



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2018; 7(1): 1476-1478  
Received: 25-11-2017  
Accepted: 27-12-2017

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## Sucking insect-pests of soybean (*Glycine max* L.), their nature of damage and succession with the crop stages

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### Abstract

The field experiment was conducted at BTC College of Agriculture and Research Station, Bilaspur, Chhattisgarh, during 2016-17. Study about seasonal incidence of pre-dominant lepidopteran insect-pests in soybean crop the soybean leaf folder (*Omiodes indicata* Fab.), tobacco caterpillar (*Spodoptera litura* Fab.), green semilooper (*Chrysodeixis acuta* Walker), leaf webber (*Anarsia ephippias* Mullar) and pod borer (*Helicoverpa armigera* Hub.) were major defoliator insect causing damage at various growth stages of the soybean crop. The peak activity of *Omiodes indicata* Fab. (1.67 larvae/mrl) and *Spodoptera litura* Fab. (1.47 larvae/mrl) were observed during third week of September. Whereas, *Chrysodeixis acuta* (1.0 larvae/mrl), *Anarsia ephippias* (0.6 larvae/mrl) and *Helicoverpa armigera* (0.67 larvae/mrl) were recorded during first week of September, third week of August and fourth week of August, respectively.

**Keywords:** seasonal incidence, peak activity, lepidopteran defoliator and soybean

### Introduction

Soybean [*Glycine max* (L.) Merrill] belonging to family Leguminaceae, sub-family Papilionaceae, is one of an important oilseed cash crop of India. It is a unique crop with high nutritional value, thus it also known as "Miracle bean, Golden bean, and Crop of the planet". It has provide 40% protein, well balanced in essential amino acids; 20% oil, rich in poly unsaturated fats specially Omega 6 and Omega 5 fatty acids; 6-7% total minerals; 5-6% crude fiber and 17-19% carbohydrates (Chauhan and Joshi, 2005) [7]. Total area of soybean in India is 10.91 million ha. with production of 10973.80 mt in 2015 with an average national yield of 951 kg/ha. Soybean occupied 42% of India's total oilseeds and 25% of edible oil production (Anonymous, 2015) [4]. In Chhattisgarh, the total area of soybean is 1.34 lakh ha. with 1.307 thousand MT production in 2016 with an average yield of 975 kg (Anonymous, 2016) [5]. Bilaspur is a district of Chhattisgarh occupies 0.205 thousand ha. area of soybean and productivity are 1517 kg/ha (Anonymous, 2009) [3].

Soybean has luxuriant crop growth, soft and succulent foliage, unlimited source of food, space and shelter there by it invites many insect-pests. 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 of 270, besides 1 mite, 2 millipedes, 10 vertebrate and 1 snail pest (Singh, 1999. Chaturvedi *et al.* (1998) reported that during *khari*, 1995, 17 insects and one mite species were recorded infesting soybean variety JS 72-44 (Gaurav) sown on 15 July, 1995 at Sehore, Madhya Pradesh, India. Of these, two damaged the stem, defoliated the plants, five sucked the cell sap and one damaged the roots at different growth stages of the crop, starting just after the emergence of the cotyledons. Alejandro and Douglas (2007) reported that the Soybean aphid, *Aphis glycines* (Hemiptera: Aphididae), is the most important insect pest attacking soybeans in North America since 2000. Sutaria *et al.* (2010) studied the seasonal incidence of jassid, *Empoasca kerri* infesting soybean and weather parameters and correlated them with a view to study the impact of different weather factors on pest incidence. Vieira *et al.* (2011) noted that when *Bemisia tabaci* occurs in large populations, the plants weakened by the extraction of large amounts of sap. Netam *et al.* (2013) studied during the course of study, Jassids, *Empoasca kerri* and white flies, *Bemisia tabaci* were recorded as the major sucking pests on soybean variety JS 93-05 causing damage at various stages of the crop. The sucking pests, whitefly was observed in higher numbers than jassids. The peak density of sucking pests was observed during third week of September with 4.4 sucking pests/plant and seasonal mean of 3.62 white flies and jassids per plant.

### Methods and Materials

To record the observations on succession of different sucking insect-pests species visiting /

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attacking soybean (Var. JS-335) crop, five plants were randomly selected and tagged from the untreated crop. The insect count was made on five leaves i.e. three from upper and two from middle part of the each plant. Thereafter, mean number of sucking insect pests per plant was worked out. The observations on the sucking insect-pests population were recorded from the standing crop at weekly intervals from the germination of the crop till its harvest. The time of first appearance of the each insect pest was observed and recorded. The nature of damage and feeding behavior of the insects were carefully observed. The weekly meteorological data on temperature, relative humidity, rainfall, sun shine hours and wind velocity will also be recorded for whole of the cropping season from the meteorological observatory located at BTC CARS, Bilaspur (C.G.).

