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**Original Research Article**

# Weather Factors Affecting Insect Pests Activities on Soybean in Malwa Region of Madhya Pradesh, India

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**A B S T R A C T**

The field experiment was conducted during *kharif* crop season 2015-16 at college of agriculture, Indore (M.P.) on cultivar RVS 2001-4 to assess the effect of weather factors on the trend of girdle beetle and green semilooper activities. The crop was sown in second week of June, 2015-16 in an area of 200 (20x10m) square meters following the recommended agronomical practices with the spacing of 40 x10 cm rows and plants, respectively. The observations on the appearance of major insect pests were recorded from germination to harvest of the crop at weekly intervals at 10 different sites in 1 meter row length from each site once in a week and correlation was worked out. For girdle beetle per cent infestation and for semilooper, larval population was counted. Girdle beetle infestation started in 30$^{th}$ MSW with 9.7% damage. The infestation increased and reached its peak as 15.4 % in 36$^{th}$ SMW ending 7th September. After that the infestation decreased slowly in next two weeks and noted least as 6.2% in 38$^{th}$ SMW ending 21$^{st}$ September. The occurrence of Green semilooper started with 4.75 insects in 29$^{th}$ SMW ending 20$^{th}$ July. The population fluctuated and reached its peak as 12.5 insects in 35$^{th}$ SMW ending 31$^{st}$ August. Both the insects significant negative correlation with maximum temperature (girdle beetle, r=-0.5619 and green semilooper, r= -0.606) and significant positive correlation with morning humidity (girdle beetle, r=0.5909 and green semilooper, r= 0.502) was recorded. Rest of the abiotic factors exhibited non significant positive or negative correlation for both insects.

**Keywords**

Weather factors, Girdle beetle, Green semilooper and correlation and regression

## Introduction

Soybean (*Glycine max* (L.) Merril) is known as the "Golden Bean" of the twentieth century. It has emerged as an important commercial crop in many countries and international trade of soybean is spread globally. Though soybean is a legume crop, yet it is widely used as oilseed. It can be grown on a variety of soil and in a wide range of climate. Soybean is a *kharif* crop in India, sown in June-July and harvested in late September–October.

Nationally soybean occupies an area of 110.65 lakh ha and its production is 69.29lak MT. Madhya Pradesh ranks first in total area (57.12 lakh ha and 53.88%) and production (36.12 lakh MT and 59.06%) in the country and is known as "soya state" in India (Annonymous, 2015).

The luxuriant crop growth, soft and succulent foliage attracts many insects and provides unlimited source of food, space and shelter. More than 150 insect pests cause damage to soybean in various parts of Madhya Pradesh in different stages of crop,

and damage due to these insect-pests is one of major constrains for soybean production. The incidence of girdle beetle and semilooper is a severe problem in the region and causes maximum loss in foliage and finally in yield. Global climatic changes, has now compelled the scientific community to study the effect of abiotic factors on insect pests presence and their trend of occurrence to manage them in systematic manner. Viewing the above situations the experiment was planned to know the occurrence of girdle beetle and semilooper relating with various weather parameters.

## Materials and Methods

Studies on occurrence of soybean girdle beetle and semilooper, was carried out during *kharif* season of 2015-16 at experimental field of Farm of college of Agriculture, Indore, (M.P.). Soybean variety RVS 2001-4 was sown in second week of June, 2015-16 in an area of 200 (20x10m) square meters following the recommended agronomical practices with the spacing of 40 x10 cm rows and plants, respectively. The observations on the appearance of major insect pests were recorded from germination to harvest of the crop at weekly intervals at 10 different sites in 1 meter row length from each sit once in a week and correlation was worked out. For girdle beetle per cent infestation and for semilooper, larval population was counted.

## Results and Discussions

### Population dynamics of girdle beetle

The infestation of girdle beetle (Table 1) started with 9.7 % in 30$^{th}$ MSW ending 27th July and it remained throughout the crop growth. The infestation reached its peak as 15.4% in 36$^{th}$ MSW ending 7th September. The significant negative correlation (Table 2) with maximum temperature (r=0.5619) and significant positive correlation with morning humidity (r=0.5909) were worked out. Further minimum temperature (r= -0.3431) and wind velocity (r= -0.2746) exhibited non significant negative correlation while rainfall (r= 0.0540) and rainy days (r= 0.3669) showed non significant positive correlation. Harish *et al* (2013) recorded occurrence of girdle beetle (*Obereopsis brevis)* and some other insect pests on soybean, variety JS 93-05 in the last week of July which showed peak density in the last week of August. Ahirwar and Payal (2015**)** observed the peak activity of girdle beetle (1.0 damaged plant per meter row) on cv. Js 335, during first week of October. These researchers also found the pest activity during July and August and even up to October and partially supported the present study as they did not correlated with abiotic factors. The findings of Yeotikar and More (2015) are in partial association as they observed that **t**he girdle beetle (*Obereopsis brevis)* infestation started in 30$^{th}$ MW (1.36%) and reached to 61.22% at harvest**.** The infestation of *Obereopsis brevis* in relation to bright sunshine hours (0.714*) was positively significant and negatively significant with wind velocity (−0.674*).

