: 4 m x 4 m
Number of Plant: 2 plants per treatment per replication

Table 1: Treatment details

Tr. No.	Treatments	Concentration (%)	Active ingredients (g a.i./ha)	Dose (ml or g/ha)
1	Cyantraniliprole 10.26% OD	0.015	75	750
2	Buprofezin 25% SC	0.05	250	1000
3	Spinosad 45% SC	0.014	73	160
4	Lambda cyhalothrin 5% EC	0.003	15	300
5	Fipronil 5% SC	0.015	75	1500
6	Flonicamid 50% WG	0.015	75	150
7	Thiamethoxam 25% WG	0.01	50	200
8	Untreated control	-	-	-

2.2 Methods of recording observations

Two observation plants comprised one treatment in each replication and four twigs (10 cm each) of four side directions of each plant (i.e. East, West, South and North) were properly labeled. The observations on total number of nymphs of thrips were recorded on the newly grown twig of the observation plants at one day before and 1, 3, 7 and 14 days after application of insecticides.

2.3 Application of insecticides

With the initiation of infestation of thrips, the first spray of insecticide was applied followed by two sprays at an interval of 15 days. The spray volume for treatment application was calibrated by spraying control plants with plain water. Spraying was taken up early in the morning hours. The required quantity of insecticide was mixed in small quantity of water in a beaker and then added to the bucket containing required volume of water.

3. Results and Discussion

The data recorded before spray was ranged from 7.77 to 12.48 thrips/10 cm twig which were found non-significant statistically (Table 2, Fig. 1). The post treatment observations recorded on first day after first spray indicated that all the insecticidal treatments were significantly superior over untreated control in reducing thrips incidence. Amongst treatments, the plants treated with spinosad recorded lowest thrips incidence (1.67 thrips/10 cm twig). It was followed by cyantraniliprole (1.84 thrips/10 cm twig) and fipronil (2.38 thrips/10 cm twig) that were found statistically at par with each other. At 3 DAS after first spray, spinosad (1.86 thrips/10 cm twig) and cyantraniliprole (2.19 thrips/10 cm twig) were most effective treatments in minimizing thrips incidence. The data recorded on 7 DAS after first spray showed that spinosad (2.27thrips/10 cm twig), cyantraniliprole (2.38 thrips/10 cm twig) and fipronil (3.09 thrips/10 cm twig) were found most effective and statistically at par with each other. At 14 DAS after first spray, spinosad (3.30 thrips/10 cm twig) recorded lowest thrips incidence and was at par with cyantraniliprole, fipronil and lambda cyhalothrin (3.52, 4.34 and 4.67 thrips/10 cm twig), respectively.

Observations recorded at 1, 3 and 7 days after second spray significantly minimum number of thrips (1.15, 1.34 and 1.88 thrips/10 cm twig) was recorded from the plants treated with spinosad followed by cyantraniliprole (1.48, 1.71 and 2.05 thrips/10 cm twig) and fipronil (1.94, 2.27 and 2.57 thrips/10 cm twig), respectively. These treatments showed no statistical difference in terms of their efficacy against thrips. Significantly lowest incidence of thrips was recorded from the plants sprayed with spinosad (3.07 thrips/10 cm twig) at 14 days after second spray followed by cyantraniliprole (3.27 thrips/10 cm twig), fipronil (3.96 thrips/10 cm twig) and lambda cyhalothrin (4.48 thrips/10 cm twig) and were at par with each other.

Observations recorded at 1 and 3 DAS after third spray, spinosad was found to be the most superior treatment (0.73 and 1.04 thrips/10 cm twig). Next promising treatments were cyantraniliprole (1.07 and 1.44 thrips/10 cm twig) and fipronil (1.40 and 1.75 thrips/10 cm twig) and were found at par with spinosad. At 7 days after third spray spinosad (1.61 thrips/10 cm twig) were statistically at par with cyantraniliprole (1.75 thrips/10 cm twig), fipronil (2.21 thrips/10 cm twig) and lambda cyhalothrin (2.71 thrips/10 cm twig) were statistically at par with each other in minimizing thrips incidence. The data recorded on 14 DAS after third spray showed that spinosad was the most superior treatment (2.56 thrips/10 cm twig) followed by cyantraniliprole, fipronil, lambda cyhalothrin and thiamethoxam (2.82, 3.30, 4.09 and 4.59 thrips/10 cm twig), respectively. It indicated that those insecticides were at par with each other and comparatively more effective than rest of the spray treatments and can be used in rotational sprays against thrips in pomegranate ecosystem.

The present findings also confirm, the order of efficacy of insecticides as spinosad, fipronil, lambda cyhalothrin, clothianidin and thiamethoxam against pomegranate thrips [6]. Fipronil 50 g a.i./ha was most promising treatments to minimizing thrips incidence on pomegranate followed by thiamethoxam 25 g a.i./ha, clothianidin 20 g a.i./ha and flonicamid 50 g a.i./ha which were at par with each other [3]. Spinosad @ 56.25 g a.i./ha was the most effective treatment at 14 DAS against pomegranate thrips followed by fipronil @ 25 g a.i./ha, lambda cyhalothrin @ 12.5 g a.i./ha and imidacloprid @ 27 g a.i./ha [7].

