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BIOLOGY OF GREEN SEMILOOPER ON SOYBEAN

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Abstract

A study on biology of green semilooper was carried out on soybean leaves. The average incubation period and hatching per cent for eggs was 2.8 days and 87.82 per cent, respectively. The average larval, pupal period, adult longevity and total life span on soybean leaves was 18.6, 6.5, 6.4 and 34.3 days, respectively. The average fecundity (eggs/female) was 443 and 417 with highest fecundity was 520 and 440 eggs/female, respectively. Whereas, average male:female sex ratio was 1 : 1.26 on soybean leaves. Known number of eggs, larvae first to fifth instar and matured larvae for pupal study were collected from the field and reared in the laboratory to study the effects of biotic factors in the life cycle of green semilooper.

Key words : Green semilooper, soybean (*Glycine max* L.), larval and pupal stage.

Introduction

Soybean (*Glycine max* L.) is one of the most important leguminous oilseed crop of great economic value occupying an important position in world trade. About 73.44 million hectare of land in world is under soybean cultivation. The area under soybean in India during 2011 was 103.338 lakh hectare and total production was 119.395 lakh tonns and productivity of 1155 kg/ha. In Maharashtra during *Kharif* 2011 area sown under soybean was 30.613 lakh hectare with total production of 38.458 lakh tonns with average yield 1256 kg/ha (Anonymous, 2011). Among various insect pests, green semilooper is one of the most serious polyphagous pest of soybean crop in India (Bhattacharya *et al*., 1977). It feeds on leaves of soybean plants from vegetative to maturity stages and hence becoming serious defoliator pest of soybean. In addition to soybean, green semilooper also feeds on the crops belonging to families compositae, leguminosae, cruciferae, linaceae, cucurbitaceae and chenopodiaceae (Singh and Rawat, 1980). In soybean, losses caused by green semilooper reported at flowering and podding stage was 50.21 per cent and foliage damage was 10.50-12.01 per cent (Singh and Singh, 1990). Defoliators like *Spodoptera litura* (Fab), *Thysanoplusia orichalcea* (Fab) damage soybean extensively by skelatization later stage and thus reducing the photosynthetic capacity of plants (Adimani, 1976). Keeping these facts in mind, the present investigation were undertaken life table of green semilooper in different meteorological weeks on soybean.

Materials and Methods

The present investigation was undertaken with the objective to study the biology and life stages of green semilooper and also aimed to construct Life table of green semilooper on soybean. The field and laboratory studies were conducted during the year 2011-2012 in the Department of Entomology, Dr P.D.K.V, Akola.The material required and the methods adopted during the course of present investigation are described below.

Material

Instruments- BOD incubator, stereoscopic microscope, refrigerator, camera lucida, weighing balance etc.

Insect feeding material

Fresh soybean leaves were used to feed the larvae.

The adult diet was prepared by dissolving following ingredients in the distilled water (boiled and cooled) and stored in amber color bottle in refrigerator.

1) Distilled water-500ml

2) Methyl-4-hydroxy benzoate-1gm

3) Honey-500ml

4) Sucrose-50gm

5) Formaldehyde(10%)-2ml

Other material : Plastic trays, plastic vials, bell jars, muslin cloth, forecep, cotton swab, white thread, soft camel hair brush, adult emergence chamber, mating etc was used.

Methodology

Experimental details

1) Year of experiment : *Kharif* 2011-2012
2) Key insect pest : Green semilooper
3) Larval host : Soybean
4) Variety : JS 335

Biology

Different stages of green semilooper were collected from unsprayed soybean field at 7 days interval starting from initiation of incidence. These stages were reared in the laboratory till F_1 generation. During this F_1 generation population, observations were recorded on biological parameters *viz.*, incubation period of egg, hatching per cent of egg, length, breadth of larva, pupa and adult wing using graphpaper were recorded, larval, pupal period, longevity and total life cycle period of green semilooper was recorded.

Results and Discussion

Biology of green semilooper were studied on soybean during *Kharif* 2011-2012 in the Laboratory, Department of Entomology, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (Maharashtra), India. The results obtained in the present investigation on biology of green semilooper on soybean are presented and discussed in this chapter.

Biology of green semilooper

The results of the laboratory studies conducted on biology of green semilooper are presented under following subheads.

Description of the life stages

Eggs

The data presented in table 1 revealed that the average hatching per cent of eggs in green semilooper was recorded to the extent of 87.82 per cent with average incubation period of 2.8 days (fig. 1). However, earlier worker, Bhattacharya *et al*. (1977) studied the biology of green semilooper on soybean in laboratory and they observed that incubation period was 3-4 days. Brodlely (1978) in his studies recorded incubation period of 3 to 4 days of green semilooper. Whereas, Goel and Kumar (1987) recorded 89.03 per cent hatching of green semilooper. These observations confirm the present findings.

