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## Seasonal incidence of sesame leaf and capsule borer, *Antigastra catalaunalis* (dup.) on sesame in relation to weather parameters

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### Abstract

Investigations on seasonal incidence of sesame leaf and capsule borer, *Antigastra catalaunalis* (Dup.) on sesame was carried out at Agronomy farm of S.K.N. College of Agriculture, Jobner (Rajasthan). The incidence of leaf and capsule borer population was recorded in the 33<sup>rd</sup> standard meteorological week (SMW) and initially, it was 6.40 larvae/ five plants. The population (7.00 larvae/ five plants) gradually increased and reached its peak in 35<sup>th</sup> SMW and gradually declined thereafter and again increased (in the 39<sup>th</sup> SMW 6.20 larvae/ five plants) and observed in traces thereafter. The population of this pest had significant negative correlation ( $r = -0.69$ ) with maximum temperature, while, minimum temperature, relative humidity and rainfall had positive significant correlation ( $r = 0.85, 0.88$  and  $0.73$ ), respectively. The leaf damage done by leaf and capsule borer was noticed in the 33<sup>rd</sup> SMW. Maximum leaf damage of 17.51 per cent and capsule damage of 11.97 per cent by leaf and capsule borer was recorded in 35<sup>th</sup> and 39<sup>th</sup> SMW, respectively. The total damage caused by this pest was in the range of 7.80 – 17.51 per cent. The total damage (both capsule and leaf damage) caused by leaf and capsule borer had significant negative correlation with maximum temperature ( $r = -0.70$ ), while, significant positive correlation with minimum temperature ( $r = 0.73$ ) and relative humidity ( $r = 0.80$ ). The rainfall showed non-significant correlation ( $r = 0.65$ ) with the total damage caused by the leaf roller and capsule borer.

**Keywords:** Seasonal incidence, sesame, *Antigastra catalaunalis*, weather parameters

### Introduction

Sesame (*Sesamum indicum* L.) known as the ‘queen of oil seeds’ is the oldest oilseed crop of world cultivated throughout India. Its seeds contain 52- 57 per cent oil and 25 per cent protein (Smith *et al.*, 2000) [1]. The pests levied heavy toll in seed yield (25 to 90%). As many as 67 insect pests of different category are recorded damaging the sesame crop from germination to maturity. The crop is attacked by 29 species of insect pests in different stages of its plant growth (Biswas *et al.*, 2001) [4]. The sesame leaf and capsule borer, *Antigastra catalaunalis* (Dup.) is the most important pest because this attacks the crop in all the growth stages after about two weeks of emergence in all sesame growing areas in India (Ahirwar *et al.*, 2009) [1] and (Suliman *et al.*, 2004) [12]. Newly hatched larvae feed the young leaves and shoot tips and at a later stage they roll the leaves together and feed inside. Thereafter feed on flowers, pods and seeds. This insect pest causes 10-70 per cent infestation of leaves, 34-62 per cent of flower buds/ flowers and 10-44 per cent infestation of capsules resulting in upto 72 per cent loss in yield (Ahirwar *et al.*, 2010) [2]. One of the reasons for the low productivity of this crop in India is because of the infestation caused by the sesame leaf and capsule borer, *A. catalaunalis* which causes a heavy seed yield loss upto 90 per cent (Ahuja and Kalyan, 2002) [3]. Activity of *A. catalaunalis* is high during August to October.

Suitable understanding of the population dynamics of leaf roller and capsule borer is important due to variation in the weather condition and changing pest status. Weather parameters play a vital role in population build up of insect pest. Correlation study helps in providing suitable know how either positive or negative association of pest population with abiotic factors. It gives direct influence of particular parameter on pest population build up as well as its indirect effect through other parameters. In the present study the efforts have been made to study the seasonal incidence, its correlation with weather parameters on population build up of sesame leaf roller and capsule borer. The study would give an idea about their peak period of insect activity which may be helpful in developing insect management strategy against them.

## Materials and Methods

Seasonal incidence of sesame leaf and capsule borer, *A. catalaunalis* was estimated under natural condition at Agronomy farm, S.K.N. College of Agriculture, Jobner (Rajasthan) during *Kharif*, 2018. Geographically, Jobner is located at longitude of 75° 28' East, latitude of 26° 06' North and at the altitude of 427 meters from the mean sea level (MSL). It falls under agro-climatic zone III A, the Semi-arid Eastern Plain region of Rajasthan.

Experimental layout: The variety RT-351 was sown on 11<sup>th</sup> July, 2018 in simple five plots of size 3 m x 2.4 m under natural condition keeping row to row and plant to plant distance of 30 cm and 10 cm, respectively and other recommended agronomic practices without spraying any insecticide.