### Population dynamics of green semilooper

The occurrence of Green semilooper (Table 1) started with 4.75 insects in 29$^{th}$ MSW ending 20$^{th}$ July. The population fluctuated and reached its peak as 12.5 insects in 35$^{th}$ MSW ending 31$^{st}$ August. The significant negative correlation (Table 2) was found with maximum temperature (r= -0.606), and non significant negative correlation with minimum temperature (r= -0.161) and wind velocity(r= -0.198) while significant positive correlation was found with morning humidity (r= 0.502) and non significant positive correlation with rainfall (r= 0.210),

and rainy days (r= 0.377). Other weather factors exhibited non significant impact on insect population. Harish *et al* (2013) reported that green semilooper (*Chryrodecxis acuta*) appeared initially on soybean, variety JS 93-05 to a greater or lesser extent in the last week of July gradually with peak population of 5.0 larvae during the last week of August. Shali and Khandwe (2014) observed the appearance of the green semilooper during last week of July and disappeared during first week of October. Ahirwar *et al* (2014) explained that peak larval population of green semilooper (*Chrysodexis acuta*) was recorded 9.97 larvae/mrl at 34$^{th}$ SW when maximum and minimum temperature was 32°C and 28.2°C, respectively. There was no significant correlation exhibited between the larval population and weather parameters. Ahirwar and Payal (2015) observed the peak activity of green semilooper, *Chrysodeixis acuta*; (0.7 larvae per meter row) during second fortnight of August. Yeotikar and More (2015) observed that the green semiloooper recorded a peak of 3.00 larvae/mrl during 34$^{th}$ MW. Ahirwar and Marabi (2014) recorded the peak larval population of green semilooper (*Chrysodexis acuta*) at 34$^{th}$ SW when maximum and minimum temperature was 32°C and 28.2°C, respectively. There was no significant correlation exhibited between the larval population and weather parameters.

**Table.1** Seasonal incidence of major insect pests of soybean during kharif 2015-16

| Period | SMW | Girdle beetle Population | Green semilooper Population |
|---|---|---|---|
| 14-20July | 29 | 0.0 | 4.75 |
| 21-27July | 30 | 9.7 | 6.20 |
| 28July-3 Aug | 31 | 10.5 | 7.80 |
| 4-10Aug | 32 | 11.3 | 8.50 |
| 11-17 Aug | 33 | 12.4 | 9.60 |
| 18-24 Aug | 34 | 14.2 | 9.12 |
| 25-31Aug | 35 | 13.1 | 12.50 |
| 1-7Sep | 36 | 15.4 | 6.50 |
| 8-14Sep | 37 | 8.7 | 4.30 |
| 15-21Sep | 38 | 6.2 | 2.10 |
| 22-28Sep | 39 | 0.0 | 0.00 |
| 29 Sep-5 Oct | 40 | 0.0 | 0.00 |

**Table.2** Correlation coefficient of girdle beetle and green semilooper infestation with abiotic factors in soybean

| S.No. | Weather parameters | Correlation coefficient of girdle beetle | Correlation coefficient of green semilooper |
|---|---|---|---|
| 1 | Temperature ($^0$C) | | |
| | Maximum | -0.5619 | -0.6069 |
| | Minimum | -0.3431 | -0.1610 |
| 2 | Morning humidity (%) | 0.5909 | 0.5020 |
| 3 | Rainfall (mm) | 0.0540 | 0.2105 |
| 4 | Rainy day | 0.3669 | 0.3772 |
| 5 | Wind velocity (km/hr) | -0.2746 | -0.0684 |

Yadav and Banerjee (2015) observed that the population of semilooper decreased with increase in rainfall and Yadav and Agnihotri (2015) observed that maximum level of *Trichoplusi ni* population attained during 39thSW showed significant positive correlation with minimum temperature and evening relative humidity in black gram. Kalyan and Ameta (2017) exhibited that the maximum population of semilooper was recorded in the 36th SMW and 39th SMW, respectively. The semilooper showed a significant and positive correlation with minimum temperature, morning evening humidity and rain fall during both the years. The highest girdle beetle damage was recorded in the 35th SMW and 37th SMW. The regression equation indicated that rainfall had significant negative and positive impact on population of white fly and semilooper, respectively. Ramesh babu *et al.*, (2017) observed that semilooper larval population was recorded late July/early August and their peak activity observed during 33-34, 33-36 and 37-39 standard weeks, in 2012, 2013 and 2014, respectively. Among the weather factors, morning relative humidity showed significant (r=0.954) and positively, highly influence on the larval population per mrl whereas evening humidity (r=-0.644) and sunshine hrs (r=-0.367) negatively and significantly influence the larval population per mrl. The various weather parameters significantly caused 92 per cent variations in larval population per mrl. The findings of these researchers are in partial agreement as they did not study completely similar to present investigation. Further the climatic conditions vary place to place which affect the activities of insect pests

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