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Population dynamics of the sesame leaf webber by continuously raising this crop round the year

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ABSTRACT

Sesame leaf webber, *Antigastra catalaunalis* Duponchel (Lepidoptera: Pyralidae) is a pest of serious concern for the cultivation of sesame. It is a regular pest and accountable for the considerable loss. Systematic study concerning the seasonal abundance of the sesame leaf webber and other pests was attempted here. The data on the seasonal abundance of the sesame pest were observed from seedling to maturity stage, and continued upto maturity of the crop. Though a continuous raising of the crop throughout the year was done, March to August was found to be favorable for most of the pests. But the dominant one is *Antigastra catalunalis*. Among the different stages of the crop, early stage upto 45 DAS was preferred to most by *Antigastra catalunalis.*

Key words*: Sesame, Sesame leaf webber, Survey and Seasonal Abundance*

Introduction

Sesame, *Sesamum indicum* L. (F:Pedaliaceae), known as the 'queen of oil seeds' is one of the oldest oilseed crops cultivated in India. It is also known as sesame, til and gingelly (Sharma, 1967); simsim, beniseed, til, safedtil, kalatil and Tillie (Vishwanath and Chhotey Lal, 1995). India ranks first in the area under cultivation with 2.09 million hectares and an annual production of 0.56 million tonnes, representing 30 percent of the world output.

The sesame seeds are rich source of edible oil. In addition to this, they are rich in protein, carbohydrates, calcium, vitamins, fat, phosphorus and trace elements. The oil is mostly used for culinary purpose and also in the manufacture of soaps, cosmetics, perfumes, insecticides and pharmaceutical products. The oil cake of sesame is also rich in carbohydrates, proteins, minerals and used as feed for poultry and farm animals.

Sesame is grown traditionally under rainfed conditions by marginal and sub marginal farmers. Among the 29 insect species reported on sesame in India, the sesame leaf webber is the most important pest (Rai, 1976). One of the major reasons for low yield in India is attributed to insect pests, which damage this crop at various stages of its growth (Rai, 1976). A severe yield loss was recorded due to the leaf webber damage (Yadav and Lal, 1978). In the tropics and sub tropics, the sesame leaf webber is also referred as sesame leaf roller, sim webworm and tile leaf and capsule borer. This belongs to the family Pyralidae under the order Lepidoptera (Hector, 1919). In India, sesame leaf webber, *Antigastra catalaunalis* (Duponchel) is the most serious pest causing upto 90 per cent yield loss (Weiss, 1983).

The shoot and leaf webber attacks all the parts except root and feeds on the tender foliage by webbing the top leaves and also bores into the shoots and capsules (Ayyar, 1940). Singh (1983) recorded

10 to 71 per cent plant infestation, 10 to 43.5 per cent capsule infestation, resulting in 8.9 to 71.5 per cent yield loss.

Since no attempt was made on population dynamics of the sesame leaf webber by continuously raising this crop round the year.

Methodology

The field trails were conducted in the fields of Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Karaikal, during the period 2003 – 2004.

Population dynamics

An experiment with monthly sowing of sesame was designed for one year to study the seasonal abundance of sesame leaf webber. The sesame variety TMV 3 was used in this study. The unit plot size was 4m X 3m. Seeds of sesame were sown on first fortnight of every month from April 2003 to March 2004 with three replications following a Randomized Complete Block Design. The rows and plants were spaced at 30 cm and 30 cm apart, respectively. The recommend crop husbandry was followed uniformly. After sowing, periodical observations were made on the crop to record the pests. Observations of larval population of the sesame leaf webber and other pest populations were commenced at fifteen days after sowing and continued at weekly intervals upto harvesting of the crop.

The observations were made on twenty random plants in each plot by visual counting and hand picking if insects on the standing crop. The prevailing abiotic factors *viz*., maximum and minimum temperature (^{0}C), relative humidity (%), rainfall (mm) and sunshine (hours) were also recorded for the corresponding periods. To ascertain the correlation between larval population and abiotic parameters (temperature, relative humidity, rainfall and sunshine hours), the coefficient of correlation (r) were worked out by taking abiotic factors as independent variable (x) and larval population as dependent variable (y).

