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## Efficacy of chemical insecticides on percent mortality of mulberry thrips under laboratory condition

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### Abstract

In the present investigation, attempt was made to find out effective chemicals for the management of mulberry thrips, *Pseudodendrothrips mori*. Initially, selected chemical insecticides were assessed in laboratory (Acephate 75 SP, Acetamiprid 20 SP, Dimethoate 30 EC, Fipronil 5 SC, Imidacloprid 17.8 SC, Dichlorvos 76 EC (std check), Control (water spray). Based on laboratory results, promising insecticides at recommended concentrations were assessed in field against mulberry thrips. The results under the laboratory conditions revealed that all insecticides showed positive results on mortality of mulberry thrips from 1<sup>st</sup> day till 5<sup>th</sup> day of treatment.

**Keywords:** Mulberry thrips, *Pseudodendrothrips mori*, chemical insecticides

### Introduction

Mulberry silkworm is monophagous in nature; therefore, mulberry is the only food plant of silkworm, *Bombyx mori*. Hence quality of mulberry leaf has a predominant influence on the growth and development of silkworm and the quality of cocoons. The production of quality mulberry leaves is based on several factors such as cultivation practices, variety, biotic and abiotic factors (Krishnaswami *et al.* 1970) <sup>[5]</sup>.

The production of good quality leaves in required quantity is influenced by pests (18%), diseases (24%), weeds (7%) and others (51%) (Govindaiah *et al.* 2005) <sup>[4]</sup>. Since mulberry is prone to several insect pest which hampers the production of good quality as well as quantity of mulberry leaves. Mulberry thrips *Pseudodendrothrips mori* is one of the most serious sucking pests on mulberry during summer, which leads to significant reduction in leaf yield and quality therefore it is necessary to find the best chemical insecticide for its management without affecting leaf quality and quantity, in order to get good rearing performance. Under this investigation, attempts were made to find the best insecticides at certain concentrations to achieve the above-mentioned objectives.

### 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-1(V1)
No. of treatments	19
No. of replications	3
Season	Summer 2021

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**Table 2:** Treatment details of chemicals used in the laboratory evaluation against *P. mori*

Treatment No.	Treatment	Dosage
T <sub>1</sub>	Acephate 75 SP	0.50 g / l
T <sub>2</sub>	Acephate 75 SP	1.00 g / l
T <sub>3</sub>	Acephate 75 SP	1.50 g / l
T <sub>4</sub>	Acetamiprid 20 SP	0.10 g / l
T <sub>5</sub>	Acetamiprid 20 SP	0.20 g / l
T <sub>6</sub>	Acetamiprid 20 SP	0.30 g / l
T <sub>7</sub>	Dimethoate 30 EC	1.00 ml / l
T <sub>8</sub>	Dimethoate 30 EC	2.00 ml / l
T <sub>9</sub>	Dimethoate 30 EC	3.00 ml / l
T <sub>10</sub>	Fipronil 5 SC	1.00 ml / l
T <sub>11</sub>	Fipronil 5 SC	2.00 ml / l
T <sub>12</sub>	Fipronil 5 SC	3.00 ml / l
T <sub>13</sub>	Imidacloprid 17.8 SC	0.15 ml / l
T <sub>14</sub>	Imidacloprid 17.8 SC	0.30 ml / l
T <sub>15</sub>	Imidacloprid 17.8 SC	0.45 ml / l
T <sub>16</sub>	Dichlorvos 76 EC	1.31 ml / l
T <sub>17</sub>	Dichlorvos 76 EC	2.63 ml / l
T <sub>18</sub>	Dichlorvos 76 EC	3.94 ml / l
T <sub>19</sub>	Control	-