Observations: To determine the seasonal incidence of sesame leaf and capsule borer on sesame crop, weekly populations were recorded on randomly selected five plants from each plot right from appearance of the pest till harvesting of the crop without any insecticidal treatment. Population of sesame leaf and capsule borer was recorded by visual observing on five randomly selected plants in each plot without disturbing the plant during morning hours.

Statistical analysis: To interpret the results of seasonal incidence of leaf roller and capsule borer on sesame, simple correlation was computed between population of insect pest and abiotic factors of environment (maximum and minimum temperature, relative humidity and rainfall). The following formula was used for calculating correlation coefficient (r).

$$r = \frac{N \sum xy - (\sum x) (\sum y)}{\sqrt{N \sum x^2 - (\sum x)^2 \cdot N \sum y^2 - (\sum y)^2}}$$

Where,

r = Simple correlation coefficient

x = Independent variables, *i.e.* abiotic components

y = Dependent variables, *i.e.* pests

N = Number of observations

## Results and Discussion

The population of leaf and capsule borer, *A. catalaunalis* recorded during the crop season *Kharif*, 2018 on sesame variety RT-351 has been presented in Table-1 along with meteorological parameters, *viz.*, minimum and maximum temperature, relative humidity and rainfall. The population of the leaf and capsule borer commenced in the 33<sup>rd</sup> standard meteorological week (SMW) and the first observation was

recorded on 11<sup>th</sup> August. Initially, the population of leaf and capsule borer was low (6.40 larvae/ five plants). The population gradually increased and reached to its peak in 35<sup>th</sup> SMW (7.00 larvae/ five plants). A fluctuating decline in the population was evident thereafter and again increased (6.20 larvae/ five plants) in the 39<sup>th</sup> SMW and observed in traces thereafter. The highest leaf roller and capsule borer population (7.00 larvae/ five plants) was observed at 24.0°C minimum temperature, 31.5°C maximum temperature, 77 per cent relative humidity and 34 mm rainfall. The present findings are corroborate with those of Kumar *et al.* (2010) [9] and Mishra *et al.* (2015) [10], who reported that the population of leaf roller and capsule borer commenced from the 33<sup>rd</sup> SMW and its population reached to maximum in 35<sup>th</sup> SMW.

Data presented in Table-1 and Fig-1 revealed that the infestation of leaf roller and capsule borer on sesame crop showed negative significant correlation with maximum temperature (r= -0.69), while, significant correlation with minimum temperature (r = 0.85), relative humidity (r = 0.88) and rainfall (r= 0.73) at 5 per cent level of significance. Choudhary *et al.* (1986) [6] and Choudhary *et al.* (2015) [7] reported that the population of leaf roller and capsule borer showed negative significant correlation with maximum temperature. Choudhary *et al.* (2015) [6] and Choudhary (2017) [5] observed that the incidence of leaf roller and capsule borer population had significant correlation with minimum temperature, relative humidity and rainfall which also corroborates with the present findings.

The leaf damage done by leaf and capsule borer, *A. catalaunalis* was commenced in the 33<sup>rd</sup> SMW. Maximum leaf damage (17.51%) by this pest was recorded in the 35<sup>th</sup> SMW, *i.e.* 25<sup>th</sup> August, 2018. Maximum capsule damage (11.97%) by leaf and capsule borer incidence was recorded in 39<sup>th</sup> SMW, *i.e.* 22<sup>th</sup> September, 2018. The total damage caused by leaf and capsule borer was in the range of 7.80 – 17.51 per cent. Gangwar *et al.* (2014) [8] reported 16.63 per cent capsule damage caused by leaf and capsule borer at maturity stage which corroborates the present findings.

The negative significant correlation (r= -0.70) was computed between the total damage and maximum temperature, while, significant correlation with minimum temperature (r= 0.73) and relative humidity (r= 0.80). The rainfall showed non-significant correlation (r= 0.65) with the total damage. The present findings are also in agreement with that of Ahirwar *et al.* (2010) [2] who reported that the leaf damage showed negative correlation with maximum temperature, while, positive correlation with minimum temperature, relative humidity and rainfall.

