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Incidence and Management of Hairy Caterpillar (*Spilarctia obliqua* Walker) on Sesame

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ABSTRACT

Incidence and management of hairy caterpillar, Spilarctia obliqua (Walk.) on sesame were studied in the field and laboratory of the Oilseed Research Centre, BARI, Gazipur, during March to July, 2000 and 2001, respectively. The pest appeared in the sesame crop in the fourth week of April at the flowering stage at 45-55 Days After Sowing (DAS) and remained up to third week of June at the pod maturity stage at 90-95 DAS. The peak populations of S. obliqua (4.00 – 4.50 larvae per plant) and their severe infestation (100% plant) were recorded in the fourth week of May, at the pod filling stage at 60-70 DAS of the crop. The yield reduction of sesame caused by S. obliqua in the treatments 1 spray, 2 sprays, 3 sprays, and 4 spray frequencies with Diazinon 60 EC @ 2 ml/litre were calculated 25.00, 30.86, 35.24 and 37.23 percent, respectively. One spray of Diazinon 60 EC applied at the pod formation stage at 50-55 DAS gave the highest benefit cost ratio (4.20).

Key words: Incidence, hairy caterpillar, sesame, infestation, management.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is the second largest source of edible oilseed crop after rapeseed and mustard in Bangladesh. Among the different insect pests attacking sesame, hairy caterpillar *Spilarctia obliqua* (Walk.) is the major and serious pest of sesame in this country (Begum 1995, Das, 1998, Biswas *et al.,* 2002). It is a polyphagous pest having a very wide range of host plants including oilseed crops, fibre crops, pulses, vegetables and some medicinal plants. The pest is also distributed in India, Pakistan, Sri-Lanka and Eastern Asia (Ahmad and Kumar, 1993; Atwal and Dhaliwal, 1997). The pale buff coloured adult moth lays eggs in clusters on the lower surface of leaves. On hatching 1st and 2nd instar larvae of *S. obliqua* damage the sesame leaves and feed apex of shoots veraciously leaving the bare stem which inhibit the growth of plants. Later on 3rd and onward instar larvae disperse and move from one plant to another and feed on the older leaves, shoots, stems, flowers and pods causing serious damages and resulting significant reduction in yield (Hussain and Begum, 1995).

Study of the incidence, nature and amount of damage and suitable management technique of *S. obliqua* in sesame crop are of great importance (Pandey *et al*., 1991). But in Bangladesh, information on different aspects of *S. obliqua* in sesame crop and its management are very scanty. A little work including the record of some insect pests of sesame have been reported by Alam

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(1976), Hobbs (1976), Kaul and Das (1986), Begum (1995) and Das (1998) in this country. Therefore, the present research work was conducted to know in details the incidence, severity of damage, yield loss and economic management of *S. obliqua*.

MATERIALS AND METHODS

The study was conducted in the field and laboratory of the Oilseed Research Centre, Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur, during two consecutive years of March to July, 2000 and 2001, respectively. Seeds of sesame (Variety -T_6) were sown on 10th March of each year of 2000 and 2001 in 5 replicated plots measuring 4m X 2m each following randomized complete block design. The plants were spaced 30 cm between rows and 10 cm between plants. Recommended agronomic practices were adopted to raise the crop properly (Mondal and Wahhab, 2001).

Observations on the populations of the larvae of *S. obliqua* were recorded from 100 randomly pre-selected plants of unsprayed sesame field. Records were taken by visual observations on the standing crop during 0700 - 1000 HR and 4.00 - 6.00 HR at weekly intervals starting from 3rd week of April to 3rd week of June, 2000 and 2001, respectively. Their nature of damage was also observed. The number of larvae attacked in sesame plants was counted.

Five treatments based on frequencies of spray namely, one spray at the flowering and pod formation stage at 50 days after sowing, two sprays at 45 and 55 DAS, three sprays at 45, 55 and 65 DAS, four sprays at 40, 50, 60 and 70 DAS and untreated control were used in this trial. Diazinon 60 EC @ 2ml/litre of water was applied in treated plots at vegetative, flowering, pod formation and pod pre-maturity stages of the crop with the help of a Knapsack sprayer (Asha) at 10 days intervals. Only tap water was sprayed in untreated plots. The population density per plant of *S. obliqua* was recorded at 75 DAS by observing 10 randomly selected plants in treated and untreated plots in both the years. Percent plant infestation due to this pest was calculated by counting infested and healthy plants from 10 randomly selected plants at 75 DAS in different replicated plots. Percent pod infestation was calculated by counting the infested and healthy pods from randomly collected 100 pods in treated and untreated plots at 80 DAS. Percent population or infestation reduction over untreated control was calculated.

The yield data (kg/ha) were recorded from insecticide treated and untreated plots. The difference between the weight of seed yield in treated and untreated plots was considered as loss. The avoidable losses or percentage of increased in yield over untreated control were calculated on the basis of formulae (Khosla 1977) as given below:

i) Per cent loss or increased in yield $= \frac{X_1 - X_2}{X_1} \times 100$

Where, X_1 is the mean yield in treated plots.
X_2 is the mean yield in untreated plots.

