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Efficacy of New Molecules of insecticides against leaf miner infesting Tomato

KEYWORDS: Leaf miner, thrips, white fly, new molecules

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ABSTRACT *The insecticides application at 25, 45 and 65 days after transplanting showed that efficacy of emamectin benzoate 5 SG @ 9.5 g a.i/ha was most effective against leaf miner,Liriomyza trifolii Burgess. followed by spinosad 45 SC @ 75 g a.i/ha and lambda cyhalothrin 5 EC @ 50 g a.i./ha. The highest yield was recorded in spinosad 45 SC @ 75 g a.i/ha (220.41 q/ha) which was found significantly superior over rest of the treatments. The second best treatment in respect of fruit yield was emamectin benzoate 5 SG @ 9.5 g a.i/ha (213.74 q/ha).*

INTRODUCTION

Tomato is one of the most remunerative vegetable crop grown in tropical and subtropical regions of the world for fresh market and processing, constituting an important part of our human diet. The consumption of tomato exceeds all vegetables and is next to Potato. India ranks 4th in production followed by China, U.S.A and Turkey (Anonymous, 2008). Tomato growers in Maharashtra regularly experienced the economic damage caused by Serpentine leaf miner,*Liriomyza trifolii* Burgess and due to polyphagous in nature and their abundance in nature is throughout the year. Moreover, round the year cultivation of tomato and availability of alternate hosts encourage the development of pest pressure.

Various factors are responsible for reducing the crop yield, of which insect pests is one of the important factors cause considerable losses in tomato production. Of these, leaf miner, *Liriomyza trifolii* Burgess (Agromyzidae: Diptera) has been found causing serious damage since last many years. In India, it was first time reported in the proceeding of the annual castor research workers' group meeting held at Hyderabad (Anonymous, 1991). Its severe infestation starting from nursery and continued till fruiting stage resulted into severe yield loss. The estimated losses due to infestation of *L. trifolii* was 46-70% loss to tomato seedlings (Pohronenzy *et al.*, 1986), 90% loss to tomato foliage (Johnson *et al.*, 1983) and 70% loss of tomato yield (Zoebisch *et al.*, 1984).

MATERIAL AND METHODS

The seedlings of hybrid "Viraj" were transplanted at 45 cm ×60 cm spacing and all agronomical practices were followed. Three sprays of insecticides were applied with the help of manually operated knapsack sprayer. The quantity of spray fluid required for treating the crop per plot was calculated by spraying untreated control plot with water.

The observations on the leaf miner population was recorded as per the method suggested by Ramesh and Ukey, (2007).Observations on pest count were recorded on five randomly selected plants in each treatment plot and total number of leaves and infested leaves due to leaf miner were counted and the percentage of leaf miner infestation was worked out at five and seven days after each spraying. Pre count was taken one day prior to first spray and subsequent counts were recorded 5 and 7 days interval after each spraying. The yield of healthy tomato fruits plucked at different picking was recorded in Kilograms, separately for each treatment plot.

The figures of total yield of six pickings were converted into quintal per hectare.The data on efficacy of insecticides and yield were subjected to analysis of variance as suggested by Panse and Sukhatme(1967).

RESULTS AND DISCUSSION

The data regarding number of leaves and number of infested leaves was recorded and per cent leaf miner infestation was worked out at 5th and 7th days after first spray is presented in Table 1. The leaf miner infestation was ranged from 13.33 to 15.30 per cent, when observations were recorded one day before the insecticide application. The significant differences did not existed among the treatments including the untreated control, thus indicated uniform infestation in experimental plot.

The leaf miner infestation was ranged from 13.33 to 15.30 per cent, when observations were recorded one day before the insecticide application. The significant differences did not existed among the treatments including the untreated control, thus indicated uniform infestation in experimental plot.

