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**Umesh Kumar**  
Department of Entomology,  
Sardar Vallabhbhai Patel  
University of Agriculture & amp;  
Technology, Meerut, Uttar  
Pradesh, India

**DV Singh**  
Department of Entomology,  
Sardar Vallabhbhai Patel  
University of Agriculture & amp;  
Technology, Meerut, Uttar  
Pradesh, India

**SK Sachan**  
Department of Entomology,  
Sardar Vallabhbhai Patel  
University of Agriculture & amp;  
Technology, Meerut, Uttar  
Pradesh, India

**Gaje Singh**  
Department of Entomology,  
Sardar Vallabhbhai Patel  
University of Agriculture & amp;  
Technology, Meerut, Uttar  
Pradesh, India

**Gopal Singh**  
Department of Plant Pathology,  
Sardar Vallabhbhai Patel  
University of Agriculture & amp;  
Technology, Meerut, Uttar  
Pradesh, India

**RB Yadav**  
Department of Agronomy,  
Sardar Vallabhbhai Patel  
University of Agriculture & amp;  
Technology, Meerut, India

**Correspondence**  
**Umesh Kumar**  
Department of Entomology,  
Sardar Vallabhbhai Patel  
University of Agriculture & amp;  
Technology, Meerut, Uttar  
Pradesh, India

## Studies on seasonal incidence of *Sesamia inferens* (Walker) on maize with relation to abiotic factors

**Umesh Kumar, DV Singh, SK Sachan, Gaje Singh, Gopal Singh and RB Yadav**

### Abstract

The present investigation was carried out at Crop Research Centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut during two consecutive year *kharif*, 2016 and *Kharif*, 2017. The peak larval population caused by pink stem borer 6.17 and 6.93 larvae/plant were recorded at third week of August (34<sup>th</sup> Standard Week) during *kharif*, 2016 and 2017, respectively. The peak infestation caused by pink stem borer 27.85 and 29.50 percent was recorded in the last week of August (34<sup>th</sup> Standard Week) during *kharif* season 2016 and 2017, respectively. The correlation of pink stem borer with various abiotic factors with maximum and minimum temperature, relative humidity showed positive correlation while negative correlation with rainfall.

**Keywords:** seasonal incidence, *Sesamia inferens*, larval population and infestation percent

### Introduction

Maize (*Zea mays* L) is one of the most versatile crop having wider adaptability under varied agro-climatic conditions. Globally, maize is known as “Queen of cereals” because it has the highest genetic yield potential among the cereals. Globally maize is the third most important cereal grain after wheat and rice. Maize is cultivated on nearly 177 million ha in about 160 countries having wider diversity of soil, climate, biodiversity and management practices that contributes 36 % (851 metric tonne) in the global grain production. The global productivity of maize is 5.7 metric tonne/ha (USDA, 2016-17). Maize (*Zea mays*) is a plant belonging to the family gramineae. Maize grain contains about 10 per cent protein, 4 per cent oil, 70 per cent carbohydrate, 2-3 per cent crude fiber, 10.4 per cent albuminoids and 1.4 per cent ash. Maize protein ‘zein’ is deficient in tryptophan and lysine, the two essential amino acids. It also contains significant quantities of vitamin E, calcium and fairly high in phosphorus. In India maize is grown in all the seasons *i.e.* *kharif*, *Rabi* and *summer*. Out of these three seasons, nearly 90% of the production is from *kharif* season, 7-8% during *rabi* season and remaining 1-2% during *summer* season. Amongst the most serious pests shoot fly and maize stem borers, (*Chilo partellus* Swinhoe, *Sesamia inferens* Walker) occurs as serious pests in India (Manjunath, 2013) [5]. Pink stem borer, *Sesamia inferens* is major insect pest of maize (Deole *et al.*, 2013) [1]. A primarily loss due to *Sesamia inferens* in *kharif* season varies from 60 to 81.7% and in *Rabi* (winter) it varies from 25.7 to 78.9% (Sekhar *et al.*, 2009) [7].

### Materials and Methods

An investigation to study the seasonal incidence of pink stem borer in maize was carried out for two consecutive year *kharif*, 2016 and *Kharif*, 2017 at Crop Research Centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. The variety Early Wonder was grown as test variety which was sown during third week of June adopting normal agronomic practices except insecticidal application. Observation on larval population and percent infestation of pink stem borer, *Sesamia inferens* were recorded on fifteen randomly selected plants from controlled plots in the morning hours at weekly intervals from six inner rows and start from 15 days after sowing till harvest of the crop. Weekly meteorological data was also recorded throughout the crop season. Weekly meteorological data on temperature (minimum and maximum in degree centigrade) relative humidity (%) and rainfall (mm) were obtained from Department of Soil Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut-250110 (U.P.) during the period of experimentation.

