



RESEARCH PAPER

Succession of insect pests and their natural enemies on soybean in Jabalpur district of Madhya Pradesh

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Abstract : A Field trial was conducted on succession of insect pests and their natural enemies on soybean (var. JS 97-52) during Kharif season 2016 at experimental field of BSP unit, JNKVV, Jabalpur (MP). Observation on insect pest and their natural enemies were recorded on the basis of weekly interval. Observation of foliage feeders (*viz*; tobacco caterpillar, brown semilooper, green semilooper and bihar hairy caterpillar) were recorded on one meter row length (mrl) at randomly selected five different spot. Sucking insect pests was recorded on individual plant by caging method. Further, stem borer infestation (stem fly and girdle beetle) was recorded from each randomly selected five plants whereas, natural enemies of insect pests was recorded from one mrl from randomly selected five spot. The findings revealed that total eight different species of insect pests and two predators and one entomopathogenic fungus (*B. bassiana*) was recorded during the whole cropping season. The first incidence of whitefly and jassids were observed on 7 and 23 days old crop (DOC), respectively which were available up to maturity of the crop. Further, first incidence of tobacco caterpillar and brown semilooper was recorded on 30 DOC while green semilooper and bihar hairy caterpillar were observed on 32 and 51 DOC, respectively. All these foliage feeders were continue present till the maturity of the crop. Infestation of stem fly and girdle beetle were first observed on 27 and 45 DOC, respectively which were also available till the harvesting of the crop. Among natural enemies predators *i.e.* ladybird beetle and spider were observed on 32 and 37 DOC while an entomopathogenic fungus *i.e.* *B. bassiana* infected larvae were observed *i.e.* green semilooper and tobacco caterpillar between 72 to 79 DOC.

Key Words : Soybean, Foliage feeders, Girdle beetle, *Beauveria bassiana*, Lady bird beetle

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INTRODUCTION

Soybean [*Glycine max* (L.) Merrill] belongs to the family Leguminaceae and sub family Papilionaceae ranks first in the world for production of edible oil. It is being grown as one of the principal food plants. Various names

have been given to this important crop as Miracle bean, Golden bean, Cow of the field, Meat of the field, Gold from the soil, Pearl of the Orient Cinderella crop etc. India ranks third in world in respect of area and fifth in terms of production (Padiwal *et al.*, 2008).

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Total area of soybean in India is 119.98 lakh ha. with production of 118.89 lakh metric tonnes in 2021 with productivity 991 kg/ha. In Madhya Pradesh, the total area of soybean is 55.69 lakh ha. with 52.29 Lakh metric tonnes in 2021 with an average yield of 939kg/ha (SOPA,2021).

There are about 32 insect pests and two non-insect pests of soybean observed in Madhya Pradesh (Saxena, 1972). The low productivity of soybean both at national and state level is attributed to abiotic and biotic stresses like drought, weeds, insect pests and diseases. Among these, insect pests often pose a serious threat to soybean production by increasing cost of cultivation and impairing quality of produce in many ways (Singh *et al.*, 2000). There are several insect pests of soybean which have affect its production and some of the major pests are stem fly, girdle beetle, green semilooper, brown semilooper, tobacco caterpillar, bihar hairy caterpillar, white fly etc. The yield loss ranged between 25.8 to 42.8 per cent in untreated plots of soybean due to the infestation of these insect pests (Abudulai *et al.* 2012). The sucking pests viz., white fly *Bemisia tabaci* (Genn.) and thrips *Thrips palmi* (Karny) (Singh and Singh, 1990). The green semilooper, *Chrysodeixis acuta* (Walker) and tobacco caterpillar, *Spodoptera litura* (Fabricious), stem fly, *Melanogromyza sojae* (Zehn.) are also cause significant yield losses (Gupta, 2008).

MATERIAL AND METHODS

The investigations on succession of insect pests and their natural enemies on soybean (*Glycine max* (L.) Merrill) was carried out at BSP unit, JNKV, Jabalpur (MP) during *Kharif* 2016 with soybean variety- JS-97-

52 which was sown on 24 June 2016 and row to row distance was 0.45 meter (m) while plant to plant distance was 0.10 m

All the recommended agronomic practices were followed to grow the crop. Observation were recorded in each plot at weekly intervals starting from after emergence to maturity of the crop. The crop was kept unprotected for this purpose. The sequence in which the pests appeared was also noted.

Observations on larval population of green semilooper, tobacco caterpillar, brown semilooper and bihar hairy caterpillar made at five randomly selected spots of one meter row length in each plot leaving border rows by shaking the plants gently over the white plastic sheet placed between the rows. Adults of white fly and nymph and adults of jassid were counted on 10 randomly selected plants per plot. However, number of plant infested stem fly and girdle beetle were also observed at weekly interval. on the other hand, numbers of predators viz. spiders and parasitic larvae were observed on one meter row length at five places per plot.

