



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2021; SP-10(12): 2093-2096  
© 2021 TPI  
[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 22-09-2021  
Accepted: 24-11-2021

**Toshima Kushram**  
Department of Entomology,  
CoA, IGKV, Raipur,  
Chhattisgarh, India

**Mukesh Kumar Sahu**  
Department of Floriculture and  
Landscape Architecture, CoA,  
IGKV, Raipur, Chhattisgarh,  
India

**Pappu Lal Bairwa**  
Department of Vegetable  
Science, CoA, IGKV, Raipur,  
Chhattisgarh, India

**Corresponding Author**  
**Toshima Kushram**  
Department of Entomology,  
CoA, IGKV, Raipur,  
Chhattisgarh, India

## Short Communication

### Seasonal incidence of major insect-pests on soybean under agro climatic condition of Chhattisgarh plain

**Toshima Kushram, Mukesh Kumar Sahu and Pappu Lal Bairwa**

#### Abstract

The present investigation entitled seasonal incidence of major insect-pests on soybean under agro climatic condition of Chhattisgarh plain was conducted at the Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh during *Kharif* season of 2015. During the course of study, six species of insect-pests viz., girdle beetle (*Obereopsis brevis*) defoliators– tobacco caterpillar (*Spodoptera litura*) and green semilooper (*Chrysodeixis acuta*) and sucking pests – whitefly (*Bemisia tabaci*) Jassid (*Empoasca kerri*) and thrips (*Thrips tabaci*) as the major insect-pests of soybean crop.

**Keywords:** Seasonal incidence, soybean

#### Introduction

Soybean is known as the “Golden Bean” of the 20<sup>th</sup> Century. Soybean is one of the most important crop in India and the world. Soybean contains about 20% oil and 40% high quality protein. Soybeans can be used to make a variety of Indian and western dishes, including bread, 'chapati,' milk, sweets, and pastries. Soybean is a commonly grown crop, however unfavorable environmental conditions have a significant impact on its yield and production. Major production comes from Madhya Pradesh followed by Maharashtra and Rajasthan. Other soybean producing states are Andhra Pradesh, Karnataka, Chhattisgarh and Gujarat. In Chhattisgarh, among all the districts, maximum area and production of soybean comes under Rajnandgaon followed by Durg, Kabirdham, Raipur and has proved to be a remunerative crop in Kanker upland area. But there are many problems in cultivation of soybean in India as well as Chhattisgarh, as all stages of this crop are prone to heavy infestation by pest complexes. The luxuriant crop growth, soft and succulent foliage attracts many insects and provides unlimited source of food, space and shelter. Insect pests caused severe damage and consequent reduction in yield (Singh *et al.*, 1991 and Sharma, 1999) <sup>[10, 8]</sup>. During the introduction of soybean in India in the early seventies, only about a dozen minor insect pests were recorded, while in 1997 this number has swelled to an alarming figure 270, besides one mite, two millipedes, 10 vertebrates and one snail pest (Singh, 1999) <sup>[9]</sup>.

The soybean defoliators mainly include tobacco caterpillar (*Spodoptera litura* Fabricius) and green semilooper (*Chrysodeixis acuta*). Immature stages (larva or caterpillar) of both tobacco caterpillar and green semilooper damages the crop at vegetative stage and in severe cases, it completely defoliates the crop and causes dramatic yield loss.

#### Materials and Methods

Soybean variety JS-335 was sown on 30<sup>th</sup> July during *Kharif* season of 2015 at Indira Gandhi Krishi Vishwavidyalaya Raipur, Chhattisgarh (India). Seasonal incidence of major insect pests caterpillars, girdle beetle and sucking pests viz., white fly, jassid and thrips and their biocontrol agents particularly lady bird beetle, spider and predatory pentatomid bug of soybean crop. Populations of caterpillars and girdle beetle were recorded on 10 randomly selected one meter row length. However, sucking pest and bio control agents population per plant was recorded on 20 randomly selected plants.

#### Result and discussion

##### Seasonal incidence of major insect-pests on soybean

The studies on the seasonal incidence of insect-pests of soybean crop on variety JS- 335 revealed that the occurrence of insect-pests complex began from 21 days after sowing.