On the 5th days after spraying all the treatments found significantly superior over untreated control in reducing the infestation of leaf miner. The treatment with emamectin benzoate 5 SG @ 9.5 g a.i/ha (11.85 %) was on par with spinosad 45 SC @ 75 g a.i/ha (12.10 %), lambda cyhalothrin 5 EC @ 50 g a.i/ha (12.95 %) and acephate 75 SP @ 2000 g a.i/ha (13.35 %) and was significantly superior over other treatments. The second best treatment was profenofos 50 EC @ 400 g a.i/ha (13.70 %) was at par with alfa cypermethrin 10 EC @ 25 g a.i/ha (13.85 %) and acetamiprid 20 SP @ 50 g a.i/ha (14.00 %) in reducing leaf miner infestation.

On the 7th day after spraying all the treatments were significantly superior over control. The treatment with emamectin benzoate 5 SG @ 9.5 g a.i/ha (11.50 %) was the most effective and was at par with spinosad 45 SC @ 75 g a.i/

ha (12.00 %), lambda cyhalothrin 5 EC @ 50 g a.i/ha (12.20 %), acephate 75 SP @ 2000 g a.i/ha (12.95 %), profenofos 50 EC @ 400 g a.i/ha (13.10 %) and were significantly superior over alfa cypermethrin 10 EC @ 25 g a.i/ha (13.70 %), acetamiprid 20 SP @ 50 g a.i/ha (13.85 %) and NSE (17.30 %). Similar results were observed on 45 and 65 days after spraying Table 2 -3.

The overall performance indicated that the per cent infestation of leaf miner was found significantly lowest in emamectin benzoate 5 SG @ 9.5 g a.i/ha (12.20 %), was at par with spinosad 45 SC @ 75 g a.i/ha (13.00 %).The second best treatments were lambda cyhalothrin 5 EC @ 50 g a.i/ha (13.76 %), acephate 75 SP @ 2000 g a.i/ha (14.00 %), profenofos 50 EC @ 400 g a.i/ha (14.25 %), alfa cypermethrin 10 EC @ 25 g a.i/ha (14.55 %) and acetamiprid 20 SP @ 50 g a.i/ha (15.10 %) and were superior to NSE 5 % @ 1500 ml/ha (16.30 %) infestation of leaf miner. Significantly highest infestation of leaf miner was recorded in untreated control plot (35.20 %). These results are in agreement with Variya and Patel (2012) who reported that emmamectin, thiamethoxam and spinosad emerged as most effective treatment against tomato leaf miner whereas Gabbiche (2001) obtained 100 per cent mortality of young larvae of leaf miner in bioassay with spinosad.

The average marketable fruit yield among different treatments ranged form 139.36 to 220.41 q/ha. The highest yield was recorded in spinosad 45 SC @ 75 g a.i/ha (220.41 q/ha) which was found significantly superior over rest of the treatments. The second best treatment in respect of fruit yield was emamectin benzoate 5 SG @ 9.5 g a.i/ha (213.74 q/ha), remaining treatments in respect of their yield of tomato were in descending order as lambda cyhalothrin 5 EC @ 50 g a.i/ha (199.07 q/ha) > acetamiprid 20 SP @ 50 g a.i/ha (193.16 q/ha) > alfa cypermethrin 10 EC @ 25 g a.i/ha (186.11 q/ha) > profenofos 50 EC @ 400 g a.i/ha (176.84 q/ha) > acephate 75 SP @ 2000 g a.i/ha (174.05 q/ha) > NSE 5 % @ 1500 ml/ha. These results are in agreement with the results obtained by Patra *et al.*(2009) and Jat and Ameta (2013).

