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RESEARCH NOTE

Management of american serpentine leaf miner, *Liriomyza trifolii* (Burgess) on tomato

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ABSTRACT: A pot culture experiment was conducted to assess the efficacy of selected non chemicals and insecticides against *Liriomyza trifolii* in tomato at College of Agriculture, Vellayani, Kerala during 2016-17. Among the various treatments chlorantraniliprole 18.5 SC 0.03 % at 10 days interval was found to be the best treatment in reducing leaf damage (percentage), number of mines plant^{-1} and number of larvae plant^{-1}. Among the non-chemicals, fish amino acid 0.5 % at 10 days interval and NSKE 5 % at 10 days interval were found effective in reducing the incidence of leaf miner in tomato.

Keywords: Serpentine leaf miner, non-chemicals, *Liriomyza trifolii*

American serpentine leaf miner, *Liriomyza trifolii* Burgess (Diptera: Agromyzidae) was introduced to India along with chrysanthemum planting materials in 1991 and it was first recorded from castor plants in Hyderabad Viraktamath *et al.,* 1993). Adult flies deposit eggs by making oviposition punctures in the leaf surface. Emerging maggot feed on the mesophyll tissues and make characteristic serpentine mines. Heavily infested tomato plants will not set fruits (Singh and Nath, 2006). Management of leaf miner is very difficult due to the characters like small body size, brief life stages, high oviposition rate, hidden larval stages and fast development of resistance to insecticides (Pawar and Patil, 2013). In this scenario, botanicals and safe insecticides can be promoted in order to overcome the harmful effects of synthetic highly toxic insecticides. So the present study is envisaged to identify green labeled insecticides and non-chemicals for the effective management of *L. trifolii* in tomato.

A pot culture experiment was conducted in completely randomized design with 13 treatments and 3 replications including an untreated check at College of Agriculture, Vellayani, Thiruvananthapuram, Kerala. Tomato variety Vellayani Vijai was selected for the study. Sprays were given from one week after transplanting. The various treatments were neem oil 2.5%, NSKE 5%, oxuron 0.5%, fish amino acid 0.5%, flubendiamide 20 WG 0.025% and chlorantraniliprole 18.5 SC 0.03% at 10 days interval and the same non-chemicals and insecticides at 20 days interval. Observations on percentage leaf damage, number of mines plant^{-1} and number of larvae plant^{-1} were recorded on four randomly selected plants in each treatment at 5, 15, 25 and 35 days after spraying. The obtained data were analyzed statistically after proper transformation. The data on effect of treatments on leaf damage number of mines plant^{-1} and number of larvae plant^{-1} at 5, 15, 25, 35 days after sprayings are presented in Table 1, 2 and 3.

The percent leaf damage ranged from 9.34 to 47.74 at 5 days after spraying. Lowest leaf damage of 9.34 per cent was recorded in chlorantraniliprole 18.5 SC 0.03% at 20 days interval followed by chlorantraniliprole 18.5 SC 0.03% at 10 days interval (9.95) and were statistically on par. Among the various non-chemicals tested, lowest leaf damage of 18.18 per cent was observed in fish amino acid 0.5% at 10 days interval treated plants followed by fish amino acid 0.5% at 20 days interval with a percentage leaf damage of 18.82 and these treatments were on par with NSKE 5% at 10 days interval (19.15) and NSKE 5% at 20 days interval (19.23).

At 15 days after spraying, lowest percentage of leaf damage was observed in treatment with chlorantraniliprole 18.5 SC 0.03% at 10 days interval (5.32) which was significantly superior to all other treatments. The second best treatment was chlorantraniliprole 18.5 SC 0.03% at 20 days interval with leaf damage of 9.47 per cent which was significantly

Table 1. Effect of treatments on damage caused by *L. trifolii* on tomato.

