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## Evaluate the efficacy of botanical insecticides against Bihar hairy caterpillar, *Spilosoma obliqua* Walker in sunflower

**Vishnu Lal, PK Bhagat, GP Painkra, KL Painkra, Neha Bhuarya and Priti Singh**

### Abstract

The present investigation entitled "To evaluate the efficacy of botanical insecticides viz.: Neem oil 0.5%, Castor oil 0.3%, Nilgiri oil 0.3%, Karanj oil 0.5%, Mahua oil and 0.5%, Azadirachtin 0.3% against Bihar hairy caterpillar, *Spilosoma obliqua* Walker in sunflower was carried out at Research-cum-Instructional Farm of Raj Mohini Devi College of Agriculture and Research Station, Ambikapur (C.G.) during *kharif* 2022. The result revealed that the minimum larval population of Bihar hairy caterpillar recorded from Neem oil 0.5% (2.51 larva/plant) followed by Azadirachtin 0.3% (2.62 larva/plant) which were significantly superior to rest of the treatments. Castor oil 0.3% (3.02 larva/plant), Nilgiri oil 0.3% (3.21 larva/plant) and Mahua oil 0.5% (3.23 larva/plant) were the next best treatment. However, Karanj oil 0.5% (4.05 larva/plant) was it least efficient in reducing the pest population. In order to efficacy of botanical insecticides, were Neem oil 0.5% followed by Azadirachtin 0.3%, Castor oil 0.3%, Nilgiri oil 0.3%, Mahua oil 0.5% and Karanj oil 0.5%.

**Keywords:** Botanical insecticides, Bihar hairy caterpillar, *Spilosoma obliqua* Walker

### Introduction

Sunflower (*Helianthus annuus* L.) is one of the important oil seed crops in the world and ranks third in area after soybean and groundnut. The sunflower belongs to the family Asteraceae (Compositae) a native of Southern USA and Mexico. It is a rich source of edible oil (40-52%) having anti-cholesterol properties due to the presence of polyunsaturated fatty acids (55-65%) linoleic acid & 20-30% oleic acid (Joksimovic, 2006) [12]. An annual herb with a rough, hairy stem, Sunflower broad, coarsely toothed rough leaves measuring 7.5-30cm (3-12 inches) long are grouped in spirals and measure 1-4.5 meters (3-15 feet) in height. The gorgeous flower heads are typically 30 cm or wider in cultivated varieties and 7.5-15 cm wide in wild specimens, Chrome in flower petals is highly appealing and face the sun properly every day. The major sunflower growing states in the country are Karnataka, Maharashtra, Andhra Pradesh and Tamil Nadu. Among these, Karnataka is the leading state in the country, popularly known as "Sunflower state". Presently in Karnataka sunflower is cultivated over an area is 0.39 mha with the production of 0.19 mt and productivity of 503 kg/ha<sup>-1</sup> (Indiastat, 2013) [2].

Insect pests infestation is one of the major constraint for sunflower production. In India more than 50 insect species have been recorded to damage the crop at different growth stages and nine are major pests. Meteorological variables plays a vital role in multiplication and distribution of insect pests, which directly influence the abundance of natural enemies (Zafar *et. al.*, 2013) [13]. Sunflower was cultivated in an area of 1.246 m ha and production of 0.848 mt with an average productivity of 681 kg/ha (AICRP, 2003) [1]. To formulate an effective, economic and sustainable pest management strategy for a specific agro-ecosystem, complete knowledge on abundance and distribution of pest in relation to weather factors is a basic requirement (Patel and Shekh, 2006) [14]. Sunflower is attacked by more than fifty insect species in India. Among them, nine are major pests which are broadly categorized as seedling pests, sucking pests, defoliators, inflorescence pests and soil insects (Basappa *et. al.*, 2005) [15].

### Material and Methods

A field experiment was conducted to evaluate the efficacy of insecticides against Bihar hairy caterpillar in sunflower during *Kharif* 2022. The crop was planted with all package of

agronomical practices. The details are following.

### Experimental layout

**Crop:** Sunflower

**Variety:** Shristi-5272

**Design:** Randomized Block design

**Treatment:** 7

**Replication:** 3

**Plot size:** 5 × 4m

**Spacing (P × R):** 40 × 20 cm

**Table 1:** Treatment details

Tr. No.	Treatment details	Dose (%)
T <sub>1</sub>	Neem oil	0.5%
T <sub>2</sub>	Castor oil	0.3%
T <sub>3</sub>	Nilgiri oil	0.3%
T <sub>4</sub>	Karanj oil	0.5%
T <sub>5</sub>	Mahua oil	0.5%
T <sub>6</sub>	Azadiractin	0.3%
T <sub>7</sub>	Control	-

### Observations was recorded

In order to count the number of Bihar hairy caterpillar larvae by visual observation, pre-treatment observations were made one day before spraying on randomly chosen and marked ten plants in each plot. After 7 days of spraying, post-treatment observations were recorded.