Percent data were transformed in to Arc sin $\sqrt{\text{percentage}}$ ($y = \sin^{-1}\sqrt{x}$) or square root ($y = \sqrt{x + 0.5}$) method before statistical analysis and other statistical analyses were done following Gomez and Gomez (1984). The means were compared following Duncun's Multiple Range Test. Economic analysis of yield data of all the treatments and benefit cost ratio (BCR) was calculated.

RESULTS AND DISCUSSION

Hairy caterpillar larvae were observed on the sesame crop in the 4th week of April at the flowering stage (40-45 DAS) and continued upto 3rd week of June at the pod maturity stage (90-95 DAS) in both 2000 and 2001. Initially the population of *S. obliqua* was low but it increased gradually upto 4th week of May and then decreased slowly upto maturity. The peak populations of *S. obliqua* were recorded as 4.00 and 4.5 larvae per plant on the 4th week of May 2000 and 2001, respectively at the pod filling stage (60-70 DAS) of the crop (Fig 1.). Comparatively high population density was recorded in 2001 than in 2000, which may be due to the differences in the environmental and other biotic factors between the two years. Begum (1995) reported that *S. obliqua* was active from March to July at the vegetative and flowering stages of the crop in this country, which is more or less similar to the present study. She mentioned that *S. obliqua* damages only shoot and leaves of sesame but in the present observation it was found that the pest damaged on the young and premature pods also. Thakur and Kaistha (1994) observed that *S. obliqua* appeared in the sesame crop from the 2nd week of August to 3rd week of September at the vegetative to pod maturity and the peak infestation (3 larvae/plant) occurred during last week of August in Himachal Pradesh, India. But in the present observation the maximum infestation occurred during May-June at the pod filling stage.

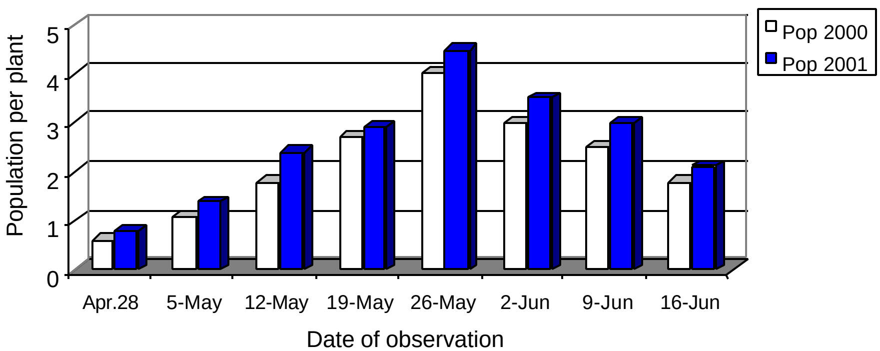

Fig. 1. Incidence of *S. obliqua* in sesame during Kharif 2000 and 2001

The average population density per plant of *S. obliqua* in ranged from 0.55 to 2.10 recorded in different spray frequencies while the population per plant of this pest in untreated plots was 4.00. All the treatments (spray frequencies) significantly reduced population density per plant of *S. obliqua* over the untreated control in both years. Four sprays frequency was significantly better than all other spray frequencies (Table 1). Percent population reduction over the untreated control of *S. obliqua* ranged from 47.50 to 86.25 calculated in different treatments (Table 1).

Table 1. Population of *S. obliqua* in sesame plant in different spray frequencies (pooled data of 2000 and 2001)

Treatments	Population of *S. obliqua* per plant	Percent population reduction over control
1 spray	2.10 b	47.50
2 sprays	1.35 c	66.25
3 sprays	0.87 d	78.25
4 sprays	0.55 e	86.25
Control	4.00 a	-

Note: Means in a column followed by different letters differ significantly at 5% level.

The average percent of plant and pod infestation caused by *S. obliqua* of sesame in different spray frequencies are presented in Tables 2 and 3. Comparatively higher infestation both in stem and pod were obtained in 2001 than 2000. The plant infestation reduction over untreated control of *S. obliqua* ranged from 49.45 to 89.25% in 2000 and 45.25 to 87.64% in 2001. Similarly, the pod infestation reduction over control of this pest ranged from 39.66 to 85.17% in 2000 and 39.58 to 83.63% in 2001 recorded in different treatments. The result revealed that about 40-50 % infestation (both in plant and pod) caused by *S. obliqua* was reduced in the one sprayed plots while 83-89% infestation reduction was found in the four sprayed plots. It is clear that percent infestation was gradually reduced with the gradual increase of spray frequencies and four sprays frequencies are better than all other spray frequencies. Almost similar observation was made by Biswas *et al.* (2002) in Bangladesh.

