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## Effect of botanicals in combination with imidacloprid against chilli thrips [*Scirtothrips dorsalis* (Hood)] on chilli (*Capsicum annuum* L.)

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### Abstract

A study was conducted during Kharif 2018 at central agriculture field, SHUATS Prayagraj (Allahabad), Uttar Pradesh (India). Eight treatments were evaluated against *Scirtothrips dorsalis* i.e., Neem oil + imidachloprid @ 2.5 ml/l+0.1 ml/lit, NSKE + imidachloprid @ 50 gm/lit+0.1ml/lit, Karanj oil + imidachloprid @ 10ml/l+0.1ml/lit, Pongamia oil + imidachloprid @ 3ml/lit+0.1ml/lit, Garlic sap extractl + imidachloprid 10gm/lit+0.1ml/lit, Tobacco oil + imidachloprid @ 3ml/l+0.1ml/lit, Imidachloprid 17.8 SL @ 0.2ml/lit and untreated control. Result revealed that maximum mean population of thrips was recorded in control and all the treatments were found effective in reducing the population of thrips as compared to control. Imidachloprid (1.32) was the most effective treatment indicating lowest population of thrips (*Scirtothrips dorsalis* Hood), followed by Neem oil + imidachloprid (1.59) and NSKE + imidachloprid (2.02). Karanj oil + imidachloprid (2.40) and Pongamia oil + imidachloprid (2.78), Tobacco oil + imidachloprid (2.86) and Garlic sap extractl + imidachloprid (2.92) is found least effective among all treatments. Among the treatments the best and most economical treatment was Imidachloprid (1:11.77) followed by Neem oil + imidachloprid (1:11.11), NSKE + imidachloprid (1:8.07), Karanj oil + imidachloprid (1:7.79), Pongamia oil + imidachloprid (1:7.06), Tobacco oil + imidachloprid (1:5.98), Garlic sap extractl + imidachloprid (1:4.91) as compared to (1:3.54) Control.

**Keywords:** *Capsicum annuum*, botanicals, *Scirtothrips dorsalis*, combination, imidacloprid

### Introduction

Chilli (*Capsicum annuum* L.) popularly known as “mirch” in Hindi. It is belongs to the family Solanaceae. Chilli is one of the important vegetable and commercial spice crops. Green fruits are good source of vitamin A and C. Chilli is grown in tropical and subtropical regions in areas over 40°C temperature. It is very sensitive to frost. In India Andhra Pradesh is the major chilli growing state in the country, contributing 33% of national production with an area of 2.35 lakh hectares. The losses cause due to insect pest complex is very enormous. Among various insect pests attacking chilli crop, thrips *Scirtothrips dorsalis* is a major pest causing huge economic losses to chilli growers (Reddy and Sreehari 2009) [3]. India is the largest producer of chillies in the world. In India, it is estimated that, the production during 2003-04 was 10, 60,345 tonnes of dry chilli from an area of 8, 84,183 hectares, as it was 8, 46,160 tonnes during the year 2002-03. The country had the highest production of 11, 13,090 tonnes from 8, and 81,290 hectares in the year 2001-02. In Uttar Pradesh, it is estimated that, the production during 2016-17 was 11.34 million tonnes of chilli from an area of 13.23 hectares.

Chilli thrips multiply appreciably at a faster rate during dry weather periods and caused a yield loss of 30 to 50% in South India (Varadharajan, 1994) [6]. The yield losses 60.5 to 74.3% of green chilli due to thrips was estimated by Patel and Gupta (1992) at Udaipur (Rajasthan).

These days use of botanicals is one of the most common and popular method for its management. So by using the botanicals having novel mode of action with higher bioefficacy on insect control and safer to environment and mammals. Bioefficacy of these botanicals need to be studied for formulating effective and economical management strategies of the chilli thrips in Prayagraj region. Therefore, the present study was under taken and the results obtained are discussed here.