### Results and Discussion

The pre-treatment observation of Bihar hairy caterpillar population were recorded at one day before and 7, 10, 12 days after the first and second spray from randomly selected per 10 plants.

#### First spray

##### Pre-treatment observation of Bihar hairy caterpillar population i.e. one day before spray

The pre-treatment observation of Bihar hairy caterpillar population was recorded with range between 4.40 to 6.03 larvae/plant. Before spray, there was no significant difference in the population of larvae between the different treatments.

#### Post treatment observation

##### At 7 days after 1<sup>st</sup> spray

At 7 days of after 1<sup>st</sup> spraying, the result revealed that all treatments were effective significantly over the control. Among different treatments the population of Bihar hairy caterpillar ranged observed from 3.33 to 4.60 larvae/plant. It was obtained lowest in Neem oil 0.5% (3.33 larvae/plant) followed by Azadiractin 0.3% (3.87 larvae/plant), Castor oil 0.5% (3.87 larvae/plant), Nilgiri oil 0.3% (4.07 larvae/plant), mahua oil 0.3% (4.07 larvae/plant), Karanj oil 0.5% (4.60 larvae/plant) and exhibited significant difference with all of the treatments. However, the maximum population of Bihar hairy caterpillar was obtain in untreated control plots (6.07 larvae/plant).

##### At 10 days after 1<sup>st</sup> spray

After 10 days of spraying, observations indicated that all treatments were effective significantly over the control. The Bihar hairy caterpillar population among treatment ranged from 2.43 to 6.27 larvae/plant. It was obtained lowest in Neem oil 0.5% (2.41 larvae/plant) followed by Azadiractin 0.3% (2.53 larvae/plant), mahua oil 0.3% (3.20 larvae/plant),

Nilgiri oil 0.3% (3.57 larvae/plant), Karanj oil 0.5% (3.83 larvae/plant), Castor oil 0.3% (3.00 larvae/plant) and exhibited significant difference with all of the treatments. The maximum population was obtained in untreated control plot (6.27 larvae/plant).

#### At 12 days after 1<sup>st</sup> spray

After 12 days of spraying, observations indicated that all treatments were effective significantly over the control. Bihar hairy caterpillar population among treatments ranged from 3.43 to 7.37 larvae/plant. It was obtained lowest population in Neem oil 0.5% (3.43 larvae/plant) followed by Castor oil 0.3% (3.60 larvae/plant), Nilgiri oil 0.3% (3.60 larvae/plant), Azadiractin 0.3% (3.67 larvae/plant), Mahua oil 0.5% (3.70 larvae/plant), Karanj oil 0.5% (4.87 larvae/plant) and exhibited significant difference with all of the treatments. The maximum Bihar hairy caterpillar population was obtained in untreated control plot (7.37 larvae/plant).

#### Second spray

##### Pre-treatment observation of Bihar hairy caterpillar at one day before of 2<sup>nd</sup> spray.

In pre-treatment observation of the Bihar hairy caterpillar population recorded ranged between 3.50 to 4.93 larvae/plant. Before spray, there was no significant difference in the population of larvae between the different treatments.

#### Post treatment observation after 2<sup>nd</sup> spray

##### At 7 days after 2<sup>nd</sup> spray

After 7 days of spraying, observed all treatments were effective significantly over the control. Bihar hairy caterpillar population among all treatments ranged from 2.53 to 8.40 larvae/plant. The minimum population of Bihar hairy caterpillar was observed from Azadiractin 0.5% (2.53 larvae/plant) followed by Neem oil 0.5% (2.60 larvae/plant), Castor oil 0.3% (2.93 larvae/plant), Nilgiri oil 0.3% (3.00 larvae/plant), and exhibited significant difference with all of the treatments. The maximum Bihar population of hairy caterpillar was obtained in untreated control plots (8.4 larvae/plant).

##### At 10 days after 2<sup>nd</sup> spray

After 10 days of 2<sup>nd</sup> spraying, found that all the treatments were effective significantly over the control. Bihar hairy caterpillar population among treatment ranged from 1.97 and 9.07 larvae/plant. The treatment Neem oil 0.5% was maintained their superiority and observed as least population with (1.97 larvae/plant) followed by Azadiractin 0.3% (2.03 larvae/plant), Castor oil 0.3% (2.50 larvae/plant), Nilgiri oil 0.3% (2.70 larvae/plant), Mahua oil 0.5% (2.70 larvae/plant), Karanj oil 0.5% (3.63 larvae/plant) and exhibited significant difference with all of the treatments. The maximum Bihar hairy caterpillar population was obtained in plot of untreated control (9.07 larvae/plant).