Treatment	Leaf damage (%)				Number of mines plant^{-1}				Number of larvae plant^{-1}			
	5 DAS	15 DAS	25 DAS	35 DAS	5 DAS	15 DAS	25 DAS	35 DAS	5 DAS	15 DAS	25 DAS	35 DAS
Neem oil 2.5% @ 10 days interval	25.71	18.41	19.42	14.61	3.92 (1.95)	6.5 (2.54)	15.95 (3.9)	16.25 (4.09)	0.67 (1.08)	0.75 (1.11)	2.00 (1.57)	1.58 (1.45)
Neem Seed Kernel Extract 5% @ 10 days interval	19.15	14.63	14.49	13.56	3.08 (1.74)	5.17 (2.28)	10.33 (3.20)	14.08 (3.81)	0.67 (1.08)	0.50 (0.99)	1.25 (1.32)	1.00 (1.22)
Oxuron 0.5% @ 10 days interval	23.10	17.87	20.02	14.63	5.67 (2.38)	7.83 (2.78)	16.92 (4.08)	20.50 (4.59)	1.00 (1.22)	0.83 (1.16)	2.92 (1.84)	2.83 (1.82)
Fish amino acid 0.5% @ 10 days interval	18.18	13.70	12.88	10.40	2.42 (1.55)	5.00 (2.24)	8.75 (2.96)	13.83 (3.74)	0.50 (1.0)	0.42 (0.95)	0.83 (1.16)	0.58 (1.03)
Flubendiamide 20 WG 0.025% @10 days interval	14.81	12.99	12.25	10.69	2.00 (1.41)	4.67 (2.16)	6.92 (2.63)	13.75 (3.77)	0.58 (1.03)	0.58 (1.03)	1.50 (1.40)	1.33 (1.34)
Chlorantraniliprole 18.5 SC 0.03% @ 10 days interval	9.95	5.32	2.98	1.52	0.75 (0.83)	0.67 (0.81)	2.17 (1.47)	1.83 (1.43)	0.08 (0.76)	0.00 (0.70)	0 (0.70)	0 (0.70)
Neem oil 2.5% @ 20 days interval	26.15	31.20	21.11	22.87	3.75 (1.94)	10.25 (3.20)	16.85 (4.11)	23.17 (4.87)	0.67 (1.08)	1.50 (1.41)	2.08 (1.60)	2.25 (1.66)
Neem Seed Kernel Extract 5% @ 20 days interval	19.23	20.30	16.15	17.32	3.50 (1.73)	6.75 (2.60)	10.58 (3.25)	17.67 (4.25)	0.58 (1.03)	0.83 (1.16)	1.75 (1.49)	1.42 (1.39)
Oxuron 0.5% @ 20 days interval	23.48	26.59	22.12	23.49	5.50 (2.34)	11.33 (3.36)	21.02 (4.58)	23.67 (4.92)	1.00 (1.22)	1.58 (1.45)	2.92 (1.84)	2.83 (1.82)
Fish amino acid 0.5% @ 20 days interval	18.82	18.51	15.72	16.18	2.75 (1.65)	5.67 (2.38)	10.58 (3.25)	16.42 (4.11)	0.50 (0.99)	0.58 (1.01)	0.92 (1.18)	1.00 (1.22)
Flubendiamide 20 WG 0.025% @ 20 days interval	14.03	17.58	13.73	14.54	1.92 (1.39)	5.33 (2.30)	9.50 (3.07)	14.92 (3.91)	0.58 (1.03)	0.67 (1.08)	1.58 (1.45)	1.58 (1.42)
Chlorantraniliprole 18.5 SC 0.03% @ 20 days interval	9.34	9.47	5.64	6.11	0.58 (0.76)	3.00 (1.72)	4.33 (2.07)	4.75 (2.28)	0.08 (0.76)	0.08 (0.76)	0 (0.70)	0 (0.70)
Untreated check	47.44	40.56	39.44	37.25	9.25 (3.04)	17.83 (4.21)	47.67 (6.91)	47.5 (6.92)	1.92 (1.55)	2.92 (1.84)	7.08 (2.75)	5.92 (2.53)
CD (0.05)	2.646	3.156	3.006	4.213	0.411	0.326	0.474	0.600	0.189	0.169	0.220	0.253

*DAS-Days after spraying

** Figures in parenthesis are √x+0.5 transformed values

different from all other treatments. Among the non-chemicals, fish amino acid 0.5% at 10 days interval was the best treatment with leaf damage of 13.70 per cent followed by NSKE 5% at 10 days interval (14.63). Similar results were recorded at 25 and 35 days after spraying also.

Lowest number of mines plant^{-1} was observed in plots treated with chlorantraniliprole 18.5 SC 0.03% at 10 days interval which was significantly different from all other treatments with 1.83 mines plant^{-1} at 35 days after spraying. Chlorantraniliprole 18.5 SC 0.03% at 20 days interval was also recorded lesser number of mines plant^{-1} (4.75). Out of the various non-chemicals tested, fish amino acid 0.5% at 10 days interval recorded lowest number of mines with 13.83 mines plant^{-1} which was statistically on par with NSKE 5% at 10 days interval (14.08), neem oil 2.5% at 10 days interval (16.25), fish amino acid 0.5% at 20 days interval (16.42) and NSKE 5% at 20 days interval (17.67).

The larval population ranged from 0 to 5.92 at 35 days after spraying. Absolute reduction of larval population was observed in chlorantraniliprole 18.5 SC 0.03% at 10 days interval and chlorantraniliprole 18.5 SC 0.03% at 20 days interval. Among the tested non-chemicals, significant reduction of number of larva was observed in fish amino acid 0.5% at 10 days interval treated plants with 0.58 larva plant^{-1}. It was on par with NSKE 5% at 10 days interval and fish amino acid 0.5% at 20 days interval with larval population of 1.00 for each treatment. Kousika *et al.,* (2015) also recorded the superiority of chlorantraniliprole 30 g a.i. ha^{-1} in reducing the leaf damage and leaf miner population in tomato. Similar findings were also made by Thamilarasi (2016) in cowpea and salad cucumber who recorded complete absence of larval stages at 15 days after spraying.

From the present studies, chlorantraniliprole 18.5% SC at 10 days interval is found to be the best treatment in reducing the percentage infestation of leaf mines, number of mines plant^{-1} and number of larvae plant^{-1}.

Among the non chemicals tested, the most effective treatment was fish amino acid 0.5% at 10 days interval. The second best treatment among the nonchemicals is NSKE 5% at 10 days interval. Reports by Pawar *et al.*, (1996) and Ganapathy *et al.*, (2010) are in conformity with the present findings.

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