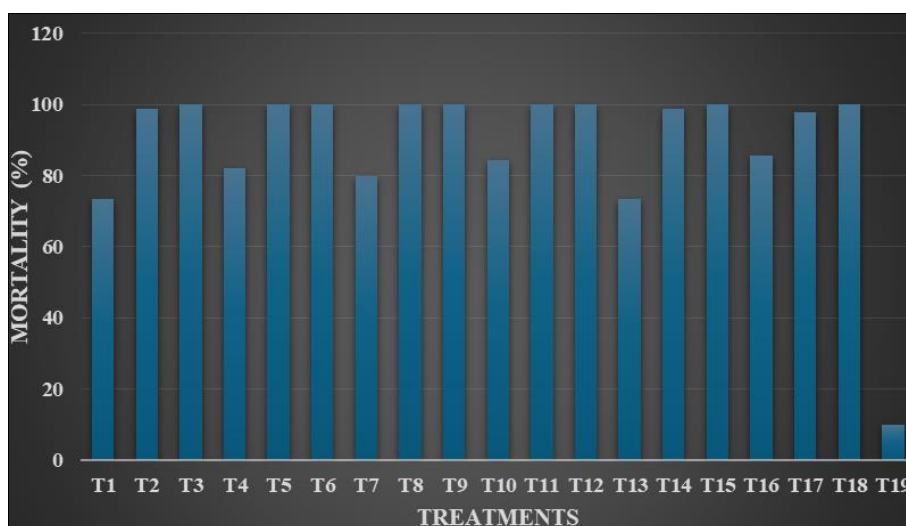
### Assessment of efficacy of chemical insecticides against mulberry thrips, *Pseudodendrothrips mori* under lab condition

Efficacy of various chemical insecticide molecules used in the study were tested in the laboratory at different concentrations

against mulberry thrips, *P. mori*. The main purpose of the study was to determine the effective insecticides on mulberry thrips and also to determine the effective concentration for further field efficacy studies.

The chemical insecticide molecules were tested in the laboratories using leaf dip bioassay method (Arshad *et al.*, 2015) [1]. Healthy and succulent fresh leaves were selected and harvested from mulberry plants and were brought to the laboratory. Insecticide solution at different concentrations were prepared and kept ready in glass beakers (5000 ml). Harvested succulent mulberry leaves were selected and with the help of forceps they were dipped into the insecticide solution for 2-3 seconds, after shade drying, the leaves were placed on water-soaked cotton which were kept on a petri plate to maintain the moisture of the leaves. Thirty numbers of second instar nymphs were carefully transferred on to the leaves on each petri-plate with the help of camel hair brush. The petri plates were kept at normal room temperature (27 °C) and RH (56%). Using binocular microscope mortality was recorded after every 24 hours till 5 days after treatment. Paintbrush is used to stimulate individual thrips, recording those that are incapacitated or fail to show any signs of movement as 'dead'. The total number of dead thrips per each petri plate were observed and recorded. Treatment details of the laboratory bioassay study is provided in Table 2. (IRAC 2010) [2].

### Results and Discussion



**Fig 1:** Efficacy of insecticides on mortality (%) of thrips under laboratory condition

T<sub>1</sub> - Acephate 75 SP @ 0.5 g / l

T<sub>2</sub> - Acephate 75 SP @ 1 g / l

T<sub>3</sub> - Acephate 75 SP @ 1.5 g / l

T<sub>4</sub> - Acetamiprid 20 SP @ 0.1 g / l

T<sub>5</sub> - Acetamiprid 20 SP @ 0.2 g / l

T<sub>6</sub> - Acetamiprid 20 SP @ 0.3 g / l

T<sub>7</sub> - Dimethoate 30 EC @ 1 ml / l

T<sub>8</sub> - Dimethoate 30 EC @ 2 ml / l

T<sub>9</sub> - Dimethoate 30 EC @ 3 ml / l

T<sub>10</sub> - Fipronil 5 SC @ 1 ml / l

T<sub>11</sub> - Fipronil 5 SC @ 2 ml / l

T<sub>12</sub> - Fipronil 5 SC @ 3 ml / l

T<sub>13</sub> - Imidacloprid 17.8 SC @ 0.15 ml / l

T<sub>14</sub> - Imidacloprid 17.8 SC @ 0.3 ml / l

T<sub>15</sub> - Imidacloprid 17.8 SC @ 0.45 ml / l

T<sub>16</sub> - Dichlorvos 76 EC @ 1.31 ml / l

T<sub>17</sub> - Dichlorvos 76 EC @ 2.63 ml / l

T<sub>18</sub> - Dichlorvos 76 EC @ 3.94 ml / l

T<sub>19</sub> - Control (untreated)