Observations on pests incidence recorded from last week of July to second week of October, *i.e.* population of each insect was recorded on soybean crop.

During the course of study, soybean crop is attacked by six species of insect-pests *viz.*, girdle beetle (*Obereopsis brevis* Swedenbord), Tobacco caterpillar (*Spodoptera litura*, Fabricius), green semilooper (*Chrysodeixis acuta* Walker), White fly (*Bemisia tabaci* Gennadius) jassid, (*Empoasca kerri* Pruthi) and thrips (*Thrips tabaci*) were observed causing

damage at various growth stages. Among the bio control agents, two predators, namely lady bird beetle (*Menochilus sexmaculata* and *Coccinella septempunctata*) spiders - *Oxyopes* sp. and *Neoscona* sp. and a predatory pentatomid bug (*Eocanthecona furcellata*) were mainly observed preying on them. The observations recorded on seasonal incidence of major insect-pests and their bio-control agents. *i.e.* Kharif, 2015 have been presented in Table 1.

**Table 1:** Seasonal incidence of major insect-pests and predators on soybean variety JS 335 during Kharif, 2015

Date of observation	SMW	Incidence meter <sup>-1</sup> row length				No of sucking pest three <sup>-1</sup> leaves				No of predators plant <sup>-1</sup>		
		No of girdle beetle damaged plants	No of caterpillar			<i>Bemisia tabaci</i>	<i>Thrips tabaci</i>	<i>Empoasca kerri</i>	Total	Coccinellid beetle	Pentatomid bug	Spiders
			<i>S. litura</i>	<i>C. acuta</i>	Total							
21-07-2015	29	0	0.1	0.3	0.4	1.25	1.6	0.05	2.9	0	0	0.2
28-07-2015	30	0	0.2	0	0.2	6.05	4.55	0.3	10.9	0	0.1	0.2
05-08-2015	31	0	0	0.1	0.1	7.4	5.94	0.3	13.64	0	0.1	0.2
11-08-2015	32	0.2	1	0.6	1.6	6.95	5.85	0.65	13.45	0.2	0.2	0.2
18-08-2015	33	0	0.4	0	0.4	7.9	6.1	0.55	14.2	0.2	0.3	0.1
25-08-2015	34	1	1.4	1.2	2.6	10	4.2	0.35	14.5	0.3	0.3	1.3
01-09-2015	35	0.3	1.3	0	1.3	5.9	4.15	0.3	10.35	0.2	0	0.3
08-09-2015	36	0.3	1.3	1	2.3	7	4.7	0.5	12.2	0.4	1	0.6
15-09-2015	37	0	0	1	1	5.55	4.1	0.4	10.2	0.2	0.3	0.6
22-09-2015	38	1.2	1	0	1	5.1	3.65	0.3	9.15	0.2	0.2	0.3
29-09-2015	39	0	0.2	0.1	0.3	4.2	3.6	0.3	8.15	0.1	0	0.2
06-10-2015	40	0	0	0	0	0.6	0.95	0.2	1.75	0.1	0	0.5
13-10-2015	41	0	0	0	0	0	0	0.1	0.1	0	0	0.2
Seasonal mean		0.23	0.53	0.33	0.86	5.76	3.48	0.33	9.35	0.15	0.19	0.38

## Pests Succession Studies

### (A) Insect-pests Fauna

#### (i) Girdle beetle – *O. brevis* (Coleoptera: Cerambycidae)

The incidence of Girdle beetle (*O. brevis* Coleoptera: Cerambycidae) was recorded on the crop in the second week of August with 0.2 girdle beetle damaged plants per meter row length and remain active throughout the cropping period. The activity of girdle beetle increased and the peak density was observed in the fourth week of September and recorded 1.2 girdle beetle infested plants per meter row with a seasonal mean of 0.23 number of girdle beetle damaged plants. The infestation level was less during this year.

#### (ii) Defoliators

Two major defoliators *viz.*, tobacco caterpillar, *S. litura* and green semilooper, *C. acuta* feeding on the foliage of the crop were observed.