RESULTS AND DISCUSSION

The major insect pests attacked at different stages of the crop were whitefly, green semilooper, tobacco caterpillar, and stem fly. Two predator *i.e.* spider and lady bird beetle and one parasites (*Beauveria bassiana*) were observed on soybean.

Total of eight insect species appeared as pest in different stages of crop growth presented in Table 1 belonging to four order viz. Hemiptera (Family: Aleyrodidae, Cicadellidae) Lepidoptera (Family: Noctuidae, Arctiidae) Diptera (Family: Agromyzidae) and

Table 1: List of insect pests infesting soybean and their natural enemies at Jabalpur during *Kharif* 2016

Common name	Scientific name	Order	Family
White fly	<i>Bemisia tabaci</i>		Aleyrodidae
Jassid	<i>Empoasca kerri</i>	Hemiptera	Cicadellidae
Green semilooper	<i>Chrysodeixis acuta</i>		Noctuidae
Tobacco caterpillar	<i>Spodoptera litura</i>		Noctuidae
Bihar hairy caterpillar	<i>Spilarctia obliqua</i>	Lepidoptera	Arctiidae
Brown semilooper	<i>Mocis indata</i> Fab.		Noctuidae
Lady bird beetle	<i>Coccinella septempunctata</i> Linn.		Coccinellidae
Girdle beetle	<i>Obereopsis brevis</i> Swed.	Coleoptera	Cerambycidae
Stem fly	<i>Melanogromyza sojae</i> Zehnt.	Diptera	Agromyzidae
Spider	<i>Oxyopes satticus</i>	Araneae	Oxyopidae
Entomopathogenic fungus	<i>Beauveria bassiana</i>	Hypocreales	Cordycipitaceae