## Results and Discussion

The population dynamics of sucking insect pests associated with various growth stages of the soybean crop were observed in the prevailing weather condition of Bilaspur, Chhattisgarh during *kharif* season 2016. The studies on insect pests succession revealed that the soybean crop was attacked by White fly (*Bemisia tabaci* Genn.), Jassid (*Empoasca kerri*), Red cotton bug (*Dysdercus cingulatus* F.), Coreid bug (*Riptortus pedestris* F.), Cow bug (*Otinotus oneratus* Walker), Mealy bug (*Planococcus lilacinus* Cokerel), Green stink bug (*Nazara viridula* L.).

In experimental plot the first group of insect pests to attack in the seedling to vegetative stage was, *Bemisia tabaci* Genn, *Empoasca kerri* and white fly *Bemisia tabaci* Genn. In the flowering stage, *Bemisia tabaci* Genn, *Empoasca kerri*, *Dysdercus cingulatus* F., and *Riptortus pedestris* F. insects were found to be attacked in soybean crop. The third group of insects which were infested the crop during pod forming stage are *Bemisia tabaci* Genn., *Empoasca kerri*, *Dysdercus cingulatus* F., and *Riptortus pedestris* F., *Planococcus lilacinus* Cokerel, and *Nazara viridula* L. The fourth major group of insect pests damaged the soybean crop during pod maturity stage were *Bemisia tabaci* Genn., *Empoasca kerri*, *Riptortus pedestris* F., and *Nazara viridula* L.

### 1. White fly, *Bemisia tabaci* Gennadius (Hemiptera: Aleyrodidae)

The *Bemisia tabaci* was first appeared on the crop in the first week of August in vegetative stage when the crop was of about 27 days old. The result showed that the pest was present on experimental plot from vegetative stage to pod maturity stage of crop i.e. up to last week of October (85 days). The pest was present on the crop during the entire cropping season.

### 2. Jassid, *Empoasca kerri* (Homoptera: Jassidae)

The attack of *Empoasca kerri* on the soybean crop was initiated in the second week of August in vegetative stage when the crop was of about 34 days old. The observation denoted that the pest was present on experimental plot from vegetative stage to pod maturity stage of crop i.e. up to third week of October (71 days).

### 3. Red cotton bug, *Dysdercus cingulatus* F. (Heteroptera: Pyrrhocoridae)

The *Dysdercus cingulatus* was first appeared on the crop in the fourth week of August in vegetative stage. The result showed that the pest was present on experimental plot from vegetative stage to pod forming (reproductive) stage of crop i.e. up to last week of September (36 days).

### 4. Coreid bug, *Riptortus pedestris* F. (Heteroptera: Coreidae)

First incidence of *Riptortus pedestris* was observed in the first week of September in flowering stage of soybean crop when the crop was of about 60 days old. The figure showed that the pest was present on the crop during the entire flowering to pod maturity stage. The observation denoted that the pest was present on experimental plot from flowering stage to pod maturity stage of crop i.e. up to last week of October (50 days).

### 5. Cow bug, *Otinotus oneratus* Walker (Hemiptera: Membracidae)

The Cow bug was first observed in second week of September. Cow bug was observed as the sap sucker insect of soybean crop and they also reduce plant vigor. The observation indicated that the pest was present very short time, from pod forming to pod maturity stage of crop (35 days) on experimental plot.

### 6. Mealy bug, *Planococcus lilacinus* Cokerell (Homoptera: Coccidae)

First appearance of the *Planococcus lilacinus* was observed in third week of September when the crop was of about 76 days old. The result denoted that the pest was present from pod forming (reproductive) stage of crop (22 days) on experimental plot.

