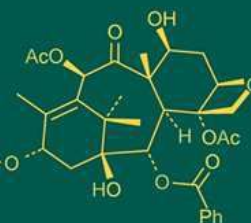
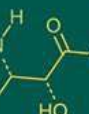
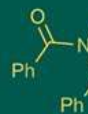
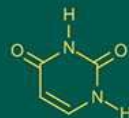


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; SP-8(8): 1301-1305
www.biochemjournal.com
Received: 25-05-2024
Accepted: 03-07-2024

Tejaswini EH
Department of Sericulture,
College of Agriculture, UAS,
GKVK, Bengaluru,
Karnataka, India

Fatima Sadatulla
Department of Sericulture,
College of Agriculture, UAS,
GKVK, Bengaluru,
Karnataka, India

Management of mulberry thrips through chemical insecticides

Tejaswini EH and Fatima Sadatulla

DOI: <https://doi.org/10.33545/26174693.2024.v8.i8Sq.2035>

Abstract

In the present investigation, attempt was made to find out effective chemicals for the management of mulberry thrips, *Pseudodendrothrips mori*. The field experiment results revealed that among the insecticides, fipronil 5 SC @ 2 ml/l recorded lowest thrips population with longer persistency followed by Imidacloprid 17.8 SC @ 0.3 ml/l and Dimethoate 30 EC @ 2 ml/l.

Keywords: Mulberry thrips, *Pseudodendrothrips mori*, insecticides, fipronil 5 SC, imidacloprid 17.8 SC, dimethoate 30 EC

Introduction

Sericulture is an integral part of the rural economy in India. Good quality and quantity mulberry leaves is hampered by pests (18%), diseases (24%), weeds (7%) and others (51%). Among the insect pests, mulberry is very much prone to sap feeders. They are commonly known as sap suckers which pierce the plant cell in leaves and suck the juice. Amongst the sap suckers infesting mulberry, infestation by thrips is highest with 42.55 percent which results in 40-50 per cent yield loss. In addition to decrease in yield and quality of mulberry leaves, thrips infestation lowers the moisture content, chlorophyll a/b ratio, protein content and carbohydrate content of mulberry leaves. Thrips infested mulberry leaves when fed to silkworms causes slower development, increased larval mortality and reduces cocoon yield and quality. Dichlorvos 76 EC is the most commonly recommended insecticide against insect pests in mulberry which has been banned from 31st December 2020. Therefore, it is need of the hour to explore the efficacy of new molecules of insecticides introduced recently for management of thrips and to select the best insecticide among them as substitute for Dichlorvos 76 EC with minimum effect on silkworm performance and cocoon productivity.

Materials and Methods

The investigation on "Management of mulberry thrips through chemical insecticides and their impact on silkworm rearing performance" was conducted during 2020-21, at the Department of Sericulture, University of Agricultural Sciences, GKVK, Bengaluru. The experimental site is located in the Eastern Dry Zone (zone-5) of Karnataka at 12°58' N latitude and 77°35' E longitude and at an altitude of 930 m above mean sea level.

Table 1: Experimental details:

Crop	Mulberry
Variety	Victory-I(V1)
spacing	(90+150) *60 cm (paired row)
No. of treatments	7
No. of replications	3
Season	Summer 2021
Crop period	February-April 2021
Design	RCBD
Gross plot size	200.7 m ²
Net plot size	116.4 m ²