#### 12 days after 2 sprays

After 12 days of spraying, found that all treatments were effective significantly superior over the untreated control. The mean population of Bihar hairy caterpillar was observed from the ranged with 1.30 to 10.00 larvae/plant. It was obtained lowest in Neem oil 0.5% (1.30 larvae/plant) followed by Azadiractin 0.3% (1.60 larvae/plant), castor 0.3% (2.23 larvae/plant), Nilgiri oil 0.3% (2.30 larvae/plant), mahua oil 0.5% (2.60 larvae/plant), Karanj oil 0.5% (3.27 larvae/plant)

and exhibited significant difference with all of the treatments. Whereas, the maximum population obtained the untreated control plots (with 10.00 larvae/plant).

Among various botanical insecticides, the lowest overall mean population was obtaining Neem oil 0.5% (2.51) followed by Azadiractin 0.3% (2.62), Castor oil 0.3% (3.02), Nilgiri 0.3% (3.21), Mahua oil 0.5% (3.46), Karanj oil 0.5% (4.05) over the control (7.86) was observed.

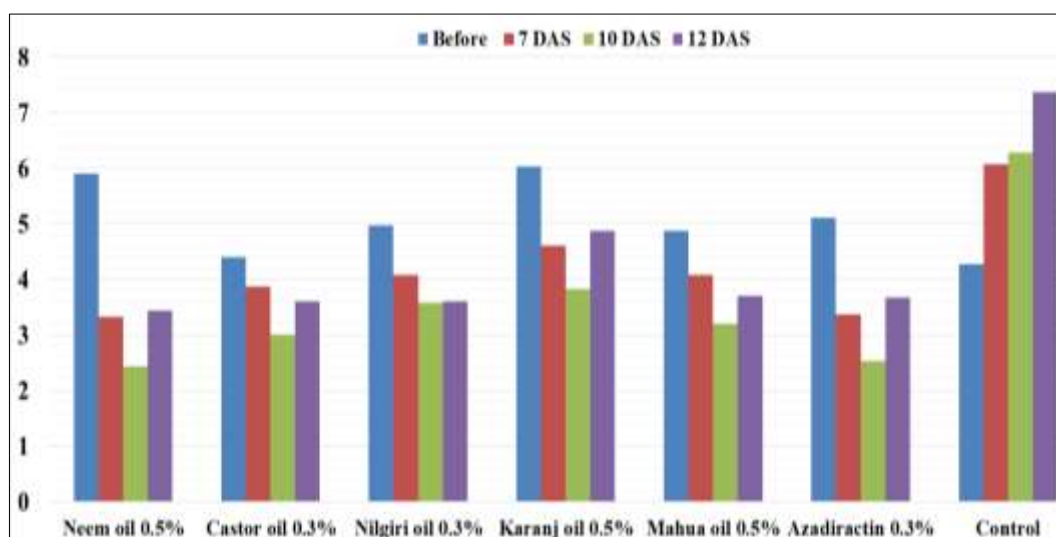
More or less these results are agreement with Patel (2015) who reported that the least larval population of *S. obliqua* was found in Azadiractin 0.0006% (with 2.96 larvae/plant) in Castor and obtained best to remaining treatments by registering minimum larval population followed by neem seed kernel extract 5% (3.04 larvae/ plant), *Beauveria bassiana* 0.4% (3.22 larvae/plant), Neem oil 0.5% (3.23 larvae /plant), neem leaf extract 10% (3.66 larvae /plant).

**Table 2:** Evaluate the efficacy of botanical insecticides against Bihar hairy caterpillar *Spilosoma obliqua* Walker on sunflower during