### Result and Discussion

#### Seasonal incidence of larval population

The larval population was first time appeared in maize field in the first week of July

(27<sup>th</sup> Standard Week) 0.48 larvae/Plant (Table-1) during kharif, 2016. The larval population increased from last week of August and reached its peak 6.17 larvae/Plant during the (34<sup>th</sup> Standard Week), when the maximum and minimum temperature 34.63 °C and 26.01°C respectively. The mean relative humidity 83.55 percent and rainfall 0 mm was recorded, respectively. The larval population of *Sesamia inferens* decreased in last week of August (35<sup>th</sup> Standard Week) during kharif, 2016. The data revealed that almost same trend of incidence of number of larva/plant was recorded during kharif, 2017(Table-2). The larval population increased from last week of August and reached its peak i.e. 6.93 larvae/Plant during the 35<sup>th</sup> Standard Week, when the maximum and minimum temperature 29.50 °C and 23.40 °C respectively. The mean relative humidity 84.10 percent and rainfall 208 mm was recorded, respectively. The larval population of *Sesamia inferens* decreased in first week of September (36<sup>th</sup> Standard Week) during kharif, 2017.

### Seasonal incidence of percent infestation

The percent infestation was first time appearing in maize field in first week of July (27<sup>th</sup> Standard Week) i.e. 2.23 percent (Table-1) during kharif, 2016. The percent infestation increased from last week of August and reached its peak i.e. 27.85 percent infestation during the (34<sup>th</sup> Standard Week), when the maximum and minimum temperature 34.63 °C and 26.01 °C respectively. The mean relative humidity 83.55 percent and rainfall 0 mm was recorded, respectively. The infestation of *Sesamia inferens* decreased in last week of August (35<sup>th</sup> Standard Week) during kharif, 2016. The data revealed that almost same trend of incidence of number of larva/plant was recorded during kharif, 2017(Table-2). The percent infestation increased from last week of August and reached its peak i.e. 29.50 percent infestation during the 35<sup>th</sup> Standard Week, when the maximum and minimum temperature 29.50 °C and 23.40 °C respectively. The mean relative humidity 84.10 percent and rainfall 208 mm was recorded, respectively. The infestation of *Sesamia inferens* decreased in first week of September (36<sup>th</sup> Standard Week) during kharif, 2017.

### Correlation coefficient

The correlation analysis between weather parameters, larval population and percent infestation presented in Table-1 during kharif, 2016. The data revealed that the correlation of larval population of *Sesamia inferens* was found positive with

maximum ( $r=0.06$ ), minimum ( $r=0.28$ ) temperature, morning ( $r=0.36$ ) and evening relative humidity ( $r=0.31$ ) respectively. While rainfall had negative correlation ( $r=-0.02$ ) with larval population during kharif, 2016. The data revealed that the correlation between percent infestation of *Sesamia inferens* was found positive with maximum ( $r=0.00$ ), minimum ( $r=0.53$ ) temperature, morning ( $r=0.45$ ) and evening relative humidity ( $r=0.72$ ) respectively. While rainfall had positive correlation ( $r=0.38$ ) with percent infestation during kharif, 2016.

The correlation analysis between weather parameters and larval population of pink stem borer has been presented in Table-2. The data revealed that the correlation of larval population of *Sesamia inferens* was found negative with maximum temperature ( $r=-0.52$ ) during kharif, 2017. The correlation between larval population with minimum temperature, morning and evening relative humidity was found positive ( $r=0.17$ ), ( $r=0.38$ ) and ( $r=0.48$ ), respectively. While rainfall had positive correlation ( $r=0.55$ ) with larval population during kharif, 2017. Further, the correlation analysis between weather parameters and percent plant infestation due to pink stem borer have been summarized in Table-2. The data revealed that the correlation of percent infestation of *Sesamia inferens* was found negative with maximum temperature ( $r=-0.44$ ) during kharif, 2017. The correlation between percent infestation with minimum temperature, morning and evening relative humidity was found positive ( $r=0.55$ ), ( $r=0.19$ ) and ( $r=0.74$ ), respectively. While rainfall had positive correlation ( $r=0.46$ ) with percent infestation during kharif, 2017. Similarly, Singh and Kular (2015) [8] also recorded positive correlation with maximum, minimum temperature and relative humidity in larval population of pink stem borer. Similarly, Kandalkar and Men (2004) [3] also recorded negative and non-significant correlation of *Chilo partellus* with maximum temperature negative and significant correlation with minimum temperature and non-significant correlation with morning relative humidity.

The present findings also supported by Kandalkar *et al.* (1996) [2], Zulfiqar *et al.* (2002) [9] and Kore *et al.* (2013) [4] also reported the negative correlation with maximum temperature and positive correlation with relative humidity and rainfall. Pated *et al.* (2008) [6] observed peak infestation of pink stem borer, *Sesamia inferens* on maize. Among the abiotic factors, maximum temperatures were negative correlation with stem borer infestation.