Statistical analysis

Data on the pests were transformed to x + 0.5 units for statistical interpretation, if zero values were recorded. Randomized Block Design (RBD) was followed for statistical analysis. Coefficient of correlations was worked out to ascertain the relation between abiotic and biotic factors with the larval population.

Experimental results

Sesame leaf webber, *A. catalaunalis*

The number of sesame leaf webber larvae recorded in different months of sowing and at different intervals of observation is presented in (Table 1). The overall mean on different months of sowing indicated that the number of larvae was maximum (15.13) during June 2003 sowing, followed by July 2003 sowing (7.20). A decreasing trend in the number of larvae was noticed from August 2003 to October 2003 sowing and there was a general decrease in the larval number during November and December 03 and January 04 sowing. Thereafter a slow increase in the number of larvae was noticed from February 04 to March 04 sowing.

The overall mean at different stages of the plant indicated that the number of larvae was maximum at 15 DAS (8.33) and thereafter it was steadily decreasing as the crop matured (Table 1). At 15 DAS, June 03 sowing showed the maximum number of larvae (32.67) followed by July 03 sowing (21.67) and the least number of larvae (0.0) was observed in November 03 sowing. The occurrence of the larvae was decreasing from July 03 sowing to September 03 sowing and there was a shoot up in the number during October 03 sowing. The larval number was found to be steadily increasing from December 03 to April 03 sowing. At 30 DAS, also in June 03 sowing the maximum number of larvae (27.33) was recorded followed by July 03 sowing (4.67) and the least number of larvae (0.0) was observed during October 03 sowing. The abundance of the larvae was decreasing from July 03 to October 03 sowing. During December 03, February 04 and March 04 sowing the occurrence of the larvae was not noticed. At 45 DAS also, the abundance of the larvae was maximum (10.00) during June 03 sowing followed by August 03 sowing (6.00). A steady increase in the number of larvae was noticed from December 03 to April 03 sowing. In between the June 03 and August 03 sowing there was a decrease in the larval number, whereas no larvae were noticed during October 03 sowing.

At 60 DAS, the maximum number of larvae (4.33) was recorded during July 03 sowing followed by June 03 sowing which was on par with May 03 and June 03 and January 04 sowing. A steady increase in the number of larvae was noticed from April 03 to

Table 1. Seasonal abundance of sesame leaf webber, *Antigastra catalaunalis* (Dup.) in different months of sowing

Months	Number of larvae (Mean of 3 replications of 20 plants each)					
	15 DAS	30 DAS	45 DAS	60 DAS	75 DAS	Overall mean
April 03	15.67(3.87)^{bc}	2.67(1.74)^{bc}	3.33(1.93)^{bcd}	0.00(0.71)^{c}	0.00	4.33
May 03	2.33(1.57)^{efg}	0.33(0.88)^{de}	0.33(0.88)^{ef}	2.00(1.56)^{b}	1.00	1.20
Jun 03	32.67(5.75)^{a}	27.33(5.25)^{a}	10.00(3.07)^{a}	3.33(1.94)^{ab}	2.33	15.13
Jul 03	21.67(4.69)^{b}	4.67(2.22)^{b}	3.67(2.03)^{bc}	4.33(2.20)^{a}	1.67	7.20
Aug 03	7.00(2.74)^{d}	2.67(1.64)^{bcd}	6.00(1.61)^{bcde}	0.67(1.05)^{c}	1.67	3.60
Sep 03	1.33(1.34)^{fg}	1.67(1.46)^{bcde}	5.33(2.41)^{ab}	0.67(1.05)^{c}	2.67	2.33
Oct 03	4.00(2.03)^{def}	0.00(0.71)^{e}	0.00(0.71)^{f}	0.00(0.71)^{c}	0.00	0.80
Nov 03	0.00(0.71)^{g}	2.67(1.61)^{bcd}	0.67(1.05)^{def}	0.67(1.05)^{c}	1.33	1.07
Dec 03	1.00(1.17)^{fg}	0.00(0.71)^{e}	0.33(0.88)^{ef}	0.33(0.88)^{c}	0.00	0.33
Jan 04	5.33(2.36)^{de}	1.00(1.17)^{cde}	0.67(1.05)^{def}	3.00(1.84)^{ab}	0.67	2.13
Feb 04	6.67(2.67)^{d}	0.00(0.71)^{e}	1.67(1.46)^{cdef}	0.33(0.88)^{c}	0.00	1.73
Mar 04	8.33(2.94)^{cd}	0.00(0.71)^{e}	2.67(1.72)^{bcde}	0.67(1.05)^{c}	0.00	2.33
C.D. (P=0.05)	(0.987)**	(0.803)**	(0.898)**	(0.497)**	NS	
Overall mean	8.33	3.58	2.89	1.33	0.95	