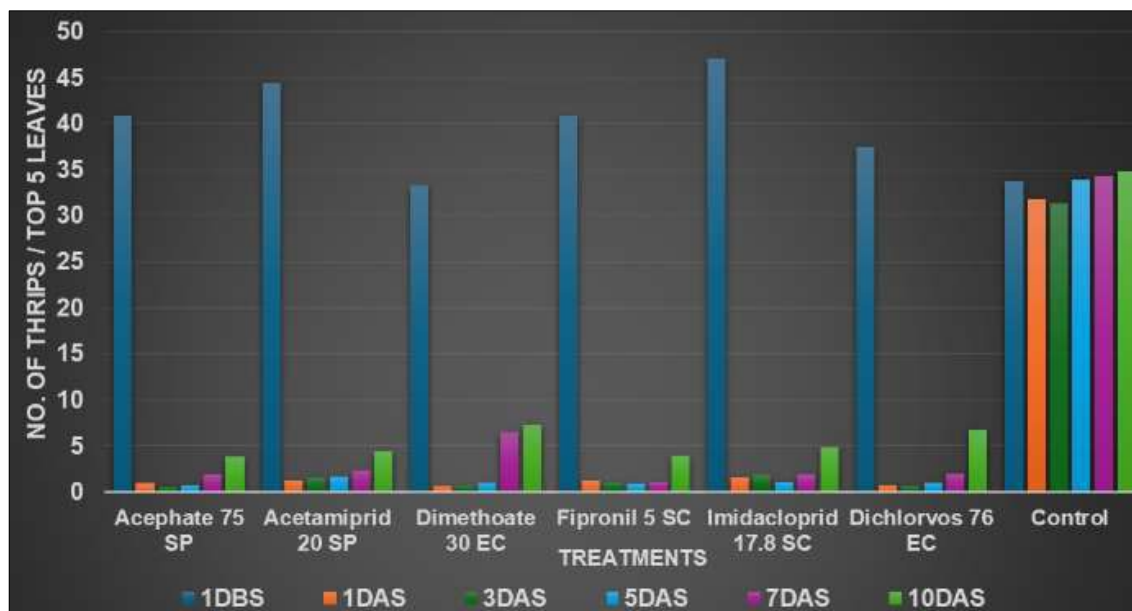
Corresponding Author:
Tejaswini EH
Department of Sericulture,
College of Agriculture, UAS,
GKVK, Bengaluru,
Karnataka, India

Table 2: Treatment details:

Treatment No.	Treatment	Dosage
T ₁	Acephate 75 SP	1.00 g/l
T ₂	Acetamiprid 20 SP	0.20 g/l
T ₃	Dimethoate 30 EC	2.00 ml/l
T ₄	Fipronil 5 SC	2.00 ml/l
T ₅	Imidacloprid 17.8 SC	0.30 ml/l
T ₆	Dichlorvos 76 EC (std check)	2.63 ml/l
T ₇	Control (water spray)	-

Experimental results

The number of thrips recorded for top 5 leaves at 1st, 3rd, 5th, 7th and 10th day after spraying of insecticides was significantly higher in control (Water spray) in both 1st and 2nd spray. Among the six insecticides evaluated, significantly lower number of thrips were recorded in acephate (3.80/5 leaves) followed by fipronil, acetamiprid, imidacloprid dichlorvos and dimethoate (Table 1, Fig1). In 2nd spray the lowest number of thrips was recorded in acetamiprid (1.40/5 leaves) followed by acephate, fipronil, imidacloprid, dichlorvos and dimethoate. (Table 2, Fig 2)

**Fig 1:** Population of mulberry thrips after first spray at 20 days after pruning**Table 1:** Efficacy of chemical insecticides on mulberry thrips population at 20 days after pruning

Treatments	Pre-spray count	No. of thrips/top five leaves									
		Post spray count					Protection over control (%)				
		1 DAS	3 DAS	5 DAS	7 DAS	10 DAS	1 DAS	3 DAS	5 DAS	7 DAS	10 DAS
T ₁ (Acephate 75 SP)	40.93	0.93	0.53	0.80	1.93	3.80	97.13	98.03	96.85	93.42	88.37
T ₂ (Acetamiprid 20 SP)	44.40	1.27	1.53	1.67	2.33	4.40	95.73	94.94	95.00	92.48	86.04
T ₃ (Dimethoate 30 EC)	33.27	0.60	0.73	0.93	6.53	7.27	97.98	97.62	97.10	78.77	77.19
T ₄ (Fipronil 5 SC)	40.87	1.20	1.07	0.87	1.09	3.93	95.75	96.41	97.31	95.63	88.44
T ₅ (Imidacloprid 17.8 SC)	47.07	1.60	1.87	1.07	1.93	4.93	95.05	94.29	96.96	94.68	85.64
T ₆ (Dichlorvos 76 EC)	37.47	0.80	0.60	0.93	2.07	6.73	96.75	97.66	96.91	93.71	79.44
T ₇ (Control)	33.80	31.87	31.40	33.93	34.33	34.80	-	-	-	-	-
F- test	NS	*	*	*	*	*	NS	*	NS	*	*
S. Em. ±	3.192	0.543	0.523	0.815	0.935	0.960	1.045	0.698	1.047	2.321	1.331
CD @ 5%	9.836	1.673	1.610	2.512	2.882	2.959	3.293	2.201	3.298	7.313	4.195

Population of thrips at 20 days after pruning

In this study efficacy of selected new insecticides was assessed against mulberry thrips *Pseudodendrothrips mori* in the field. Most of the insecticides assessed were found effective on mulberry thrips.