### Materials and Methods

The experiment was conducted during Kharif season, 2018 at the Central Agricultural Research Farm of “Sam Higginbottom University of Agriculture, Technology and Sciences” Prayagraj, Uttar Pradesh, India, in a randomised block design with eight treatment,

using variety Suryamukhi in a plot size of (2m x 2m) at spacing of (45 x 30 cm) with recommended package of practices excluding plant protection.

The spray was done after the population reaching its ETL (3 thrips / plant). The observation of the pests was recorded from three tender leaves of four randomly selected plants from each net plot area and three leaves (top, middle and bottom) from each plant were selected. The average percent reduction of pest population of all two sprays was worked out by using Henderson and Tilton's formula described as under:

$$\text{Percent reduction} = 100 (1 - T_a \times C_b / T_b \times C_a)$$

#### Where

T<sub>a</sub> = Number of insect in treated plot after botanicals application

T<sub>b</sub> = Number of insect in treated plot before botanicals application

C<sub>a</sub> = Number of insect in untreated plot check after botanicals application

C<sub>b</sub> = Number of insect in untreated plot check after botanicals application

The present reduction was transformed to angular values from which analysis of variance was calculated for determining the critical difference (CD) at 5% levels of significance.

The data on thrips population thus converted to the percentage of mortality and were subjected to statistically analysis after arcsine transformation. The data on percentage reduction obtained are presented in table 1 (Overall mean 1<sup>st</sup> and 2<sup>nd</sup> spray). The insecticide treatments include Neem oil + imidachloprid, NSKE + imidachloprid, Karanj oil + imidachloprid, Pongamia oil + imidachloprid, Garlic sap extract + imidachloprid, Tobacco oil + imidachloprid, Imidachloprid along with untreated control. The incidence of the chilli thrips was recorded from the four randomly selected

plants. Observations were recorded one day before spray and 3<sup>rd</sup>, 10<sup>th</sup> days after spraying. Treatment wise yield of healthy marketable fruits was recorded at each picking, converted them in kg/ha and data thus obtained were statistically analyzed. Economics of different treatments were worked out based on yield and cost of treatments.

#### Results and Discussion

In the experiment, eight different treatments were taken, consisting of T<sub>1</sub>-Neem oil + imidachloprid, T<sub>2</sub> -NSKE + imidachloprid, T<sub>3</sub>- Karanj oil + imidachloprid, T<sub>4</sub>-Pongamia oil + imidachloprid, T<sub>5</sub>-Garlic sap extract + imidachloprid, T<sub>6</sub>-Tobacco oil + imidachloprid, T<sub>7</sub>-Imidachloprid and T<sub>0</sub>-control were tested to compare the efficacy against (*Scirtothrips dorsalis* H) and their Influence on yield of chilli.

The data of population of chilli thrips (*Scirtothrips dorsalis* H.) on first and second spray revealed that all the treatments were significantly superior control the treatment Imidachloprid was found significantly superior (1.32) followed by all Neem oil + imidachloprid (1.59) and NSKE + imidachloprid (2.02), Karanj oil + imidachloprid (2.40) and Pongamia oil + imidachloprid (2.78) are found statically at par with each other than Tobacco oil + imidachloprid (2.86) and Garlic sap extractl + imidachloprid (2.92) is found least effective among all treatments. Thrips (*Scirtothrips dorsalis* H.) and pro all the treatments were found to be significantly superior over control. Similar result were also reported by Seal *et al.* (2006) [5] reported that imidacloprid most effective in reducing the density of *Scirtothrips dorsalis*. Rakesh Meena (2017) [2] results revealed that among the different treatments Imidacloprid proved to be the effective treatments followed by Pongamia oil, Neem oil. Imidacloprid 0.005% was the most effective treatment in percentage reduction of chilli with 67.58% reduction over control. Also reported by Patel *et al.* (2009) [1] and Seal *et al.* (2006) [5].