**Table 1:** Seasonal incidences and correlation of larval population and infestation of *Sesamia inferens* during kharif, 2016

S.W.	Date of observation	No. of Larvae/ Plants	(%) Infestation	Temperature (°c)			Relative Humidity%			Rainfall (mm)
				Max.	Min.	Mean	Mor.	Even.	Mean	
25	June, 18-24	0	0	36.06	25.29	30.67	89.84	65.43	77.64	2.20
26	June, 25- July, 01	0	0	37.04	25.87	31.46	86.96	61.81	74.39	3.10
27	July, 02-08	0.48	2.23	33.00	23.71	28.36	93.93	78.53	86.23	60.20
28	July, 09-15	0.84	11.12	35.17	25.53	30.35	88.63	71.67	80.15	5.20
29	July, 16- 22	1.00	20.08	32.83	25.27	29.05	96.00	78.76	87.38	177.90
30	July, 23-29	1.08	22.20	33.06	24.76	28.91	97.11	76.96	87.04	30.70
31	July, 30-Aug, 05	2.11	23.47	32.79	24.00	28.39	95.79	79.96	87.87	14.10
32	Aug, 06-12	2.40	24.43	33.60	26.37	29.99	96.70	78.67	87.69	93.70
33	Aug, 13-19	3.44	26.67	32.46	25.73	29.09	96.21	82.59	89.40	40.10
34	Aug, 20-26	6.17	27.85	34.63	26.01	30.32	94.33	72.77	83.55	0.00
35	Aug, 27-Sep, 02	4.40	23.46	36.00	25.50	30.75	93.59	80.91	87.25	76.10
36	Sep, 03-09	3.00	20.00	33.73	24.67	29.2	94.36	71.57	82.96	0.00
37	Sep, 10-16	3.28	15.56	34.57	24.29	29.43	95.67	65.53	80.60	2.00
38	Sep, 17-23	2.84	11.50	35.00	24.74	29.87	95.73	66.37	81.05	21.20
39	Sep, 24-30	2.33	10.86	34.57	23.44	29.01	94.09	63.64	78.86	0.00
40	Oct, 01-07	1.82	6.67	34.50	24.33	29.41	96.97	62.57	79.77	1.20

41	Oct, 08-14	1.62	4.45	27.01	21.19	24.10	96.06	52.89	74.47	0.00
42	Oct, 15-21	1.40	1.48	33.10	16.34	24.72	93.31	37.32	65.32	0.00
43	Oct, 22- 28	0.66	0.74	32.33	15.97	24.15	95.77	42.61	69.19	0.00
Correlation coefficient with larval population				0.06	0.28		0.36	0.31		-0.02
Correlation coefficient with percent infestation				-0.00	0.53		0.45	0.72		0.38

**Table 2:** Seasonal incidences and correlation of larval population and infestation of *Sesamia inferens* during kharif, 2017

S.W.	Date of observation	No. of Larvae/ Plants	(%) Infestation	Temperature (°c)			Relative Humidity%			Rainfall (mm)
				Max.	Min.	Mean	Mor.	Even.	Mean	
25	June, 18-24	0	0	37.0	24.0	30.5	68.8	45.5	57.2	10.0
26	June, 25- July, 01	0	0	32.8	24.8	28.8	88.0	75.4	81.7	61.0
27	July, 02-08	0.88	2.23	33.8	24.2	29.0	84.0	60.5	72.3	17.0
28	July, 09-15	1.00	13.34	31.5	24.8	28.2	86.4	65.2	75.8	2.0
29	July, 16- 22	1.13	21.46	33.2	25.2	29.2	86.2	71.4	78.8	55.0
30	July, 23-29	1.67	22.25	32.8	24.8	28.8	94.4	73.0	83.7	20.0
31	July, 30-Aug, 05	2.88	23.68	31.8	25.1	28.5	96.5	79.9	88.2	47.0
32	Aug, 06-12	3.77	24.40	32.1	25.0	28.6	92.4	71.1	81.8	30.7
33	Aug, 13-19	3.95	26.67	31.1	25.0	28.1	87.1	73.6	80.4	38.0
34	Aug, 20-26	4.00	28.54	32.5	25.1	28.8	91.2	73.8	82.5	27.0
35	Aug, 27-Sep, 02	6.93	29.50	29.5	23.4	26.5	94.4	73.7	84.1	208.0
36	Sep, 03-09	5.11	22.23	32.1	21.8	27.0	95.8	71.9	83.9	19.0
37	Sep, 10-16	3.88	16.55	33.8	22.4	28.1	90.4	68.3	79.4	0.0
38	Sep, 17-23	2.84	11.12	30.8	21.3	26.1	92.7	72.3	82.5	57.0
39	Sep, 24-30	2.44	8.85	33.4	21.0	27.2	98.7	58.9	78.8	0.0
40	Oct, 01-07	2.17	6.67	33.3	19.5	26.4	97.7	52.4	75.1	0.0
41	Oct, 08-14	1.88	4.45	32.5	18.2	25.4	97.4	48.7	73.1	0.0
42	Oct, 15-21	1.34	1.83	32.7	14.4	23.6	95.5	44.8	70.2	0.0
43	Oct, 22- 28	0.77	1.48	30.6	13.3	22.0	96.8	53.3	75.1	0.0
Correlation coefficient with larval population				-0.52	0.17		0.38	0.48		0.55
Correlation coefficient with percent infestation				-0.44	0.55		0.19	0.74		0.46

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