Larvae

The data presented in table 2 revealed the observations on the length and breadth of various larval instars.

The average length and breadth of first instar larvae was 2.5 and 0.5 mm, respectively. The body length was ranging from 2 to 3 mm.

The average length and breadth of second instar larvae was 9.3 and 1.3 mm. The body length and breadth was ranging from 8 to 10.5 mm and 1 to 1.5 mm, respectively.

The average length and breadth of third instar larvae was 17.20 and 2.6 mm. The body length and breadth was ranging from 15.5 to 18.5 mm and 2 to 3 mm, respectively.

The average length and breadth of fourth instar larvae was 24 and 4.5 mm. The body length and breadth was ranging from 23.5 to 25 and 3.5-4.5 mm, respectively.

The average length and breadth of fifth instar larvae was 33 and 5.2 mm. The body length and breadth was ranging from 31 to 35 mm and 4.5 to 6 mm, respectively. (plate 1).

Goel and Kumar (1987) reported similar results as regards the length and breadth of first to fifth instar larvae of green semilooper was 2.5 and 0.3 mm, 8 and 1.3 mm, 17 and 2.2 mm, 23.7 and 3.7 mm, 32 and 4.3 mm, respectively, which confirms.

Table 1 : Hatching percentage of eggs in green semilooper.

Pair no.	No. of eggs observed	No. of eggs hatched	Per cent hatching	Incubation period (days)
1	400	350	87.55%	2.0
2	405	355	87.65%	4.0
3	300	265	88.33%	2.5
Average			87.82%	2.8

Table 2 : Body length and breadth of different larval instars of green semilooper.

Instars	No observed	Length		Breadth	
		Range (mm)	Average (mm)	Range (mm)	Average (mm)
I	10	2-3	2.5	0.5	0.5
II	10	8-10.5	9.3	1.0-1.5	1.3
III	10	15.5-18.5	17.20	2.0-3.0	2.6
IV	10	23.5-25.0	24	3.5-4.5	4.5
V	10	31-35	33	4.5-6.0	5.2

Table 3 : Length and breadth of pupa of green semilooper.

Pupa	No observed	Length		Breadth	
		Range (mm)	Average (mm)	Range (mm)	Average (mm)
Female	10	20-24.5	21.60	5-6	5.70
Male	10	18-19	18.40	5-5.5	5.15

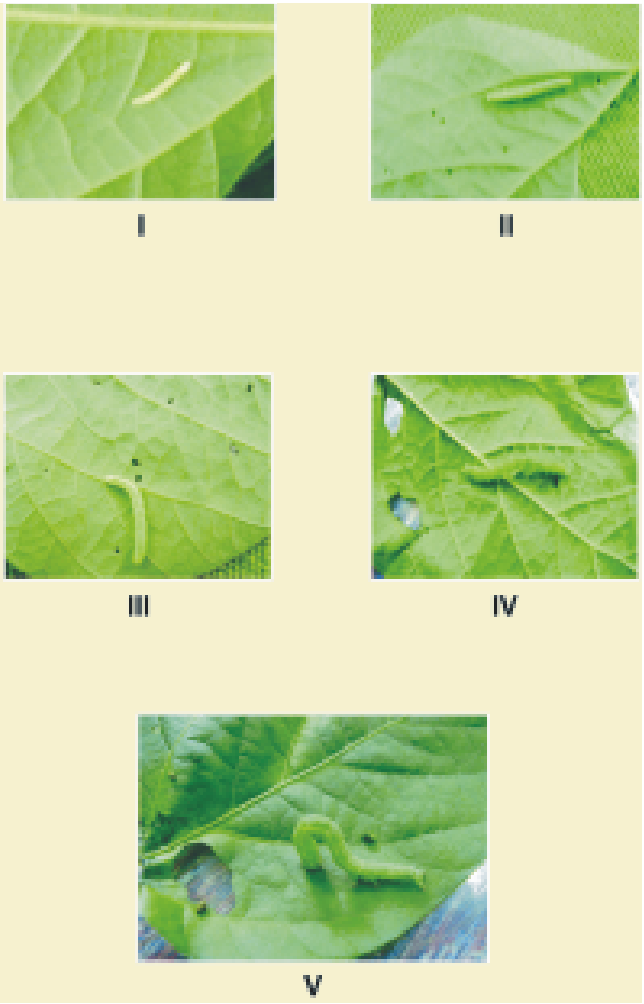

Plate 1 : Different larval instars.