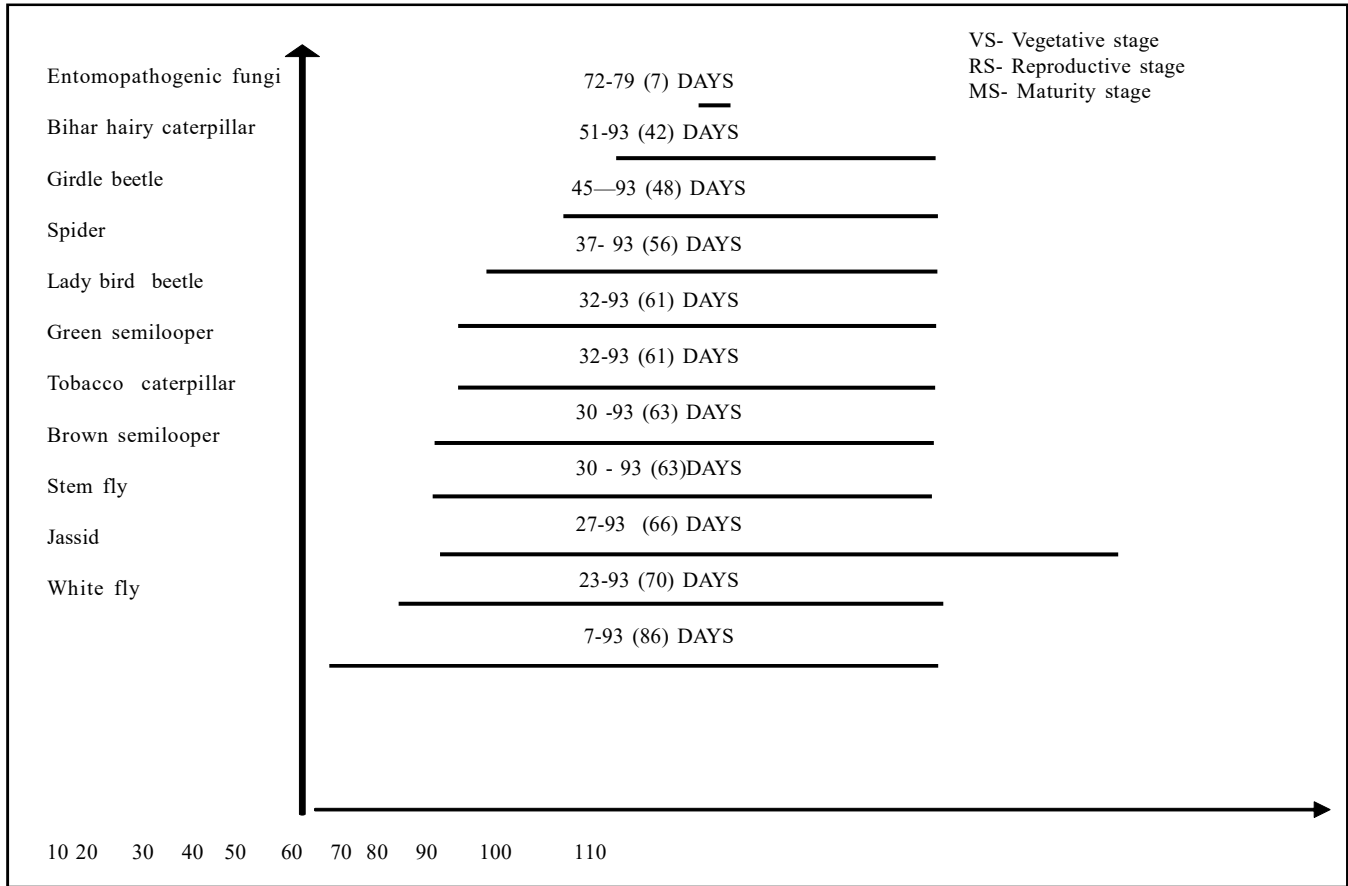


Fig. 1: Succession of insect pests of soybean and their natural enemies

Coleoptera (Family: Cerambycidae). Two predators *i.e.* spider and lady bird beetle belonging to Araneae (Family: Oxyopidae) and Coleoptera (Family: Coccinellidae), respectively and one parasite *Beauveria bassiana* belonging to order Hypocreales (Family: Cordycipitaceae) were recorded.

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

White fly appeared when the crop age was about 7 days old (seedling stage) *i.e.* 28th SMW and their activity continued till the maturity stage of the crop. Present findings are accordance with those of Biswas *et al.* (2013), Raghuvanshi *et al.* (2014) they reported white fly as an important sucking pest of soybean which was present on crop upto maturity stage of the crop.

Jassid, *Empoasca kerri* (Hemiptera: Cicadellidae):

Jassid appeared when the crop age was about 23 days old at 30th SMW and their activity continued till the maturity stage of the crop. Netam *et al.* (2013) also

recorded jassid on soybean.

Tobacco caterpillar *Spodoptera litura*, Fabricius (Lepidoptera: Noctuidae):

Tobacco caterpillar appeared after seedling stage when crop age was about 30 days old at 31th SMW and continued till the maturity of the crop. In accordance with present findings Ahirwar *et al.* (2015) reported that the tobacco caterpillar was associated with soybean and a serious pest in Madhya Pradesh.

Brown semilooper, *Mocis undata* Fab. (Lepidoptera: Noctuidae) :

First appearance of brown semilooper was observed immediately after seedling stage when the crop age was about 30 days old at 30th SMW and available upto the entire cropping season.

Green semilooper, *Chrysodeixis acuta* Walker (Lepidoptera: Noctuidae):

Green semilooper appeared during the vegetative

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stage of the crop when the crop age was about 32 days old at 32th SMW and continued till the maturity of the crop and caused damaged to foliage, flowers and pods. Present findings are in accordance with Singh and Singh (1987) they also reported green semilooper as pest of flowers and pods of soybean. Ahirwar *et al.* (2015) reported green semilooper and tobacco caterpillar as major pest of soybean and appeared from vegetative to maturity stage of the crop.

Bihar hairy caterpillar, *Spilarctia obliqua* (Lepidoptera: Arctiidae):

First appearance of bihar hairy caterpillar was observed in the vegetative stage when the crop age was about 51 days *i.e.* 3rd August 2016 during the 34th SMW and the pest was present on the crop till maturity stage of the crop. *i.e.* first week of October.

Stem fly, *Melanagromyza sojæ* Zehntner (Diptera: Agromyzidae):

First incidence of stem fly was observed in the vegetative stage when the crop age was about 27 days at 31th SMW and was available upto the entire cropping season. Kundu and Srivastava (1991) reported that stem fly incidence on soybean commenced from third week after sowing and continued upto tenth week.

Girdle beetle, *Obereopsis brevis* (Coleoptera: Cerambycidae) :

First incidence of girdle beetle was observed in vegetative stage when crop age was 45 days at 33th SMW and was available on the crop upto maturity stage of the crop. *i.e.* first week of October.

Natural enemies :

Total two species of predators *i.e.* lady bird beetle and spider and one species of parasite entomopathogenic fungus, *Beauveria bassiana* observed from there productive stage to the maturity of the crop Sosa *et al.* (2001).

Conclusions:

Suckingpests *viz.*, white fly and jassid was observed at the 7 and 23, respectively, days old crop and available up to maturity of the crop. Whereas, defoliators pests like brown semilooper, tobacco caterpillar, green semi looper and bihar hairy caterpillar were present on the crop, when the crop age was about 30, 30,32 and 51

days, respectively and continued till the maturity of the crop.

However, infestation of stem fly and girdle beetle was first observed when the crop age was about 30 and 45 day sold, respectively and continued till the maturity of the of crop. Lady bird beetle, Spider and *Beauveria bassiana* infected larvae recorded when crop age was 32, 37 and 72, respectively.

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