The number of thrips for top five leaves recorded one day before spray revealed non-significant difference in thrips population indicating uniform distribution of thrips in all the treatments. The thrips population varied from 33.80 to 47.07 (Table 1; Fig 1). The number of thrips recorded for top five leaves on first day after spray was significantly higher in untreated control. Among the seven treatments, lowest number of thrips was recorded in T₃ (Dimethoate 30 EC @ 2 ml/l) (0.60/top 5 leaves), followed by T₆ (dichlorvos 76 EC @ 2.63 ml/l) (0.80/top 5 leaves), T₁ (acephate 75 SP @ 1

g/l) (0.93/top 5 leaves), T₄ (fipronil 5 SC @ 2 ml/l) (1.20/top 5 leaves), T₂ (acetamiprid 20 SP @ 0.2 g/l) (1.27/top 5 leaves), T₅ (Imidacloprid 17.8 SC @ 0.3 ml/l) (1.60/top 5 leaves), and control (water spray) recorded (31.87/top 5 leaves). However, there is no significant difference in the per cent reduction in the pest density over control among the treatments, but it was highest in case of T₃ (dimethoate 30 EC @ 2 ml/l) (97.98%), followed by T₁ (acephate 75 SP @ 1 g/l) (97.13%), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (96.75%) and T₄ (Fipronil 5 SC @ 2 ml/l) (95.75%), T₂ (acetamiprid 20 SP @ 0.2 g/l) (95.73%) and the least was recorded in T₅ (Imidacloprid 17.8 SC @ 0.3 ml/l) (95.05%). Dimethoate 30 EC is a widely used organophosphate insecticide, it is an acetylcholinesterase inhibitor which disables cholinesterase, an enzyme essential

for central nervous system function. It acts as both contact and systemic insecticide

On the third day after spray, significantly lowest number of thrips was recorded in T₁ (Acephate 75 SP @ 1 g/l) (0.53/top 5 leaves), followed by T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (0.60/top 5 leaves), T₃ (dimethoate 30 EC @ 2 ml/l) (0.73/top 5 leaves), T₄ (fipronil 5 SC @ 2 ml/l) (1.07/top 5 leaves), T₂ (acetamiprid 20 SP @ 0.2 g/l) (1.53/top 5 leaves) and T₅ (Imidacloprid 17.8 SC @ 0.3 ml/l) (1.87/top 5 leaves) and the highest population of thrips was recorded in control (Water spray) (31.40/top 5 leaves). However, the per cent reduction in the pest density over control was significantly higher in case of T₁ (Acephate 75 SP @ 1 g/l) (98.03%), followed by T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (97.66%), T₃ (dimethoate 30 EC @ 2 ml/l) (97.62%), T₄ (fipronil 5 SC @ 2 ml/l) (96.41%), T₂ (acetamiprid 20 SP @ 0.2 g/l) (94.94%) and T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (94.29%). Acephate is an organophosphate systemic insecticide used to control sucking and biting insects by direct contact or ingestion, it also binds to and inhibit the acetylcholinesterase enzyme in nervous system tissues.

On fifth day after spray significantly lower number of thrips were recorded in T₁ (Acephate 75 SP @ 1 g/l) (0.80/top 5 leaves) followed by T₄ (Fipronil 5 SC @ 2 ml/l) (0.87/top 5 leaves), T₃ (Dimethoate 30 EC @ 2 ml/l) (0.93/top 5 leaves), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (0.93/top 5 leaves), T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (1.07/top 5 leaves) and T₂ (acetamiprid 20 SP @ 0.2 g/l) (1.67/top 5 leaves) and control (water spray) recorded the highest population of 33.93 for top 5 leaves. However, there was no significant difference in the per cent reduction in thrips density over control and it was higher in case of T₄ (Fipronil 5 SC @ 2 ml/l) (97.31%) followed by T₃ (Dimethoate 30 EC @ 2 ml/l) (97.10%), T₅ (Imidacloprid 17.8 SC @ 0.3 ml/l) (96.96%), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (96.91%), T₁ (Acephate 75 SP @ 1g/l) (96.85%) and T₂ (acetamiprid 20 SP @ 0.2 g/l) (95%).

