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Study on Incidence of Major Insect Pests and Parasitism in Sesame Crop

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Abstract – Insect pests create problems to farmers by damaging crop and decreasing productivity. The sesame yield is greatly affected by the attack of insect pests. In our country, farmers are using various kinds of synthetic chemical pesticides for plant protection from a long period of time. These pesticides are degrading the quality of cereals as well as environment. To overcome this problem, it is important to replace these pesticides by biological control to maintain the quality of food & environment. In the present study, a field experiment was carried out on incidence of insect pests and parasitism in sesame crop. Larval parasitoids Bracon sp., on Leaf Webber/capsule borer, Antigastra catalaunalis, and Apanteles sp. on bihar hairy caterpillar, Spilosoma oblqua, a polyphagous insect pest were found during field survey and the rearing of these insect pests in Entomology Research Laboratory, Agra College Agra.

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INTRODUCTION

Sesame (Til) is one of the oldest indigenous cultivated oilseed crops in the world. Sesame seed contain 50-60% oil and 25% protein with antioxidants such as sesamolin, sesamin and has been used as active ingredients in antiseptics, bactericides, vermicides, disinfectants, other repellents, anti tubercular agents [1]. The crop has other great medicinal value and is used in the treatment of rheumatoid arthritis, asthma, cancer, blood pressure and diabetes etc. It is grown in about 53 countries of the world. India, Myanmar and China are chief producer of sesame. There is about 4.8 million metric tonnes of sesame seeds produced in the world. India ranks first in the world with 1.74 m ha (37.00 per cent of the world) area with 0.60 m tones (27.00 per cent of the world production). The sesame yield is greatly affected by the attack of insect pests. In India, the crop is reported to damage by more than 30 species of pests [2, 3]. Shoot webber and capsule borer, *Antigastra catalaunalis* Duponchel (Lepidoptera: Pyralidae) is the most serious pest causing 25.00 – 90.00 per cent yield loss [4]. Other major pests are sesame gall fly, *Asphondylia sesame* Felt (Diptera: Cecidomydae); til hawk moth, *Acherontia styx* Westwood (Lepidoptera: Sphingidae); jassid, *Orosius albicintus* Distant (Hemiptera: Cicadellidae); and mite, *Polyphagotarsonemus latus* Bank (Acarina: Tarsonemidae). Bihar hairy caterpillar, *Spilarctia obliqua* (Wlk) is a polyphagus pest, feeding on pulses, jute, sesamum, linseed, cotton, sorghum, groundnut and some vegetables. During the early instars, the caterpillars feed gregariously on the leaves and then disperse. In severe infestations, plants may be completely denuded [5]. The larvae of Bihar hairy caterpillar are voracious feeder and its population often reaches epidemic level when they defoliate plants and move from field to field finishing the vegetation of the area of their visit. It is a serious pest of sesame and other crops in West Bengal, Bihar, Uttar Pradesh, Punjab, Madhya Pradesh, Manipur and some other states in India. They cause serious damage and significant reductions in yield of preferred crops including sesame [6]. Biological pest control by predators and parasitoids, as well as entomopathogenic nematodes and microbes, has been in action since the dawn of agriculture and there is a long history of farmers seeking to increase its efficacy. Ant colonies have been traded and the movement of ants between tree crop canopies facilitated by bamboo poles for 100s of years [7].Sesame capsule borer has several natural enemies[8].The parasitization potential of *Meteorus* spp. On *S. obliqua* feeding on cultivated *Vigna mungo* and wild weeds, *Xanthium strumarium* and *Parthenium hysterophorus* was to the extent of 77%[9] Reported 2-4 % with an average of 3.14 ± 0.61 per cent parasitization by *Trichogramma chilonis* Ishii on *A. convolvuli* from a single egg 2 to 3 parasitoids with an average of 2.30 ± 0.48 parasitoids emerged[10]. Braconid parasitoids have been observed parasitizing on different species of insect pests in which Apanteles spp. were dominant predominating a minimum of 7.5 and maximum 20.0 per cent parasitization on different species of crop pests[11]. Farmers are using synthetic chemical pesticides to control

insect pests. The large use of insecticides to control insect pest population resulting in harmful effects and biomagnifications due to which environment is polluting and fertile lands are acquiring infertility. Efforts should be made to develop biocontrol methods for the management of major pests. No attention was given on the evaluation of parasites for the management of insect pests of this crop. In the present study, incidence of major insect pests and parasitism in sesame crop is evaluated.