Table 1 : Efficacy of insecticides against Leaf miner after first

Sr. No	Treatments	Dose g a.i./ ha	Per cent leaf miner infestation after first spray			Mean
			Precount	5 DAS	7 DAS	
1	Acetamiprid 20 SP	50	14.52 *(22.39)	14.00 (21.95)	13.85 (21.83)	13.92 (21.89)
2	Emamectin benzoate 5 SG	9.5	13.33 (21.41)	11.85 (20.13)	11.50 (20.11)	11.67 (20.12)
3	Spinosad 45 SC	75	14.20 (22.13)	12.10 (20.34)	12.00 (20.26)	12.05 (20.30)
4	Alfa Cypermethrin 10 EC	25	14.35 (22.25)	13.85 (21.82)	13.70 (21.72)	13.77 (21.77)
5	Lambda cyhalothrin 5 EC	50	15.10 (22.86)	12.95 (21.08)	12.20 (20.42)	12.57 (20.75)
6	Acephate 75 SP	2000	14.60 (22.45)	13.35 (21.42)	12.95 (21.07)	13.15 (21.24)
7	Profenofos 50 EC	400	14.55 (22.41)	13.70 (21.72)	13.10 (21.22)	13.40 (21.47)
8	NSE 5 %	1500 ml/ha	14.75 (22.57)	16.50 (23.96)	17.30 (24.58)	16.90 (24.27)
9	Untreated control		15.30 (23.03)	20.35 (26.81)	22.50 (28.31)	21.42 (27.56)
	SE ±		NS	0.509	0.460	
	CD at 5 %		NS	1.528	1.379	

spray (25 days after transplanting).

DAS- Days after spraying
*Figures in paranthesis are arcsine transformed values

Table 2 : Efficacy of insecticides against Leaf miner after second spray (45 days after transplanting).

Sr. No	Treatments	Dose g a.i./ ha	Per cent leaf miner infestation after second spray		Mean
			5 DAS	7 DAS	
1	Acetamiprid 20 SP	50	16.05 *(23.62)	15.90 (23.50)	15.97 (23.56)
2	Emamectin benzoate 5 SG	9.5	12.54 (20.73)	12.42 (20.63)	12.48 (20.68)
3	Spinosad 45 SC	75	13.65 (21.66)	13.30 (21.38)	13.47 (21.52)
4	Alfa Cypermethrin 10 EC	25	15.70 (23.34)	15.54 (23.35)	15.62 (22.84)
5	Lambda cyhalothrin 5 EC	50	14.20 (22.11)	13.98 (21.95)	14.09 (22.03)
6	Acephate 75 SP	2000	14.75 (22.17)	14.35 (22.25)	14.55 (22.41)
7	Profenofos 50 EC	400	15.25 (22.98)	14.90 (22.69)	15.07 (22.83)
8	NSE 5 %	1500 ml/ha	17.55 (24.76)	16.95 (24.26)	17.25 (24.51)
9	Untreated control		28.42 (30.91)	27.85 (31.36)	28.13 (31.13)
	SE ±		0.587	0.617	
	CD at 5 %		1.760	1.850	

DAS- Days after spraying
*Figures in paranthesis are arcsine transformed values

Table 5 : Efficacy of insecticides against Leaf miner after third spray (65 days after transplanting).

Sr. No	Treatments	Dose g a.i./ ha	Per cent leaf miner infestation after third spray		Mean
			5 DAS	7 DAS	
1	Acetamiprid 20 SP	50	15.10 *(22.84)	14.92 (22.72)	15.01 (22.78)
2	Emamectin benzoate 5 SG	9.5	12.20 (20.42)	11.75 (20.04)	11.97 (20.23)
3	Spinosad 45 SC	75	13.00 (21.13)	12.65 (20.83)	12.85 (20.98)
4	Alfa Cypermethrin 10 EC	25	14.55 (22.42)	14.20 (22.13)	14.37 (22.27)
5	Lambda cyhalothrin 5 EC	50	13.76 (21.77)	13.20 (21.30)	13.48 (21.53)

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6	Acephate 75 SP	2000	14.00 (21.97)	13.45 (21.51)	13.72 (21.77)
7	Profenofos 50 EC	400	14.25 (22.17)	13.86 (21.85)	14.05 (22.01)
8	NSE 5 %	1500 ml/ha	16.30 (23.81)	15.95 (23.52)	16.12 (23.66)
9	Untreated control		35.20 (36.39)	37.65 (37.85)	36.42 (37.12)
	SE ±		0.365	0.319	
	CD at 5 %		1.095	0.957	

DAS- Days after spraying
*Figures in paranthesis are arcsine transformed values

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