Tobacco caterpillar- *S. litura* (Lepidoptera: Noctuidae) was first appearance on last week of July with a mean population of 0.1 larva per meter row length. The pest density increased gradually and attained the peak in the last week of August with 1.4 larvae with a seasonal mean of 0.53 larva per meter row. There was a gradual decline in the population, which disappeared completely after the last week of September.

The attack of Green semilooper (*C. acuta* Lepidoptera: Noctuidae) was first recorded on the crop in the last week of July with a mean population of 0.3 larva per meter row length. The pest density increased gradually and attained the peak in the last week of August with 1.2 larvae with a seasonal mean of 0.33 larva per meter row. Thereafter the population of the pest decreased gradually and disappeared due to senescence of the crop after the last week of September.

#### (iii) Sucking Pests

Of the three sucking pest, white fly (*B. tabaci* Hemiptera: Aleyrodidae) was the major pest. Its population ranged from 0.6 to 10.0 nymphs and adults/ three leaves/ plant with seasonal mean of 5.76 flies. It was first appeared on the crop in the last week of July with a mean population of 1.25 flies. Thereafter, the density of whitefly increased gradually with a peak of 10.0 flies in the last week of August. The infestation of thrips (*Thrips tabaci* Thysanoptera: Thripidae) started in the last week of July with a mean population of 1.6 and its population ranged from 0.95 to 6.1 nymphs and adults per plant with seasonal mean of 3.48. Thereafter, the density of thrips decreased gradually after the third week of August. The jassids (*Empoasca kerri* Hemiptera: Cicadellidae) made their first appearance on the crop in the last week of July with the mean population of 0.05 insect per plant. The pest density increased gradually and attained the peak in the second week of August with 0.65 insect per plant and with seasonal mean of 0.33. There was a gradual decline in the pest density after the second week of August. Singh (1996)<sup>[6]</sup> reported a severe infestation of green semilooper, feeding on buds, flowers and pods of soybean in Raisen, Hoshangabad and Narsinghpur districts of Madhya pradesh. Kumar *et al.* (1998)<sup>[4]</sup> estimated the population density of some insects associated with soybean and they also noted that the population densities of *Spilosoma oblique* (Walker) and *Spodoptera litura* (Feb.). Around the second half of October, the crop growth phase was at its peak. However, densities of *Empoasca* sp. and thrips were maximum during the later part of September or early October.

Ahirwar (2013)<sup>[1]</sup>, Kujur (2011)<sup>[3]</sup>, and Netam (2011) also reported similar observations (2010). As a result, these observations are consistent with the current findings.

**(B) Predatory fauna of soybean pests**

Soybean is mainly attacked by girdle beetle, tobacco caterpillar, green semilooper, whitefly, thrips and jassid at different growth stages of the crop. To assess the potential of biological control of these insects on soybean, study was undertaken during *Kharif*, 2015. It revealed the following predatory fauna on these insects.

**(a) Lady bird beetle**

Two species of lady bird beetle, *M. sexmuculata* and *C. septumpunctata* were recorded as the major bioagents of the sucking pests. They made their first appearance on the crop in the second week of August with 0.2 grub and adult per plant. They were observed feeding on nymphs and adults of jassids, thrips and whiteflies. Their activity continued till the first week of October and peak activity was observed in the second week of September with 0.4 grub and adult per plant.

**(b) Predatory Pentatomid bug**

The Pentatomid bug, *Eocanthecona furcellata* was observed to suck the body sap of caterpillar pests. It made its first appearance on the crop in the last week of July with 0.1 bug per plant. Its density increased gradually with the peak population of 1.00 bug in the second week of September and a seasonal mean of 0.19 bug. It coincide with the peak activity of caterpillar pests on the crop.