**Table 1:** Seasonal incidence of leaf and capsule borer, *Antigastra catalaunalis* (Dup.) on sesame in relation to weather parameters

S. No.	Standard Meteorological weeks (SMW)	Date of observation	Temperature (°C)		Average relative humidity (%)	Total rainfall (mm)	Larval population of leaf and capsule borer/5 plants	Leaf damage (%)	Capsule damage (%)	Total damage (%)
			Maximum	Minimum						
1.	33	11-08-2018	34.4	24.7	72	14.6	6.40	14.09	0.00	14.09
2.	34	18-08-2018	31.2	23.8	80	48.4	6.80	15.21	0.00	15.21
3.	35	25-08-2018	31.5	24	77	34.0	7.00	17.51	0.00	17.51
4.	36	01-09-2018	30.5	22.9	81	33.0	6.00	13.79	0.00	13.79
5.	37	08-09-2018	30	21	74	1.60	5.60	5.35	8.47	13.82
6.	38	15-09-2018	34.2	20.2	63	0.00	5.80	4.52	9.44	13.96
7.	39	22-09-2018	32.8	19.1	64	19.8	6.20	4.03	11.97	16.00
8.	40	29-09-2018	36.7	18.9	51	0.00	4.00	3.64	5.56	9.20
9.	41	06-10-2018	35.7	15.4	47	0.00	3.60	2.43	5.37	7.80
		Maximum temperature (r)					-0.69*	-	-	-0.70*
		Minimum temperature (r)					0.85*	-	-	0.73*

Mean relative humidity (r)					0.88*	-	-	0.80*
Rainfall (r)					0.73*	-	-	NS

\*Significant at 5 per cent level of significance

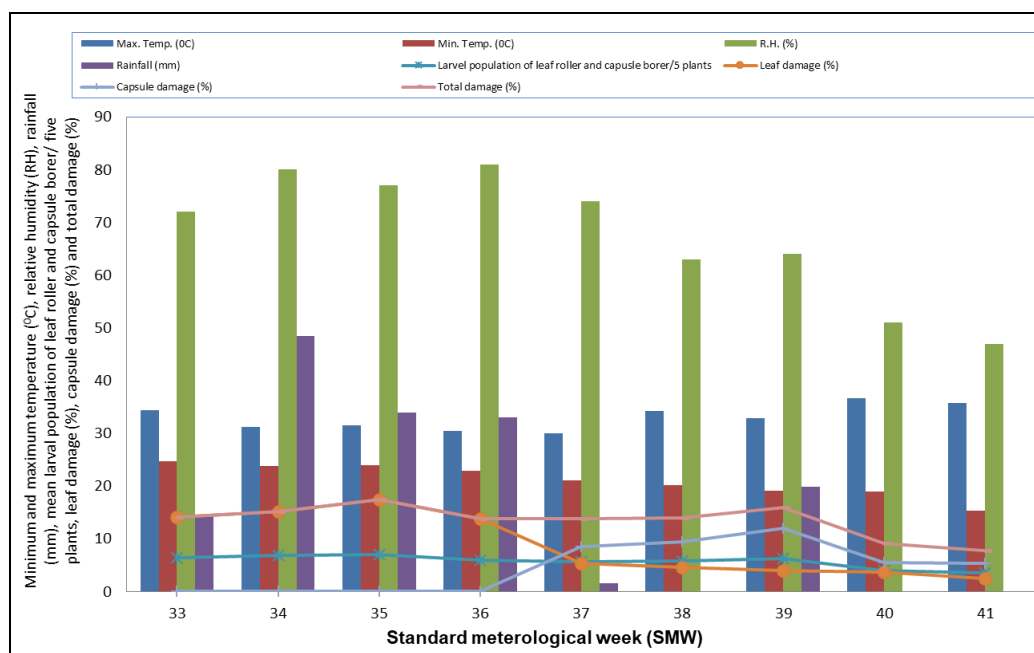


Fig 1: Seasonal incidence of leaf and capsule borer, *Antigastra catalaunalis* (Dup.) on sesame in relation to weather parameters

## Conclusion

The incidence of leaf roller and capsule borer, *A. catalaunalis* commenced from 33<sup>rd</sup> SMW (3.66 leaf roller and capsule borer/ five plants) and continued till 41<sup>st</sup> SMW. The population reached its peak in 35<sup>th</sup> SMW (7.0 leaf roller and capsule borer/ five plants). The correlation coefficient worked out revealed that the infestation of leaf roller and capsule borer on sesame crop showed negative significant correlation with maximum temperature ( $r = -0.69$ ), while significant correlation with minimum temperature ( $r = 0.85$ ), relative humidity ( $r = 0.88$ ) and rainfall ( $r = 0.73$ ). The negative significant correlation ( $r = -0.70$ ) was computed between the total damage and maximum temperature, while, significant positive correlation with minimum temperature ( $r = 0.73$ ) and relative humidity ( $r = 0.80$ ). The rainfall showed non-significant correlation with the total damage.

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