On seventh day after spray significantly lowest number of thrips were recorded with fipronil 5 SC @ 2 ml/l (1.09/top 5 leaves) followed by T₁ (acephate 75 SP @ 1 g/l) (1.93/top 5 leaves), (Imidacloprid 17.8 SC @ 0.3 ml/l) (1.93/top 5 leaves), Dichlorvos 76 EC @ 2.63 ml/l (2.07/top 5 leaves), T₂ (Acetamiprid 20 SP @ 0.2 g/l) (2.33/top 5 leaves), T₃ (Dimethoate 30 EC @ 2 ml/l) (6.53/top 5 leaves) and control (Water spray) (34.33/top 5 leaves). However, the per cent reduction in the pest density over control was significantly higher in case of T₄ (fipronil 5 SC @ 2 ml/l) (95.63%) followed by T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (94.68%), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (93.71%), T₁ (Acephate 75 SP @ 1 g/l) (93.42%), T₂ (acetamiprid 20 SP @ 0.2 g/l) (92.48%), and T₃ (dimethoate 30 EC @ 2 ml/l) (78.77%). Fipronil is a broad-spectrum insecticide that belongs to phenylpyrazole chemical family that disrupts the insect central nervous system by blocking (GABA) gamma - Aminobutyric acid - gated chloride channels and glutamate chloride channels (GluCl).

However, on tenth day after spray the population of thrips gradually increased in all the treatments and it was significantly low in T₁ (acephate 75 SP @ 1 g/l) (3.80/top 5 leaves), followed by T₄ (fipronil 5 SC @ 2 ml/l) (3.93/top 5 leaves), T₂ (acetamiprid 20 SP @ 0.2 g/l) (4.40/top 5 leaves), T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (4.93/top 5 leaves), T₆ (dichlorvos 76 EC @ 2.63 ml/l) (6.73/top 5 leaves) and T₃ (dimethoate 30 EC @ 2 ml/l) (7.27/top 5 leaves). While control (water spray) recorded 34.80 for top 5 leaves. Further, the per cent reduction over control in the thrips density was significantly highest in case of T₄ (fipronil 5 SC @ 2 ml/l) (88.44%) followed by T₁ (acephate 75 SP @ 1 g/l) (88.37%), T₂ (acetamiprid 20 SP @ 0.2 g/l) (86.04%), T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (85.64%), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (79.44%) and T₃ (dimethoate 30 EC @ 2 ml/l) (77.19%). This might be due to reduced efficacy of insecticides.

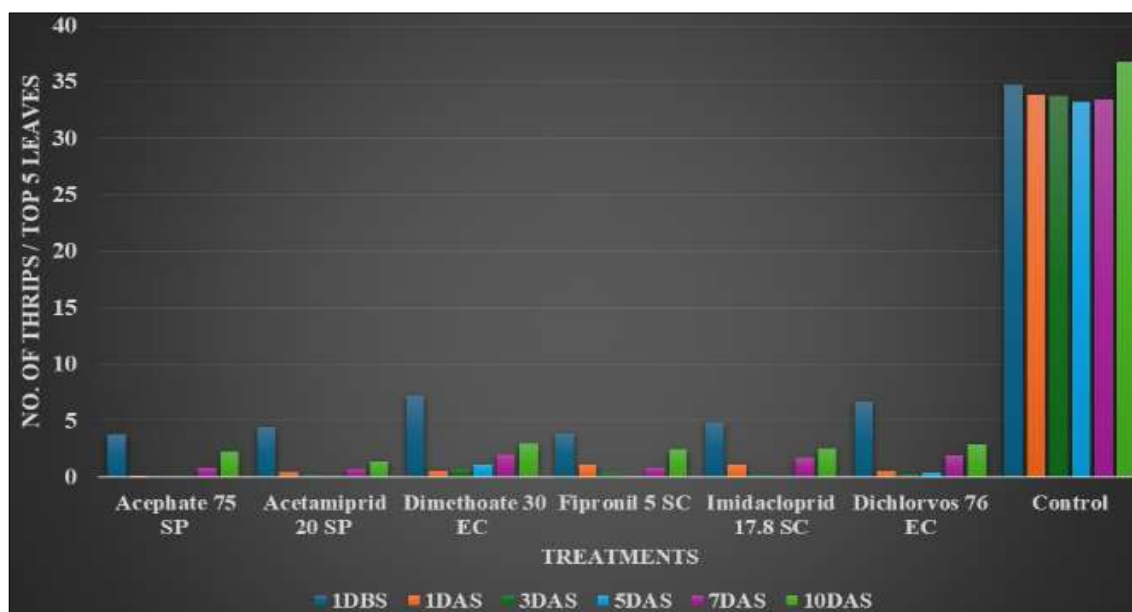


Fig 2: Population of mulberry thrips after second spray at 30 days after pruning

Table 2: Efficacy of chemical insecticides on mulberry thrips population at 30 days after pruning