### Efficacy of insecticides on mortality (%) of thrips under laboratory condition

The efficacy of chemical insecticides at different concentrations against mulberry thrips (*Pseudodendrothrips mori*) on V-1 mulberry leaves under laboratory condition revealed significant results (Table 3; Fig 1). All the insecticides showed positive result on mortality of mulberry thrips from the first day till fifth day of the treatment. Among the treatments T<sub>3</sub> (acephate 1.5 g / l), T<sub>5</sub> (Acetamiprid 0.2 g / l), T<sub>6</sub> (Acetamiprid 0.3 g / l), T<sub>8</sub> (dimethoate 2 ml / l), T<sub>9</sub> (dimethoate 3 ml / l), T<sub>11</sub> (fipronil 2 ml / l), T<sub>12</sub> (Fipronil 3 ml / l), T<sub>8</sub> (Dimethoate 2 ml / l), T<sub>9</sub> (dimethoate 3 ml / l), T<sub>11</sub> (Fipronil 2 ml / l), T<sub>12</sub> (fipronil 3 ml / l)

l), T<sub>15</sub> (imidacloprid 0.45 ml / l) and T<sub>18</sub> (Dichlorvos 3.94 ml / l) showed 100 per cent mortality. The lowest mortality of mulberry thrips was observed in T<sub>1</sub> (Acephate 0.5 g / l) (73.33%) and T<sub>13</sub> (imidacloprid 0.15 ml / l) (73.33%). T<sub>3</sub> (Acephate 1.5 g / l) showed the highest mortality of 100 per cent at the concentration of 1.5 g / l followed by mortality of 98.89 per cent at 1 g / l concentration. Among the acephate treated leaves least mortality was observed in 0.5 g / l concentration (73.33%).

Among acetamiprid treated leaves, T<sub>5</sub> (Acetamiprid) @ 0.2 g / l and T<sub>6</sub> (acetamiprid) @ 0.3 g / l showed 100 per cent mortality, followed by T<sub>4</sub> (Acetamiprid) @ 0.1 g / l. Among dimethoate treated leaves T<sub>8</sub> (Dimethoate) @ 2 ml / l and T<sub>9</sub> (Dimethoate) @ 3 ml / l showed 100 per cent mortality, followed by T<sub>7</sub> (dimethoate) @ 1 ml / l (80%). Among fipronil treated leaves, T<sub>11</sub> (Fipronil) @ 2 ml / l and T<sub>12</sub> (Fipronil) @ 3 ml / l concentration resulted in 100 per cent mortality, followed by T<sub>10</sub> (Fipronil) @ 1 ml / l (84.44%). T<sub>14</sub> (Imidacloprid) @ 0.3 ml / l showed 98.89 per cent mortality, followed by T<sub>15</sub> (Imidacloprid) 0.45 ml / l (100%). Among the imidacloprid treated leaves least mortality was observed in T<sub>13</sub> (Imidacloprid) @ 0.15 ml / l (73.33%). Dichlorvos 76 EC being used as the standard check recorded 100 percent mortality of thrips when treated @ 3.94 ml

/ l (T<sub>18</sub>), followed by 2.63 ml / l (T<sub>17</sub>) (97.78%) and @ 1.31 ml / l (T<sub>16</sub>) concentration (85.56%). Among the treatments, control recorded least mortality of thrips (10%).