DAS – Days After Sowing** significant at P=0.01 level* signicicant at P = 0.05 level NS – Non significant
Values in () are x+0.5 transformed values.
Means followed by a common letter are not significantly different

July 03 sowing, thereafter the number was decreasing and decreased upto December 03 which further declined upto February and March 04 sowing, except for January 04. No larvae were observed during April and October 03 sowing. At 75 DAS no significant difference existed between the number of larvae at different months of sowing which indicated that late stage was not freshly infested.

The correlation between the larval number and abiotic and biotic factors was ascertained and presented in Table 2. The mean larval population showed a significantly positive correlation with maximum temperature and significantly high negative correlation with morning and evening relative humidity. The correlation was low and non-significant with minimum temperature, sunshine, rainfall and dewfall. The number of natural enemies like spiders, coccinellids and other predators and parasitoids did not show any correlation with the larval population. In case if the spiders, coccinellids and other natural enemies were used as dependent variable same relation wasseen.

Discussion

Leaf webber, *A. catalaunalis*

A regular sowing of sesame throughout the year indicated that there was a continuous infestation by sesame leaf webber, *A. catalaunalis*, but the abundance of the larval population differed in various months and magnitude or difference may be attrib-

Table 2. Correlation between the larvae of *Antigastra catalaunalis* and abiotic factors (April 2003 – March 2004)

S.No.	X – Variable	Y – Variable	(r)
1	Maximum temperature (^{0}C)	Leaf webber population	0.2623*
2.	Minimum temperature (^{0}C)	Leaf webber population	0.1937^{NS}
3.	Morning RH (%)	Leaf webber population	-0.3784**
4.	Evening RH (%)	Leaf webber population	-0.3683**
5.	Sunshine (hrs)	Leaf webber population	-0.1434^{NS}
6.	Rainfall (mm)	Leaf webber population	-0.0591^{NS}
7.	Dewfall (mm)	Leaf webber population	-0.2455^{NS}

X=Abiotic factors (independent) Y = Larval population (dependent)
r = Coefficent of correlation ** Significant at 0.01 level
*Significant at 0.05 level NS Non significant

uted to multivarious factors like temperature, relative humidity, rainfall and the presence of natural enemies. Cheema and Gurdip Singh (1987) also reported that *A. catalaunalis* remained active throughout the year in Punjab. They had even reported that 12 overlapping generations were completed in a year and their biological activity varied according to the season. In this study, lowest larval number was recorded during October sowing, because October month recorded the maximum rainfall compared to all other months which was not conducive for the multiplication of insect pest, It was also proved beyond doubt that the per cent larval survival was minimum (60 per cent) in October as compared to 85.72 per cent in July. So this explained that October was less congenial for the larval survival and probably reflected in low larval population (Cheema and Gurdip Singh, 1987). Another factor for the variation in population was the fecundity of the female moths of *A. catalaunalis* emerged in field in different seasons. The studies conducted by Cheema and Gurdip Singh (1987) revealed that the moths emerged from May to August showed high fecundity of 84.91 ± 31.03 whereas the moths emerged from December to February showed fecundity of 71.02 +4.76. In other period of year, a moderate fecundity between 38-53 eggs per female was noticed. This was also one of the reasons that the population was maximum during June, July and it was less during October to February. The overall mean for different stages of crop indicated that the maximum number of larvae was noticed at 15 DAS. It was revealed that the insect flourished on the crop throughout the growth period infesting all aerial parts of the plants like leaves, flower buds, flowers and capsules. This may be attributed to the changes in the nutritional status of the crop due to the physiology and phenological phases of the crop growth namely the vegetative, early flowering, flowering capsule formation and post flowering - capsule maturation phase. So the results obtained in present study also clearly indicated a similar phenomena that the earlier stage of the crop was more prone to attack of pest than late stage.