Treatments	Pre-spray count	No. of thrips/top five leaves									
		Post spray count					Protection over control (%)				
	1DBS	1DAS	3DAS	5DAS	7DAS	10DAS	1DAS	3DAS	5DAS	7DAS	10DAS
T ₁ (Acephate 75 SP)	3.80	0.07	0.00	0.00	0.80	2.27	99.81	100.00	100.00	97.58	93.94
T ₂ (Acetamiprid 20 SP)	4.40	0.47	0.27	0.00	0.73	1.40	98.39	99.06	100.00	97.44	95.96
T ₃ (Dimethoate 30 EC)	7.27	0.53	0.73	1.13	2.00	3.00	98.19	97.35	96.46	93.40	91.20
T ₄ (Fipronil 5 SC)	3.93	1.07	0.40	0.00	0.87	2.47	96.71	98.78	100.00	97.05	92.95
T ₅ (Imidacloprid 17.8 SC)	4.93	1.13	0.27	0.00	1.73	2.53	96.35	99.09	100.00	94.65	92.90
T ₆ (Dichlorvos 76 EC)	6.73	0.60	0.27	0.40	1.93	2.87	98.25	99.17	98.78	94.29	91.91
T ₇ (Control)	34.80	33.87	33.80	33.20	33.40	36.73	-	-	-	-	-
F- test	*	*	*	*	*	*	*	*	*	*	*
S. Em. ±	0.960	0.680	0.556	0.903	0.762	0.867	0.509	0.277	0.216	0.426	0.792
CD @ 5%	2.959	2.096	1.713	2.740	2.347	2.672	1.604	0.872	0.679	1.343	2.494

Population of thrips at 30 days after pruning

Before taking up second spray at thirty days after pruning the thrips population recorded on tenth day after first spray was considered as pre-count. Significant difference was observed between the treatments which could be due to residual toxicity of the first spray given at 20 days after pruning (Table 2; Fig 2). The number of thrips recorded for top five leaves on first day after spray was significantly higher in control (Water spray) (33.87/top 5 leaves). Among the six treatments, significantly lowest number of thrips was recorded in T₁ (Acephate 75 SP @ 1 g/l) (0.07/top 5 leaves) followed by T₂ (Acetamiprid 20 SP @ 0.2 g/l) (0.47/top 5 leaves), T₃ (Dimethoate 30 EC @ 2 ml/l) (0.53/top 5 leaves), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (0.60/top 5 leaves), T₄ (Fipronil 5 SC @ 2 ml/l) (1.07/top 5 leaves) and the least was recorded in T₅ (Imidacloprid 17.8 SC @ 0.3 ml/l) (1.13/top 5 leaves). However, the per cent reduction in the pest density over control was highest in case of T₁ (acephate 75 SP @ 1 g/l) (99.81%) followed by T₂ (acetamiprid 20 SP @ 0.2 g/l) (98.39%), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (98.25%), T₃ (dimethoate 30 EC @ 2 ml/l) (98.19%), T₄ (fipronil 5 SC @ 2 ml/l) (96.71%) and the least was recorded in T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (96.35%).

On the third day after spray, 100 per cent mortality of thrips was recorded in T₁ (acephate 75 SP @ 1 g/l) (0.00/top 5 leaves), followed by T₂ (acetamiprid 20 SP @ 0.2 g/l) (0.27/top 5 leaves), T₆ (dichlorvos 76 EC @ 2.63 ml/l) (0.27/top 5 leaves), T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (0.27/top 5 leaves), T₄ (fipronil 5 SC @ 2 ml/l) (0.40/top 5 leaves), T₃ (dimethoate 30 EC @ 2 ml/l) (0.73/top 5 leaves) and the least was recorded in control (Water spray) (33.80/top 5 leaves). However, the per cent reduction in the pest density over control was significantly higher in case of T₁ (acephate 75 SP @ 1 g/l) (100%), followed by T₆ (dichlorvos 76 EC @ 2.63 ml/l) (99.17%), T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (99.09%), T₂ (acetamiprid 20 SP @ 0.2 g/l) (99.06%), T₄ (fipronil 5 SC @ 2 ml/l) (98.78%) and the least in T₃ (Dimethoate 30 EC @ 2 ml/l) (97.35%).

