

# Eco friendly management of Tobacco caterpillar (*spodoptera litura*) on Soybean (*Glycine max l.*) in Allahabad agro-climatic condition

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## Abstract

The present investigation “Eco friendly management of tobacco caterpillar (*spodoptera litura*) on soybean (*Glycine max L.*) in Allahabad agro-climatic condition,” cultivar i.e. JS 71-05 was conducted during *kharif* season, 2012 at Agricultural Research Farm, SHIATS, Tobacco caterpillar (*Spodoptera litura* Fab.) population increased and gradually reached its peak incidence of larval population 4.42 larvae per plant at 38<sup>th</sup> standard week (October second week) there after declined trend was observed as temperature decreased. It was found that *Spodoptera litura* population increased in Allahabad. The occurrence of tobacco caterpillar (*Spodoptera litura* Fab.) commenced from 33<sup>rd</sup> standard week (August third week) with an average population of larvae 0.42%. The increasing maximum temperature and positively correlated with maximum temperature. Among the pesticides evaluated, Cypermethrin 0.006% recorded highest percentage larvae reduction (52.23%) at 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 15<sup>th</sup> days after spraying (DAS) and proved significantly superior to rest of the treatments. *Bacillus thuringensis* was recorded (43.25%) larvae reduction. Minimum percent of larvae reduction by tobacco caterpillar were observed in Cypermethrin 0.006% with (52.23%) which are followed by *Bacillus thuringensis* recorded (43.25%), *Beauveria bassiana* (37.96%), NSKE 5% (34.08%) Neem oil 2% (31.69%), Cow urine 20% (23.41%) and CGKE 5% (21.84%) larvae reduction. The highest yield was registered with Cypermethrin 0.006% about 1380 kg/ha which is followed by *Bacillus thuringensis* (25%) 1208 kg/ha and *Beauveria bassiana* (0.02%) 1179 kg/ha, over 610 kg/ha yield of untreated check.

**Key words:** - *Bacillus thuringensis*, Insecticides, NSKE. *Spodoptera litura*,

## 1. Introduction

Soybean [*Glycine max* (L.) Merrill] is leguminous crop cultivating in different agro climatic regions of India. Soybean is a miracle crop having rich source of protein (40.50%) and oil (18-20%) and the maximum it also contains good amount of minerals, salts, vitamins, like thiamine and Riboflavin, soybean it also use in preparation of soya milk. (Rai *et. al.* 1973). The defoliators [(*Spodoptera litura*) (Fab.)]; is feeding on foliage, flower and pods causing significant yield loss (Singh and Singh 1990). The tobacco caterpillar *S. Litura* (Fab.) is a serious and regular Pest in Madhya Pradesh. It damages Soybean from mid August to October in *Kharif* and from November to March in *Rabi* (Anon. 2007).

*Beauveria bassiana* is entomopathogen fungi produces toxin beauvericin. That attacks more than 700 insect species. The fungi multiply quickly so the whole insect cells are infected. Infected insect will stop eating and died the insect.

## 2. Materials and Methods

The present investigation entitled “Eco friendly management of tobacco caterpillar (*Spodoptera litura*) on soybean (*Glycine max L.*) in Allahabad agro-climatic condition” was planned to carry out the studies on the effect of certain chemical, biological and botanical insecticides against tobacco caterpillar, under the field conditions at the central research field, Sam Higginbottom Institute.

**Table 1.1 Field efficacy of botanicals and Cypermethrin against tobacco caterpillar on soybean crop during *kharif* season 2012-13.**
**First spray**

Treatments		% Reduction over control					Over all mean
		Days after spraying					
		Before	3 DAS	7 DAS	10 DAS	15DAS	
T <sub>1</sub>	Neem oil	3.47(10.73)	20.52(26.93)	37.14(37.74)	34.72(36.10)	34.38(35.89)	31.69(34.25)
T <sub>2</sub>	NSKE	3.60(10.93)	22.74(28.48)	39.36(38.85)	36.43(37.12)	37.80(37.93)	34.08(35.71)
T <sub>3</sub>	Cow urine	3.13(10.19)	16.92(24.28)	30.89(33.76)	34.95(36.24)	30.87(33.75)	28.41(32.20)
T <sub>4</sub>	GCKE	3.67(1.10)	14.69(22.53)	23.72(29.14)	26.57(31.02)	22.36(28.22)	21.84(27.86)
T <sub>5</sub>	Cypermethrin	39.93(11.43)	45.69(42.52)	54.61(47.64)	55.28(48.03)	53.33(46.90)	52.23(46.27)
T <sub>6</sub>	<i>B.bassiana</i>	3.53(10.82)	26.35(30.88)	39.36(38.85)	44.81(42.02)	41.31(39.99)	37.96(38.03)
T <sub>7</sub>	<i>Bt</i>	3.67(1.10)	33.93(35.62)	47.44(43.53)	46.90(43.22)	44.73(41.97)	43.25(41.12)
T <sub>0</sub>	Control	4.47(12.20)	0.00	0.00	0.00	0.00	0.00
<b>Overall Mean</b>		<b>3.68</b>	<b>22.61</b>	<b>34.07</b>	<b>34.96</b>	<b>33.10</b>	
<b>F- test</b>		NS	S	S	S	S	S
<b>S. Ed. (±)</b>		0.408	3.144	1.956	3.401	3.357	2.107
<b>C. D. (P = 0.05)</b>		0.866	6.666	4.147	7.209	7.117	4.466