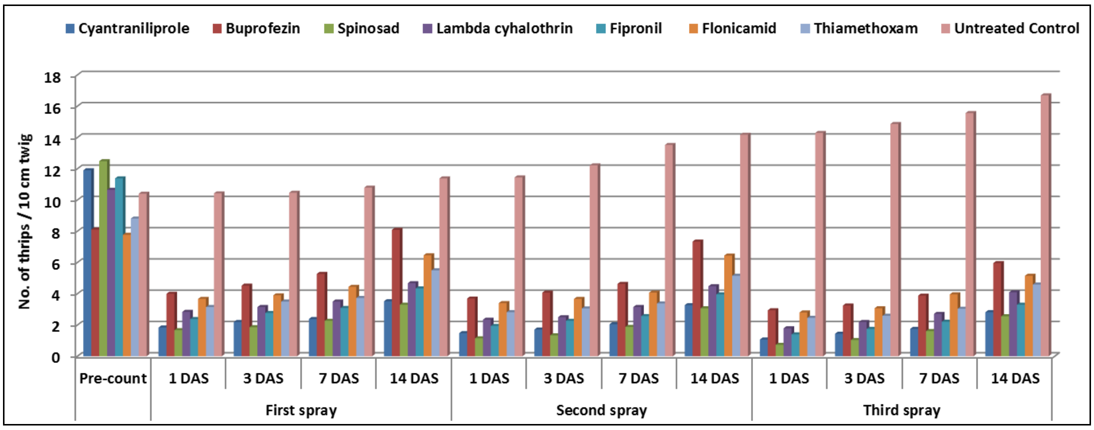

Fig 1: Pooled data of bio-efficacy of newer insecticides against thrips infesting pomegranate (Hasta bahar 2016 and 2017)

Table 2: Pooled data of bio-efficacy of newer insecticides against thrips infesting pomegranate (Hasta bahar 2016 and 2017)

Tr. No.	Treatments	Conc. (%)	Average No. of thrips/10 cm twig												
			Pre-count	1st spray				2nd spray				3rd spray			
				1 DAS	3 DAS	7 DAS	14 DAS	1 DAS	3 DAS	7 DAS	14 DAS	1 DAS	3 DAS	7 DAS	14 DAS
T_1	Cyantraniliprole 10.26 OD	0.015	11.90 (3.51)	1.84 (1.53)	2.19 (1.63)	2.38 (1.69)	3.52 (2.01)	1.48 (1.39)	1.71 (1.48)	2.05 (1.59)	3.27 (1.92)	1.07 (1.25)	1.44 (1.38)	1.75 (1.48)	2.82 (1.81)
T_2	Buprofezin 25 SC	0.05	8.11 (2.88)	4.00 (2.12)	4.52 (2.24)	5.27 (2.40)	8.09 (2.93)	3.69 (2.05)	4.07 (2.13)	4.63 (2.26)	7.34 (2.80)	2.94 (1.85)	3.25 (1.93)	3.88 (2.09)	5.96 (2.54)
T_3	Spinosad 45 SC	0.014	12.48 (3.60)	1.67 (1.45)	1.86 (1.52)	2.27 (1.66)	3.30 (1.94)	1.15 (1.28)	1.34 (1.35)	1.88 (1.53)	3.07 (1.88)	0.73 (1.10)	1.04 (1.24)	1.61 (1.44)	2.56 (1.75)
T_4	Lambda cyhalothrin 5 EC	0.003	10.65 (3.33)	2.84 (1.82)	3.15 (1.90)	3.50 (1.99)	4.67 (2.26)	2.34 (1.67)	2.50 (1.72)	3.15 (1.90)	4.48 (2.23)	1.79 (1.51)	2.19 (1.62)	2.71 (1.79)	4.09 (2.13)
T_5	Fipronil 5 SC	0.015	11.38 (3.44)	2.38 (1.68)	2.77 (1.80)	3.09 (1.89)	4.34 (2.20)	1.94 (1.56)	2.27 (1.66)	2.57 (1.74)	3.96 (2.10)	1.40 (1.37)	1.75 (1.49)	2.21 (1.62)	3.30 (1.93)
T_6	Flonicamid 50 WG	0.015	7.77 (2.86)	3.67 (2.04)	3.90 (2.10)	4.44 (2.22)	6.46 (2.63)	3.40 (1.97)	3.67 (2.04)	4.07 (2.13)	6.44 (2.63)	2.80 (1.81)	3.07 (1.88)	3.96 (2.11)	5.15 (2.37)
T_7	Thiamethoxam 25 WG	0.01	8.81 (3.01)	3.15 (1.90)	3.50 (2.00)	3.73 (2.04)	5.50 (2.45)	2.82 (1.82)	3.06 (1.88)	3.38 (1.97)	5.15 (2.37)	2.46 (1.72)	2.59 (1.75)	3.04 (1.88)	4.59 (2.22)
T_8	Untreated Control	---	10.40 (3.30)	10.42 (3.30)	10.46 (3.31)	10.79 (3.36)	11.38 (3.44)	11.44 (3.46)	12.21 (3.56)	13.52 (3.74)	14.17 (3.83)	14.29 (3.85)	14.86 (3.92)	15.56 (4.01)	16.69 (4.14)
S.E.+			0.25	0.09	0.09	0.10	0.12	0.10	0.10	0.12	0.12	0.09	0.10	0.13	0.16
C.D. at 5%			NS	0.29	0.27	0.30	0.36	0.29	0.32	0.36	0.37	0.28	0.32	0.39	0.50

Figures in parentheses are $\sqrt{x + 0.5}$ transformed values DAS: Days after Spray NS: Non-Significant

4. Conclusion
Based on the two years trail, it can be concluded that thrips is major pest of pomegranate and treatments comprised of spinosad 45 SC, cyantraniliprole 10.26 OD and fipronil 5 SC were the most effective insecticides to minimize the incidence of pomegranate thrips.

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