Amongst the lowest concentrations of chemical insecticides assessed dichlorvos 76 EC @ 1.31 ml / l recorded highest mortality of thrips (85.56%) followed by fipronil @ 1 ml / l (84.44%), acetamiprid @ 0.1 g / l (82.22%), dimethoate @ 1 ml / l (80%) and the lowest mortality was observed in imidacloprid @ 0.15 ml / l (73.33%) and acephate @ 0.5 g / l (73.33%). When the chemical insecticides were assessed at the recommended dosage (As per label claim) on other crops, acetamiprid @ 0.2 g / l, dimethoate @ 2 ml / l and fipronil @ 2 ml / l showed 100 percent mortality of mulberry thrips. Recommended dosage of acephate 1 g / l and imidacloprid 0.3 ml / l showed 98.89% mortality of mulberry thrips followed by dichlorvos @ 2.63 ml / l (97.78%). Through laboratory bioassay, it was possible to shortlist the insecticides and their concentrations effective against thrips for field evaluation. (Table. 3, Fig.1). Similarly, Byrne *et al.* (2007) [3] reported that in bioassay with first and second flush leaves, imidacloprid (273 mg a. i., pot<sup>-1</sup>) was the most effective insecticide, providing at least 70 per cent mortality of thrips for 14 weeks.

**Table 3:** Efficacy of insecticides on per cent mortality of thrips under laboratory condition

Treatments	Per cent mortality					Cumulative mortality (%)
	1DAT	2DAT	3DAT	4DAT	5DAT	
T <sub>1</sub> (Acephate 0.5 g/l)	2.22	16.67	17.78	20.00	16.67	73.33
T <sub>2</sub> (Acephate 1 g/l)	6.67	22.22	21.11	24.44	24.44	98.89
T <sub>3</sub> (Acephate 1.5 g/l)	10.00	32.22	25.56	26.67	5.56	100.00
T <sub>4</sub> (Acetamiprid 0.1g/l)	8.89	17.78	24.44	20.00	11.11	82.22
T <sub>5</sub> (Acetamiprid 0.2 g/l)	16.67	30.00	34.44	11.11	7.78	100.00
T <sub>6</sub> (Acetamiprid 0.3 g/l)	27.78	38.89	16.67	16.67	0.00	100.00
T <sub>7</sub> (Dimethoate 1 ml/l)	4.44	13.33	26.67	30.00	5.56	80.00
T <sub>8</sub> (Dimethoate 2 ml/l)	12.22	23.33	36.67	26.67	1.11	100.00
T <sub>9</sub> (Dimethoate 3 ml/l)	16.67	26.67	41.11	15.56	0.00	100.00
T <sub>10</sub> (Fipronil 1ml/l)	13.33	15.56	32.22	6.67	16.67	84.44
T <sub>11</sub> (Fipronil 2ml/l)	17.78	21.11	46.67	14.44	0.00	100.00
T <sub>12</sub> (Fipronil 3ml/l)	20.00	26.67	40.00	13.33	0.00	100.00
T <sub>13</sub> (Imidacloprid 0.15 ml/l)	8.89	15.56	26.67	15.56	6.67	73.33
T <sub>14</sub> (Imidacloprid 0.3 ml/l)	13.33	20.00	38.89	26.67	0.00	98.89
T <sub>15</sub> (Imidacloprid 0.45ml/l)	17.78	26.67	40.00	15.56	0.00	100.00
T <sub>16</sub> (Dichlorvos 1.31ml/l)	20.00	13.33	30.00	13.33	8.89	85.56
T <sub>17</sub> (Dichlorvos 2.63ml/l)	26.67	36.67	21.11	13.33	0.00	97.78
T <sub>18</sub> (Dichlorvos 3.94ml/l)	30.00	42.22	13.33	6.67	7.78	100.00
T <sub>19</sub> (Control)	0.00	0.00	3.33	4.44	2.22	10.00
F- test	*	*	*	*	*	*
S. Em. ±	1.508	2.237	1.873	2.350	1.925	3.184
CD @ 5%	4.317	6.404	5.363	6.728	5.510	9.115

DAT- Days after treatment, \*Significant at 5%

### Summary and Conclusion

The effect of insecticides at different concentrations against mulberry thrips on V-1 mulberry variety under laboratory condition revealed that all the chemical insecticides recorded 100 per cent mortality when used at above recommended concentrations. However, the chemical insecticides *viz.*, acetamiprid @ 0.2 g / l, dimethoate @ 2 ml / l and fipronil @ 2 ml / l showed 100 percent mortality of mulberry thrips when used at recommended dosage and below recommended dosage. Effective insecticides after evaluating under the lab condition were taken up for thrips management under field condition.

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