**Table 1:** Population of chilli thrips after application of both spray on chilli (Overall mean)

Treatment No.	Treatment	% Reduction over control population of <i>Scirtothrips dorsalis</i> .			C:B ratio
		1 <sup>st</sup> Spray Mean	2 <sup>nd</sup> spray Mean	Overall Mean	
T <sub>1</sub>	Neem oil + Imidacloprid (2.5ml/l+0.1ml/l)	1.71	1.30	1.59	1:11.11
T <sub>2</sub>	NSKE + Imidacloprid(50gm/l+0.1ml/l)	2.04	2.00	2.02	1:8.07
T <sub>3</sub>	Karanj oil + Imidacloprid(10ml/l+0.1ml/l)	2.59	2.22	2.40	1:7.79
T <sub>4</sub>	Pongamia oil + Imidacloprid(3ml/l+0.1ml/l)	2.82	2.75	2.78	1:7.06
T <sub>5</sub>	Garlic Sap extract + Imidacloprid(10gm/l+0.1ml/l)	2.95	2.89	2.92	1:4.91
T <sub>6</sub>	Tobacco oil + Imidacloprid(3ml/l+0.1ml/l)	3.02	2.70	2.86	1:5.98
T <sub>7</sub>	Imidacloprid(0.2ml/l)	1.40	1.24	1.32	1:11.77
T <sub>0</sub>	Control	6.06	12.76	9.41	1:3.54
	F-Test	S	S	S	
	S.Ed(+)	0.06	0.04	0.19	
	C.D.(P= 0.05)	0.12	0.60	0.40	

The highest yield was recorded in T<sub>7</sub>-Imidacloprid (275.22 q/ha), followed by T<sub>1</sub>-Neem oil + imidacloprid (253.98 q/ha), as compared to control T<sub>0</sub> (90.54 q/h). When cost benefit ratio was worked out, interesting result was achieved. Among the treatment studied, the best and most economical treatment was T<sub>7</sub>-Imidacloprid (1:11.77), followed by T<sub>1</sub>-Neem oil + imidacloprid (1:11.11), as compared to control T<sub>0</sub> (1:3.54). Similar result were also reported by Seal *et al.* (2006) [5] reported that imidacloprid was found most effective in reducing the population of chilli thrips (*Scirtothrips dorsalis*). This result supported by Patel *et al.*, (2009) [1] reported that

Imidacloprid (0.01%) was most effective as it reduced the maximum larval population at each observational interval during first and second spray with highest marketable yield (253.35 q/ha). Samota *et al.* (2017) [4] reported that Imidachloprid 17.8% SL maximum yield of chilli. Among all the treatments Imidacloprid @ 0.2ml/litre proved to be the best treatment followed by Neem oil + imidacloprid @ 2.5ml/litre+0.1ml/lit, NSKE + imidachloprid @ 50 gm/lit+0.1ml/lit, Karanj oil + imidachloprid @ 10ml/l+0.1ml/lit, Pongamia oil + imidachloprid @ 3ml/lit+0.1ml/lit, Garlic sap extract + imidachloprid 10gm/lit

+ 0.1ml/lit, Tobacco oil + imidachloprid @ 3ml/l+0.1ml/lit also effective in managing (*Scirtothrips dorsalis* H.) reduction. Recommended dose of botanicals may be useful in devising proper integrated pest management strategy against chilli thrips.

### Conclusion

From the critical analysis of the present findings it was concluded that among all the treatment Imidacloprid 0.005% proved to be the best treatment followed by Neem oil 2.5ml/lit+ Imidachloprid, NSKE 5%+ Imidachloprid, Karanj oil 2.5ml/lit+ Imidachloprid, Pongamia oil+ Imidachloprid and Tobacco oil+ Imidachloprid, Garlic sap extracts 10g/Lit+ Imidachloprid were also effective in managing *Scirtothrips dorsalis* reduction and better yield. So that are recommended doses of botanicals may be useful in devising proper integrated pest management strategy against chilli thrips.

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