Dhaliwal (1997) reported that plant infestation caused by *S. obliqua* in sesame as 80-90% recorded in Punjab, India.

Table 2. Plant infestation caused by *S. obliqua* and infestation reduction over control in sesame plant in different spray frequencies of 2000 and 2001

Treatments	Plant infestation (%)		Percent plant infestation reduction over control	
	2000	2001	2000	2001
1 spray	50.55 b	54.75 b	49.45	45.25
2 sprays	28.35 c	30.52 c	71.65	69.48
3 sprays	18.24 d	20.14 d	81.76	79.86
4 sprays	10.75 e	12.36 e	89.25	87.64
Control	100.00 a	100.00 a	-	-

Note: Data were transformed for analysis. Means in a column followed by different letters differ significantly at 5% level.

Table 3. Pod infestation caused by *S. obliqua* and infestation reduction over control in sesame plant in different spray frequencies of 2000 and 2001

Treatments	Plant infestation (%)		Percent plant infestation reduction over control	
	2000	2001	2000	2001
1 spray	8.75 b	10.15 b	39.66	39.58
2 sprays	5.25 c	7.25 c	63.79	56.84
3 sprays	3.50 d	4.13 d	75.86	75.42
4 sprays	2.15 e	2.75 e	85.17	83.63
Control	14.50 a	16.80 a	-	-

Note: Data were transformed for analysis. Means in a column followed by different letters differ significantly at 5% level.

The average yield, yield loss of sesame caused by *S. obliqua* and the economics in different spray frequencies of pooled data of 2000 and 2001 are presented in Table 4. The highest seed yield (980.48 kg/ha) was obtained from the plots which received four sprays. But this was statistically similar to those plots which received three sprays. Significantly higher seed yield (kg/ha) was obtained from other treatments than the untreated plots. Avoidable yield losses due to *S. obliqua* of sesame in the treatments were 25.00, 30.86, 35.24 and 37.23, respectively which could be minimized by applying Diazinon 60 EC @ 2 ml/litre of water if sprayed at appropriate frequencies. The benefit cost ratios (BCR) of the treatments were 4.20, 2.48, 1.83 and 1.31, respectively (Table 4). The highest BCR (4.20) was obtained from the treatment received one spray while the lowest (1.31) was in the treatment which received four sprays. The result revealed that though the seed yield and net income were the highest in the 4th treatment but the lowest BCR was recorded in this treatment due to highest management cost (Table 4.).

The results of the present study are almost similar to the findings of other investigators. Kaul and Das (1986) reported that *S. obliqua* were controlled by spraying Diazinon 60 EC @ 2 ml/ litre of water in the infested fields in this country. Patil *et al.* (1992) estimated that the yield losses of sesame caused by major insects was 36.56% when Carbaryl 0.2% was sprayed two frequencies from at 35 and 50 DAS in Maharashtra, India. Ahuja (1991) reported that two sprays of Endosulfun 35 EC at 30 and 50 DAS gave the maximum benefit cost ratio (4.40). Goel and Kumar (1991) suggested that Qunalphos 25 EC was found to be effective on the egg masses of *S. obliqua* while Ripcord 10 EC was effective against newly hatched larvae of this pest in Uttar Pradesh, India.

Table 4. Yield loss of sesame caused by *S. obliqua* and economics of different spray frequencies of pooled data of 2000 and 2001

Treatments	Seed yield (Kg/ha)	Increased yield over control (Kg/ha)	Percent loss in yield	Cost of insecticide & spray (Tk./ha)	Gross income (Tk./ha)	Net income (Tk./ha)	Benefit cost ratio (BCR)
1 spray	820.50 c	205.05	25.00	789.00	4101.00	3312.00	4.20
2 sprays	890.24 b	274.79	30.86	1578.00	5495.80	3917.80	2.48
3 sprays	950.37 a	334.92	35.24	2367.00	6698.40	4331.4	1.83
4 sprays	980.48 a	365.03	37.23	3156.00	7300.60	4144.6	1.31
Control	615.45 d	-	-	-	-	-	-

Note: In a column, means followed by the common letters are not significantly different at 5% level.

Price of sesame seed = Tk. 20.00/kg BCR = $\frac{\text{Net income}}{\text{Management cost}}$

Cost of labour = Tk. 75.00 /day/labour.
Cost of Diazinon 60EC = Tk. 624.00/litre.
3 Labours and 1 litre Diazinon 60 EC being required for 1 hectare crop field spraying @ 2 ml/litre of water.
1 machine spray volume = 10 litre required 200 sqm land spraying in one time.
Other variable costs were same in different treatments.

CONCLUSION

The present study revealed that *S. obliqua* damaged the sesame crop seriously at the pod filling stage (60-70 DAS) and only one spray of Diazinon 60 EC @ 2ml/litre of water applied at this vulnerable stage gave the highest BCR (4.20). This finding could be helpful to the farmers for formulating appropriate management techniques and to reduce insect infestation avoiding indiscriminate use of insecticides in this country.

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