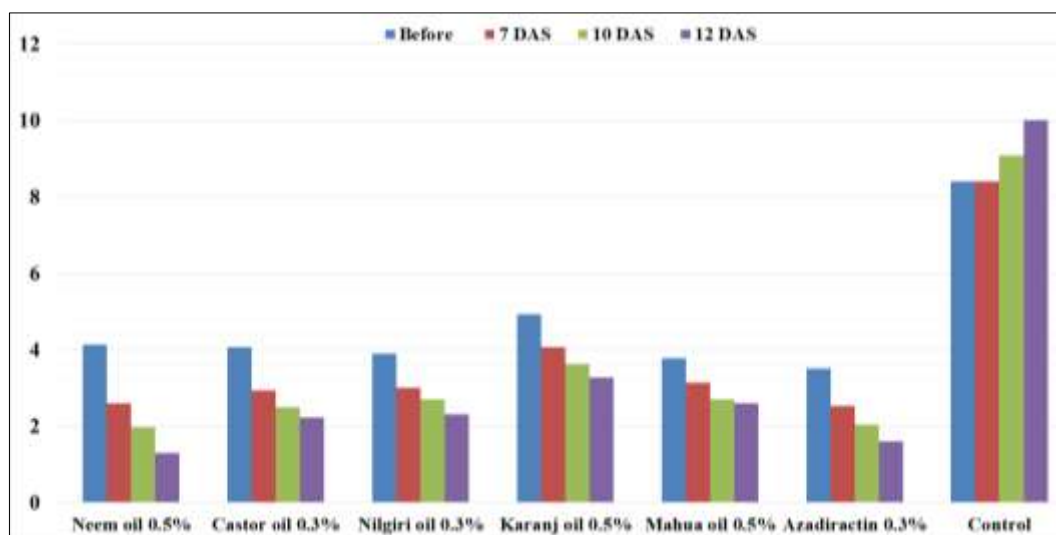
S. No.	Treatment	Average larval population of Bihar hairy caterpillar/plant								overall mean of after 7, 10 and 12 after 1 <sup>st</sup> and 2 <sup>nd</sup> spray
		1 <sup>st</sup> spray				2 <sup>nd</sup> spray				
		Before	7 DAS	10 DAS	12 DAS	Before	7 DAS	10 DAS	12 DAS	
T <sub>1</sub>	Neem oil 0.5%	5.90 (2.52)	3.33 (1.96)	2.43 (1.63)	3.43 (1.98)	4.13 (2.15)	2.60 (1.76)	1.97 (1.57)	1.30 (1.34)	2.51 (1.73)
T <sub>2</sub>	Castor oil 0.3%	4.40 (2.20)	3.87 (2.09)	3.00 (1.80)	3.60 (2.02)	4.07 (2.12)	2.93 (1.83)	2.50 (1.73)	2.23 (1.65)	3.02 (1.88)
T <sub>3</sub>	Nilgiri oil 0.3%	4.97 (2.34)	4.07 (2.14)	3.57 (1.95)	3.60 (2.02)	3.90 (2.10)	3.00 (1.87)	2.70 (1.79)	2.30 (1.67)	3.21 (1.93)
T <sub>4</sub>	Karanj oil 0.5%	6.03 (2.56)	4.60 (2.25)	3.83 (2.02)	4.87 (2.31)	4.93 (2.33)	4.07 (2.13)	3.63 (2.03)	3.27 (1.94)	4.05 (2.13)
T <sub>5</sub>	Mahua oil 0.5%	4.87 (2.29)	4.07 (2.14)	3.20 (1.85)	3.70 (2.05)	3.77 (2.05)	3.13 (1.90)	2.70 (1.79)	2.60 (1.76)	3.23 (1.93)
T <sub>6</sub>	Azadiractin 0.3%	5.10 (2.35)	3.37 (1.97)	2.53 (1.67)	3.67 (2.04)	3.50 (2.00)	2.53 (1.74)	2.03 (1.59)	1.60 (1.44)	2.62 (1.77)
T <sub>7</sub>	Control	4.27 (2.16)	6.07 (2.55)	6.27 (2.55)	7.37 (2.80)	8.40 (2.98)	8.40 (3.05)	9.07 (3.09)	10.00 (3.24)	7.86 (2.89)
	Sem++	0.163	0.083	0.066	0.054	0.113	0.079	0.054	0.045	-
	C.D at 5%	NS	0.257	0.204	0.165	0.347	0.244	0.167	0.140	-

Kharif 2022

Figures in the parentheses are  $\sqrt{x} + 0.5$  transformed values day after spray



**Fig 1:** Evaluate the efficacy of botanical insecticides against Bihar hairy caterpillar on sunflower at 1<sup>st</sup> spray during Kharif 2022



**Fig 2:** Evaluate the efficacy of botanical insecticides against Bihar hairy caterpillar on sunflower at 2<sup>nd</sup> spray during Kharif 2022





**Fig 3:** View of damaged leave with larvae of Bihar hairy caterpillar



**Fig 4:** Application of botanical insecticide

### Conclusion

Neem oil 0.5% treated plot was most effective treatment for management of Bihar hairy caterpillar population among all treatments. However, Karanj oil 0.5% was found at lower order of efficacy.

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