**(c) Spiders**

Besides the lady bird beetle and pentatomid bug, two predatory spiders, namely, lynx spider and orb weaver spider were found preying upon lepidopterous caterpillars and sucking pests, respectively. *Oxyopes sp.* is a hunting spider, whereas, *Neoscona sp.* is a web building spider. The spiders made their first appearance on the crop in the last week of July with a mean population of 0.2 spiders per plant. It coincided with the appearance of host insects on the crop. They were active throughout the growth period of the crop, till the third week of October. Their population ranged from 0.1 to 1.3 spiders with a seasonal mean of 0.38 spiders per

plant. The spiders disappeared from the crop from the fourth week of October with the disappearance of their host insects.

To observe the effect of predatory population on the activity of the insect pests, the population of predators *i.e.* coccinellid beetles, pentatomid bugs and spiders was co-related with the population of lepidopterous caterpillars and sucking pests. Correlation between coccinellid beetles and total sucking pests (*B. tabaci*, *T. tabaci* and *E. karri*) were found to be positive and significant at 5 per cent level with “r” value 0.532. Similarly, the correlation coefficient between spiders and total sucking pests was found to be positive but non-significant at 5 per cent level with “r” value 0.238. Correlation between lepidopterous pests (*S. litura*, and *C. acuta*) and spiders was also found to be positive and significant at 5 percent level with “r” values 0.710. Further correlation between predatory pentatomid bug and lepidopterous pests was also found to be positive and significant at 5 percent with “r” values 0.666.

Similar results were reported by Van den berg and Shepard Nasikin (1998) during their studies the natural enemy population increased with increase in host density, although, there was no evidence of density dependence. Netam (2010)<sup>[5]</sup> and Kujur (2011)<sup>[3]</sup> also observed positive but non-significant correlations between predatory fauna and incidence of soybean insect-pests *i.e.* lepidopterous caterpillars and sucking pests, during the course of his investigation. Gardiner *et al.* (2011)<sup>[2]</sup> observed that in Michigan, the exotic coccinellids *Coccinella septempunctata* and *Harmonia axyridis* were the most abundant predators found in soybean fields. The present results are also confirmed with the findings of Ahirwar (2013)<sup>[1]</sup> who observed positive and significant correlation between predatory population of spider and lepidopterous pests and similarly, a positive and significant correlation between predatory population of pentatomid bugs and lepidopterous pests and correlation between coccinellid beetles and total sucking pests was found to be positive and significant. The correlation coefficient between spiders and total sucking pests was found to be positive but non-significant during the course of his investigation.

**Table 2:** Insect-pests fauna observed on Soybean variety JS 335 during *Kharif*, 2015

S. No.	Common name	Systemic position	Damaging stage	Range of incidence	Status peak of activity
1.	Girdle beetle	<i>Obereopsis brevis</i> (Coleoptera : Cerambycidae)	Grub	0.2 to 1.2 (Grubs m <sup>-1</sup> . row)	Fourth week of September
2.	Tobacco caterpillar	<i>Spodoptera litura</i> (Lepidoptera : Noctuidae)	Caterpillar	0.1 to 1.4 (Caterpillars m <sup>-1</sup> . row)	Last week of August
3.	Green semilooper	<i>Chrysodeixis acuta</i> (Lepidoptera : Noctuidae)	Caterpillar	0.1 to 1.2 (Caterpillars m <sup>-1</sup> . row)	Last week of August
4.	White fly	<i>Bemisia tabaci</i> (Hemiptera : Aleyrodidae)	Nymph and Adult	0.6 to 10.0 (flies three <sup>-1</sup> leaves)	Second week of August
5.	Thrips	<i>Thrips tabaci</i> (Hemiptera : Thripidae)	Nymph and Adult	0.95 to 6.1 (thrips plant <sup>-1</sup> )	Third week of August
6.	Jassids	<i>Empoasca kerri</i> (Hemiptera : Cicadellidae)	Nymph and Adult	0.05 to 0.65 (Jassids plant <sup>-1</sup> )	Second week of August