MATERIAL & METHODS

Study of incidence of insect pests and parasitism was carried out in sesame growing area research field Nagla Sirji, Agra and Entomology Research Laboratory, Agra College Agra. Randomly 100 plants were observed to investigate the incidence of pest infestation and parasitism at weekly interval. The larval, pupal and adult populations were recorded. The larvae and pupae were collected and observed daily to note the date of emergence of pests and parasitoids. Data were analyzed statistically.

RESULTS AND DISCUSSION

Two insect pests and their parasitoids were found during the study as follows:

Insect Pests:

***1. Antigastra catalaunalis* Dup. (Lepidoptera: Pyralidae) Plate:1**

Leaf Webber and capsule borer, *Antigastra catalaunalis* Dup. (Lepidoptera: Pyralidae) is a major and serious pest of sesame crop damaging the crop at all stages from seedling to flower and capsule stages.

***2. Spilosoma obliqua* (Wlk)(Lepidoptera: Arctiidae) Plate: 2**

Bihar hairy caterpillar, *Spilosoma obliqua* is a widely distributed polyphagous insect pest of pulses, jute, sesamum, linseed, cotton, sorghum, groundnut and some vegetables crops, causing economic losses by means of defoliation and leads in the reduction of crop yield.

Parasitoids:

***1. Bracon sp.* (Hymenoptera: Braconidae) Plate:3**

Larval parasitoid *Bracon sp.* were visualized in the III week of august on leaf Webber, *Antigastra catalaunalis*.This is a gregarious larval ectoparasitoid. *Bracon sp.* is natural enemy of leaf webber and capsule borer. Larvae of these parasitoids get their nourishment from the fluid present in host body.

2. *Apanteles sp.* Parasitoid Plate: 4

Apanteles sp. Parasitoid were observed in III week of august during rearing of Bihar hairy caterpillar. It is a gregarious parasitoid of *spilosoma obliqua*. Larva of this parasitoid spin milky white cocoon.

Plate: 1 *Antigastra catalaunalis* adult

Plate: 2 *Spilosoma .obliqua* adult

Plate: 3. *Bracon sp.* parasitoid, Larvae of *Bracon sp.* on *Antigastra catalaunalis* larva

Plate: 4 *Apanteles sp.* parasitoid of Bihar hairy caterpillar, *Spilosoma obliqua* larva

Table: 1. Statement showing the incidence of plant infestation, insect pests and parasitism in sesame crop in Kharif season 2018

Month / Week	% of infested plants	A. Catalaunalis			S. obliqua		
		No. of larvae	% of emergence		No. of larvae	% of emergence	
			A. Catalaunalis	Bracon sp. Parasitoid		S. obliqua	Apanteles sp. Parasitoid
July							
I	-	-	-	-	-	-	-
II	-	-	-	-	-	-	-
III	-	-	-	-	-	-	-
IV	7.00	20	75	10.00	15	86.66	6.66
August							
I	12.00	28	67.85	17.85	27	85.18	7.40
II	21.00	36	61.11	19.44	40	72.50	12.50
III	25.00	45	57.77	24.44	81	66.66	14.81
IV	27.00	54	51.85	27.77	112	76.78	21.42
September							
I	28.00	68	50.00	32.35	68	60.29	22.05
II	36.00	85	62.35	25.88	54	59.25	24.07
III	41.00	105	49.52	34.28	33	66.66	12.12
IV	45.00	32	43.75	37.50	35	54.28	28.57
October							
I	41.00	15	53.33	33.33	24	66.66	20.83
II	34.00	25	68.00	20.00	16	56.25	18.75
III	31.00	12	58.33	16.66	-	-	-
IV	-	-	-	-	-	-	-

Table: 2 Incidence of pest pupae of sesame

Month/ Week	A. Catalaunalis		S. obliqua	
	No. of Pupae	% of emergence	No. of Pupae	% of emergence
July				
I	-	-	-	-
II	-	-	-	-
III	-	-	-	-
IV	-	-	-	-
August				
I	8	75.00	-	-
II	10	70.00	5	73.33
III	13	69.23	7	80.00
IV	15	73.33	12	75
September				
I	18	83.33	5	80.00
II	14	78.57	11	90.90
III	17	81.81	17	88.88
IV	21	85.71	19	85.71
October				
I	8	87.50	8	87.50
II	6	83.33	6	83.33
III	8	62.50	-	-
IV	-	-	-	-

Table 1 shows that the incidence of plant infestation starts from IV week of July and its parasitism beginning of IV week of July whereas it was maximum 45.00 per cent in the IV week of September. Therefore, it starts declining slowly upto the III week of October as plants become harder and the crop matures.