On fifth day after spray also 100 per cent mortality of thrips was recorded in T₁ (Acephate 75 SP @ 1 g/l) (0.00/top 5 leaves) followed by T₂ (Acetamiprid 20 SP @ 0.2 g/l) (0.00/top 5 leaves), T₄ (fipronil 5 SC @ 2 ml/l) (0.00/top 5 leaves) and T₅ (Imidacloprid 17.8 SC @ 0.3 ml/l) (0.00/top 5 leaves). T₆ (Dichlorvos 76 EC @ 2.63 ml/l) recorded 0.40/top 5 leaves followed by T₃ (dimethoate 30 EC @ 2 ml/l) (1.13 per top 5 leaves) and the least was recorded in control (Water spray) (33.20/top 5 leaves). However, the per cent reduction in thrips density over control was 100 per cent in case of T₁ (acephate 75 SP @ 1g/l) (100%) followed

by T₂ (acetamiprid 20 SP @ 0.2 g/l) (100%), T₄ (fipronil 5 SC @ 2 ml/l) (100%) and T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (100%). T₆ (dichlorvos 76 EC @ 2.63 ml/l) recorded 98.78% and least was recorded in T₃ (Dimethoate 30 EC @ 2 ml/l) (96.46%).

On seventh day after spray significantly lowest number of thrips were recorded in T₂ (acetamiprid 20 SP @ 0.2 g/l) (0.73/top 5 leaves) followed by T₁ (acephate 75 SP @ 1 g/l) (0.80/top 5 leaves), T₄ (Fipronil 5 SC @ 2 ml/l) (0.87/top 5 leaves), T₅ (Imidacloprid 17.8 SC @ 0.3 ml/l) (1.73/top 5 leaves), T₆ (Dichlorvos 76 EC @ 2.63 ml/l) (1.93/top 5 leaves), T₃ (Dimethoate 30 EC @ 2 ml/l) (2/top 5 leaves) and the least was recorded in control (water spray) (33.40/top 5 leaves). However, the per cent reduction in the thrips density over control was significantly higher in case of T₁ (Acephate 75 SP @ 1 g/l) (97.58%), T₂ (Acetamiprid 20 SP @ 0.2 g/l) (97.44%), T₄ (fipronil 5 SC @ 2 ml/l) (97.05%), T₅ (imidacloprid 17.8 SC @ 0.3 ml/l) (94.65%), T₆ (dichlorvos 76 EC @ 2.63 ml/l) (94.29%) and it was found least in T₃ (dimethoate 30 EC @ 2 ml/l) (93.40%).

Discussion

Subramanian *et al.* (2010) reported that dichlorvos (0.076%) and acetamiprid (0.03%), were most effective, recording significantly lower thrips population levels. Misra *et al.* (2003) studied the effect of certain insecticides like dimethoate (0.2%), quinalphos (0.2%), imidacloprid (0.05%) and methyl parathion (0.2%) in the management of *Pseudodendrothrips mori* in mulberry and the results revealed that imidacloprid (0.05%) was found to be very effective. Poornima (2015) [3] also reported that acetamiprid 20 SP @ 0.25 g and fipronil 5 SC @ 1 ml/l were effective in controlling the thrips.

Conclusion

Though acephate and acetamiprid recorded higher reduction in population of thrips, mulberry leaves exhibited phytotoxic symptoms as well as reduced population of natural enemy (coccinellid). As an alternative to dichlorvos, fipronil, imidacloprid and dimethoate can be used for managing thrips in mulberry.

Reference

- Subramanian S, Muthuswami M, Krishnan R, Thangamalar A, Indumathi P. Bioefficacy of botanicals and insecticides against mulberry thrips, *Pseudodendrothrips mori* Niwa. KA J Agril Sci. 2010;23(1):47-50.

2. Misra S, Reddy CR, Sivaprasad V, Reddy KD. Effect of certain insecticides in controlling *Pseudodendrothrips mori* in mulberry. *Int. J Ind Entomol.* 2003;7(1):83-86.
3. Poornima MH. Bioefficacy of newer insecticides and non-chemicals against mulberry thrips and their safety to silkworms. MSc thesis, University of Agricultural Sciences, Dharwad (India); c2015.
4. Tejaswini EH. Management of Mulberry Thrips Through Chemical Insecticides and Their Impact on Silkworm Rearing Performance (Doctoral dissertation, University of Agricultural Sciences, Bangalore); c2021.
5. Sakthivel N, Qadri SM. Efficacy of certain insecticides and botanicals against mulberry thrips, *Pseudodendrothrips mori* Niwa (Thysanoptera: Thripidae). *Indian Journal of Entomology.* 2010;72(2):152-154.