**Table 3:** Predatory fauna observed on Soybean variety JS 335 during *Kharif*, 2015

S. No.	Common name	Systemic position	Insect pests preyed	Range of incidence	Status of activity peak
1.	Lady bird beetle	a) <i>Menochilus sexmuculata</i> b) <i>Coccinella septempunctata</i> (Coleopteran : Coccinellidae)	Whiteflies, Thrips and jassids Whiteflies, Thrips and jassids	0.1 to 0.4 (beetles plant <sup>-1</sup> )	Second week of September
2.	Pentatomid bug	<i>Eocanthecona furcellata</i> (Hemiptera: Pentatomidae)	Lepidopterous caterpillars	0.1 to 1 (bugs meter <sup>-1</sup> row)	Second week of September
3.	Spiders – (a) Lynx spider (b) Orb weaver	<i>Oxyopes salticus</i> (Araneae: Oxyopidae) <i>Neoscona sp.</i> (Araneae:	Lepidopterous caterpillars Whiteflies, thrips & Jassids	0.1 to 1.3 (Spiders meter <sup>-1</sup> row)	Last week of August

spider	Araneidae)		
--------	------------	--	--

**Table 4:** Influence of predatory fauna on the incidence of caterpillars and sucking pests infesting soybean during, *Kharif*, 2015

S. No.	Date of observation	No of predators plant <sup>-1</sup>			Incidence of insect pests	
		Coccinellid beetle	Pentatomid bug	Spiders	No of caterpillar meter <sup>-1</sup> row	No of sucking pest three <sup>-1</sup> leaves
1	21-07-2015	0	0	0.2	0.4	2.9
2	28-07-2015	0	0.1	0.2	0.2	10.9
3	05-08-2015	0	0.1	0.2	0.1	13.64
4	11-08-2015	0.2	0.2	0.2	1.6	13.45
5	18-08-2015	0.2	0.3	0.1	0.4	14.2
6	25-08-2015	0.3	0.3	1.3	2.6	14.5
7	01-09-2015	0.2	0	0.3	1.3	10.35
8	08-09-2015	0.4	1	0.6	2.3	12.2
9	15-09-2015	0.2	0.3	0.6	1	10.2
10	22-09-2015	0.2	0.2	0.3	1	9.15
11	29-09-2015	0.1	0	0.2	0.3	8.15
12	06-10-2015	0.1	0	0.5	0	1.75
13	13-10-2015	0	0	0.2	0	0.1
Correlation coefficient (r) =	Coccinellid beetle plant <sup>-1</sup>			-		0.532
	Pentatomid bug plant <sup>-1</sup>			0.666		-

**References**

- Ahirwar RB. Seasonal incidence of major insect- pests and their biocontrol agents of soybean crop. M.Sc Thesis, Indira Gandhi Krishi Vishwavidyalaya, Raipur, 2013, p. 110.
- Gardiner MM, O'Neal ME, Landis DA. Intraguild predation and native lady beetle decline. Justin Wright, Duke University, United States of America, 2011.
- Kujur J. Population dynamics of major insect-pests of soybean and management of defoliators and girdle beetle. M.Sc. (Ag.) Thesis, I.G.K.V., Raipur, India, 2011.
- Kumar V, Manglik VP, Bhattacharya AK. Estimation of population density of some insect pests of soybean. J Insect Sci. 1998;11(1):14-18.
- Netam H. Evaluation of key insect pest management components on soybean. M.Sc. (Ag.) Thesis, I.G.K.V., Raipur, India, 2010, p. 48-56.
- Singh OP. Annual Progress Report (Entomology) of all India co-ordinated. Research Project on soybean, R.A.K. college of Agri. Sehore, 1996.
- Van Den BH, Shepard BM. Damage incidence by *Etiella zinckenella* in Soybean in East Java, Indonesia. International Journal of Pest Management. 1998;44(3):153-159.
- Sharma AN. IPM system in agriculture. Aditya Books Pvt. Ltd. New Delhi, 1999, 137-169.
- Singh OP. Perspective and prospects of insect pest control in India with reference to sustainable environment in India In: proc. world soybean conf.-vi, aug. 4-7, 1999, Chicago, Illionois, U.S.A., 1999, 638-640.
- Singh OP, Sharma S, Singh KJ, Srivastava SK. Assessment of avoidable loss caused by jassid, *Apheliona maculosa* dist. in soybean. Journal of Insect Science. 1991;4:87-88.