Major pest, *A. catalaunalis* (leaf webber) and its parasitoid, *Bracon sp.* were first appeared in the IV week of July. Minimum 10.00 per cent parasitism was observed in July. It increased upto IV week of September with maximum 37.50 per cent parasitization. Thereafter, parasitism reduced to 16.66 per cent till III week of October. The emergence of leaf webber also decreased from 75.00 to 43.75 per cent in July to September as the parasitism increased from 10.00 to 37.50 per cent during the corresponding months. In October, the emergence of leaf webber increased as the parasitism reduced during this month.

Another major pest, *S. obliqua* (Bihar hairy caterpillar) and its *Apanteles sp.* parasitoid were also observed for the first time in the IV week of July. The Bihar hairy caterpillar and its parasitoid showed similar trend in the incidence like leaf webber and its parasitoid. The parasitism increased upto 28.57 per cent from July to September at 30^0 C average temperature and 74.00 to 78.00 per cent average humidity (Table 3). In October, parasitism reduced to 18.75 per cent due to decrease in average temperature (27^0 C) and humidity (64.00 per cent). The emergence of Bihar hairy caterpillar also suppressed 86.66 to 56.25 per cent with the increase in parasitism from July to September.

Table: 2 shows that no pupal parasitoid were recorded on the above two pests. The incidences

of emergence of all the pests from pupae were remaining high during the crop season due to the absence of parasitoids. It ranged from 62.50 to 87.50 per cent for *A. catalaunalis*, and 73.33 to 90.90 percent for *S. obliqua*.

It is clear from the above discussion that all the two parasitoids are playing an important role in reducing the pests population. Among two parasitoids, the incidence of *Bracon* sp. was high from the beginning and outnumbered the *Apanteles sp.* parasitoid till the end of the crop season. *Bracon sp.* excercised well by killing upto 37.50 per cent larval population of leaf webber, *A. catalaunalis* followed by an *Apanteles sp.* parasitoid which killed upto 28.57 per cent population of Bihar hairy caterpillar, *S. obliqua*.

Table: 3. statement showing monthly Summary of Temperature, Humidity and Rainfall for Kharif Season 2018

	Temperature High/ Low	Humidity High/ Low	Rainfall
June	45 °C/25 °C	100%/18%	
Average	34 °C	56%	55.7mm
July	38 °C/26 °C	98%/39%	
Average	30 °C	77%	203.3mm
August	37 °C/25 °C	100%/51%	
Average	30 °C	78%	243.2mm
September	38 °C/23 °C	98%/36%	
Average	30 °C	74%	129.7mm
October	38 °C/16 °C	99%/21%	
Average	27 °C	64%	24.8mm

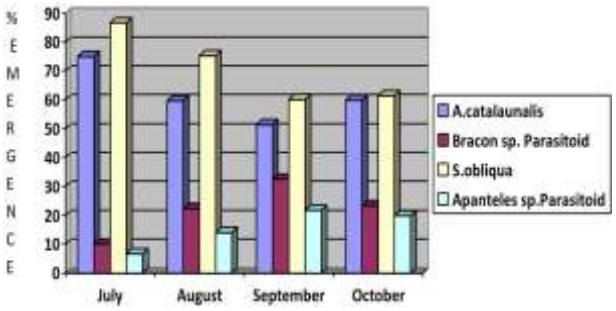

Figure 1: Incidence of pest larvae and parasitism in sesame crop.

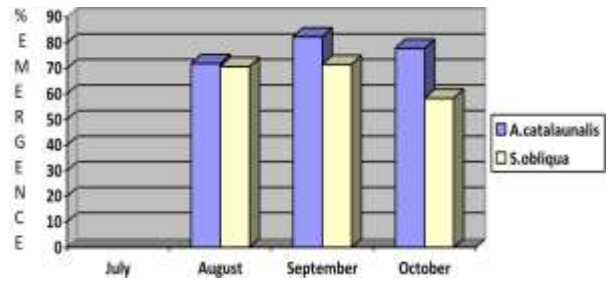

Figure 2: Incidence of pest pupae and parasitism in sesame crop.

CONCLUSION

Sesame crop is attacked by many insect pests in India which are responsible for decreasing the grain yield of sesame. Leaf Webber and capsule borer *Antigastra catalaunalis* causes significant damage at every stage of sesame crop. Polyphagous insect, Bihar hairy caterpillar, Spilosoma obliqua, during the early instars, the caterpillars feed gregariously on the leaves and then disperse. In severe infestations, plants may be completely denuded by this insect. Therefore, attention may be focused on the role of these parasitoids to use them as a tool in the biological control of insect pests of sesame crop.

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