**Table 1.2 Field efficacy of botanicals and Cypermethrin against tobacco caterpillar on soybean crop during *kharif* season 2012-13.**
**Second spray**

Treatments		% Reduction over control					Overall mean
		Days after spraying					
		Before	3 DAS	7 DAS	10 DAS	15DAS	
T <sub>1</sub>	Neem oil	2.93(9.85)	44.40(41.78)	50.10(45.05)	53.65(47.09)	53.33(46.90)	50.37(45.21)
T <sub>2</sub>	NSKE	3.00(9.97)	44.73(41.97)	48.14(43.93)	57.83(49.50)	58.09(49.65)	52.20(46.26)
T <sub>3</sub>	Cow urine	3.27(10.41)	37.39(37.69)	42.37(40.61)	51.57(45.89)	48.73(44.27)	45.02(42.14)
T <sub>4</sub>	GCKE	3.33(10.51)	31.79(34.32)	36.60(37.22)	45.30(42.30)	44.12(41.62)	39.45(38.90)
T <sub>5</sub>	Cypermethrin	2.40(8.91)	59.42(50.42)	65.47(54.01)	70.63(57.18)	76.66(61.11)	68.05(55.58)
T <sub>6</sub>	<i>B.baassiana</i>	2.80(9.63)	48.24(43.99)	51.96(46.12)	62.14(52.02)	65.07(53.77)	56.85(48.93)
T <sub>7</sub>	<i>Bt</i>	2.60(9.27)	53.83(47.19)	57.73(49.44)	66.32(54.52)	69.68(56.58)	61.89(51.87)
T <sub>0</sub>	Control	4.33(12.01)	0.00	0.00	0.00	0.00	0.00
<b>Overall Mean</b>		<b>3.08</b>	<b>39.98</b>	<b>44.05</b>	<b>50.93</b>	<b>51.96</b>	<b>0.00</b>
<b>F- test</b>		NS	S	S	S	S	S
<b>S. Ed. (±)</b>		0.645	3.047	4.426	3.937	2.359	2.036
<b>C. D. (P = 0.05)</b>		1.366	6.461	9.382	8.346	5.001	4.317

of Agriculture, Technology and Sciences, Allahabad during the *Kharif* season 2012-13. One chemical, two biological, and four botanicals insecticides were evaluated against the tobacco caterpillar (*Spodoptera litura*). The treatments were imposed by using hand sprayer @ 0.5 litres of spray solution/4 m<sup>2</sup> depending on crop growth stages. The crop received two sprays, the first being given at before flowering stage (*i.e.* 40 days after sowing) when the population crossed economic threshold while, the second spray was imposed 18 days after first spray. The experiment was carried out using Randomized Block Design (RBD) method using three replications. Two sprays were done and the reduction population of per plant was recorded on 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 15<sup>th</sup> days after each spray

### 3. Results and Discussion

The data (Table 1.1 and 1.2) indicated that all the insecticidal treatment were significantly superior over control in reducing the *Spodoptera litura* recording at 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 15<sup>th</sup> days after insecticidal application. The treatment with Cypermethrin 0.006% was found significantly superior as compared to other insecticides. The highest reducing of 52.23, 68.05, 53.33 and 76.66% was recorded at 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 15<sup>th</sup> days after application. As regards grain yield, the yield of 13.80q/ha. was obtained in this treatment. The next promising treatment was *Bacillus thuringiensis* 25% which recorded larvae reduction of 43.25, 61.89, 44.73 and 69.68% the grain yield was 12.08 q/ha. Both these treatment were found to be par with each other as regards to larvae reduction and grain yield. Further, the treatment with *Bacillus thuringiensis* 25% and *Beauveria Bassiana* 0.02% were equally effective in reducing larval 43.25 and 56.85% up to two weeks after application and yield recorded was

12.08 and 11.79 q/ha. Respectively, **Chaudhary and Sachan (1995)** also reported effectiveness of various chemicals against major insect pests of soybean indicated highest larval reduction per cent in the treatment with Cypermethrin (52.23, 68.05, 66.05 and 62.11%). In the treatment CGKE consistently lower larval reduction was reported 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> and 15<sup>th</sup> after spraying (21.84, 39.45, 39.36 and 44.12%).

### 4. Conclusion

In this study, it was concluded that the treatment, Cypermethrin 0.006% showed maximum reduction of *Spodoptera litura*. The grain yield obtained was also highest (13.80q/ha) in this treatment. The treatment with *Bacillus thuringiensis* was also at par with *Beauveria Bassiana*. These finding are in agreement with those reported by **Ahmed et al. (2004)**.

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