### 7. Green stink bug, *Nazara viridula* L. (Heteroptera: Pentatomidae)

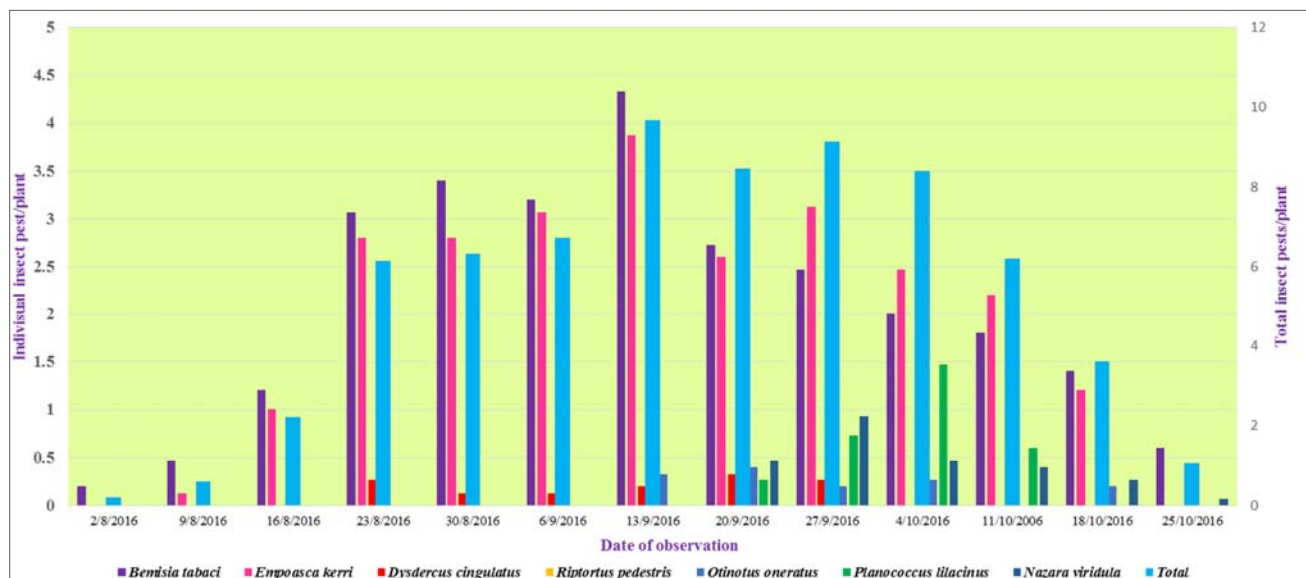
The attack of *Nazara viridula* on the soybean crop was initiated in the third week of September in pod formation stage when the crop was about 76 days old. The observation indicated that the pest was present on experimental plot from pod formation stage to maturity stage of crop i.e. up to last week of October (35 days).

**Table 1:** Seasonal activity of sucking insect-pests on soybean, *Glycine max* during experimental period, 2016

| Date of observation | Average population* of sucking insect-pests/plant (No.) |                       |                             |                            |                          |                              |                        | Total |
|---------------------|---|-----------------------|-----------------------------|----------------------------|--------------------------|------------------------------|------------------------|-------|
|                     | <i>Bemisia tabaci</i>                                   | <i>Empoasca kerri</i> | <i>Dysdercus cingulatus</i> | <i>Riptortus pedestris</i> | <i>Otinotus oneratus</i> | <i>Planococcus lilacinus</i> | <i>Nazara viridula</i> |       |
| 2/8/2016            | 0.2   | 0                     | 0                           | 0                          | 0                        | 0                            | 0                      | 0.2   |
| 9/8/2016            | 0.47  | 0.13                  | 0                           | 0                          | 0                        | 0                            | 0                      | 0.6   |
| 16/8/2016           | 1.2   | 1                     | 0                           | 0                          | 0                        | 0                            | 0                      | 2.2   |
| 23/8/2016           | 3.07  | 2.8                   | 0.27                        | 0                          | 0                        | 0                            | 0                      | 6.14  |
| 30/8/2016           | 3.4   | 2.8                   | 0.13                        | 0                          | 0                        | 0                            | 0                      | 6.33  |
| 6/9/2016            | 3.2   | 3.07                  | 0.13                        | 0.33                       | 0                        | 0                            | 0                      | 6.73  |
| 13/9/2016           | 4.33  | 3.87                  | 0.2                         | 0.93                       | 0.33                     | 0                            | 0                      | 9.66  |
| 20/9/2016           | 2.73  | 2.6                   | 0.33                        | 1.67                       | 0.4                      | 0.27                         | 0.47                   | 8.47  |
| 27/9/2016           | 2.47  | 3.13                  | 0.27                        | 1.4                        | 0.2                      | 0.73                         | 0.93                   | 9.13  |
| 4/10/2016           | 2   | 2.47                  | 0                           | 1.73                       | 0.27                     | 1.47                         | 0.47                   | 8.41  |
| 11/10/2016          | 1.8   | 2.2                   | 0                           | 1.2                        | 0                        | 0.6                          | 0.4                    | 6.2   |

|            |     |     |   |      |     |   |      |      |
|------------|-----|-----|---|------|-----|---|------|------|
| 18/10/2016 | 1.4 | 1.2 | 0 | 0.53 | 0.2 | 0 | 0.27 | 3.6  |
| 25/10/2016 | 0.6 | 0   | 0 | 0.4  | 0   | 0 | 0.07 | 1.07 |

\*Average of three replication



**Fig 1:** Seasonal activity of sucking insect-pests on soybean, *Glycine max* during experimental period, 2016

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