Sanjay Kumar and Goel (1994) reported that a decline in the number of larvae was clear when the crop approached maturity and characterized by narrowing, hardening, yellowing and falling of leaves. During the late phase of the crop and increased activity of the natural enemies of the pest was seen which another factor was for the decline of sesame leaf webber population. A similar phenomenon was also reported by Ahuja (1989).

The mean number of larvae showed a significantly positive correlation with maximum temperature and high negative correlation with morning and evening relative humidity. This indicated that a high temperature and a low relative humidity coupled with no rainfall were the most conducive environmental conditions for the fast multiplication of the insect. These factors are common during June sowing in Karaikal. More or less a same effect of temperature and relative humidity was reported by Sanjay Kumar and Goel (1994). The minimum temperature had a negative correlation with larval population and this indirectly supported the present finding that maximum temperature have positive correlation with larval population and they have also established the fact the afternoon relative humidity had a negative effect on the larval population of *Antigastra catalaunalis* which was corroborated with the present finding also.

It was revealed that the lower mean population of the larvae was also due to the cumulative effect of the abiotic factors like temperature and relative humidity. Choudhary *et al*. (1986) and Singh *et al*. (1992) discussed a negative correlation of *Antigustra catalaunalis* population on sesame with prevailing meteorological parameters New Delhi and Bihar, respectively.

Conclusion

The sesame leaf webber *A. catalaunalis* population was found maximum during June 03 sowing followed by July 03 sowing. A minimal population was seen in December sowing. Considering the stage of the crop the population was maximum at 15 DAS. There was a positive correlation between the larval population of sesame leaf webber and maximum temperature and a negative correlation with morning and evening relative humidity.

Conflict of Interest

Authors declares that there is no conflict of Interest exists.

References

Ahuja, D.B. 1989. Seasonal occurrence of insect pests in *Sesame indicum*Linn.*J.Ent. Res*. 13(2): 116-120.

Ayyar, T.V.R. 1940. Hand book of Economic Entomology

for South India. Govt. of Madras.pp.202-204.
Cheema, J.S. and Gurdip Singh. 1987. Biology of sesame leaf webber and capsule borer, *Antigastra catalaunalis* (Duponchel) Lepidoptera: Pyralide) in Punjab. *J. Res. Punjab Agric. University*. 24(1): 65-74.
Choudhary, R., Singh, K.M. and Singh, R.N. 1986. Pest complex and sucession of insect pests in *Sesamum indicum* Linn. *J. Ent. Res*. 48(4): 428-434.
Hector, G.P. 1919. Reports of the economic Botanist to the Governrmnet of Bengal Reports of Department of Agriculture, Bengal. pp. 31-33.
Rai, B.K. 1976. Pests of oilseed crops in India and their control. Indian Council of Agricultural Research, New Delhi. pp. 77-80.
Sanjay Kumar, Goel, S.C. and Kumar, S. 1994. Record of a new larval parasitoid associated with *Antigastra catalunalis* (Dup) (Lepidoptera: Pyralidae). *J. Bombay Natural History Society.* 91(2): 331.
Sharma, R.P. 1967. Hand Book of Agriculture. Indian Council of Agricultural Research, Krishi Anusandhan Bhavan, Pusa, New Delhi. Pp.1303.
Singh, R. 1983. *Biology and assement of losses caused by til leaf roller and pod borer, Antigastracatalaunalis to sesame.* M.S., Thesis. Dept. of Entomology, Haryana Agricultural Univesity, Hissar, India.
Vishwanath and Chhotey Lal, 1995. *Oil Seeds in India – An Overview.* Westvill Publishing House, New Delhi. pp.228.
Weiss, E.A. 1983. Sesame. In: *Oil Seeds Crops*. Longman, Londen New York-660p.
Yadav, R.P. and Lal, B.S. 1978. Studies on the comparative efficacy of some popular insecticides against Sesamum pod borer, *Antigastra catalaunalis* (Dup). *Oilseeds J.* 6: 34-35.