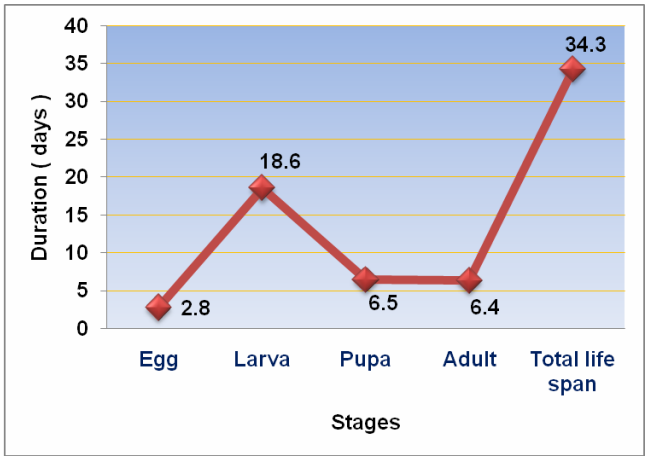

Fig. 1 : Duration of life stages of Green semilooper.

Pupa

The data presented in table 3 revealed that the female pupa averaged 21.60 mm in length and 5.7 mm in breadth. Female pupa was in the range of 20 to 24.5 mm in length while the breadth varied from 5 to 6 mm.

Similarly, male pupa averaged 18.40 mm in length

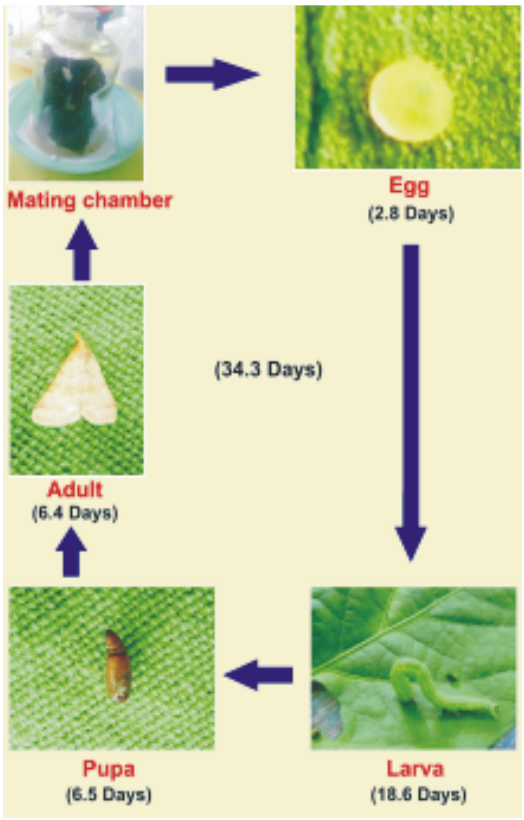

Plate 2 : Life cycle of Green semilooper.

Table 4 : Length and breadth of female and male wing of green semilooper.

Adult	No observed	Length		Breadth	
		Range (mm)	Average (mm)	Range (mm)	Average (mm)
Female	10	19-21	20.9	34-45	38.29
Male	10	15-17	16.20	27-30	28.28

Table 5 : Duration of larval and pupal stages of green semilooper.

Stages	No. observed	Duration in days	
		Range	Average
Larva	10	16-23	18.6
Pupa	10	6-7	6.5

and 5.15 mm in breadth. Male pupa was in the range of 18 to19 mm in length while the breadth varied from 5 to 5.5 mm (table 3).

Earlier workers, Goel and Kumar (1987) reported same results as regards the length of female pupa 21.60 mm and length of male pupa 18.80 mm, respectively, which supports the present findings.

Adult

The data presented in table 4 revealed that the female

Table 6 : Longevity of adult of green semilooper.

Adult	No. observed	Longevity (days)	
		Range	Average
Female	10	6-7	6.40
Male	10	7-8	7.40

Table 7 : Total life cycle of green semilooper.

Host	Duration (days)	
	Range	Average
Soybean	30-35	34.3

wing averaged 20.9 mm in length and 38.29 mm in breadth. Female wing was in the range of 19 to 21 mm while the breadth varied from 34 to 45 mm, respectively.

Similarly, male wing was (average) 16.20 mm in length and 28.28 mm in breadth. Male wing was in the range of 15 to17 mm while the breadth varied from 27 to 30 mm, respectively (table 4).

Similar observations were recorded by Goel and Kumar (1987) as regards the length and wing expanse of male moth (16 × 38 mm) and length and wing expanse of female moth (19 × 43 mm), which confirms the present findings.

Duration of larval and pupal stages of green semilooper

The data presented in table 5 revealed that the duration of larval stage was ranging from 16 to 23 days with an average of 18.6 days. Similarly, the duration of pupal stage was ranging from 6-7 days with an average of 6.5 days, respectively.

Earlier workers, Basu and Chatterjee (1969) reported the larval period ranged from 16 to 29 days. Whereas, Bhattacharya *et al*. (1977) reported the larval period about 14 days and pupal period 8.2 days of green semilooper on soybean which confirms the present findings.

Longevity of adult of green semilooper

Adult female survived for 6 to 7 days with an average of 6.40 days. Similarly, adult male survived for 7 to 8 days with an average of 7.40 days (table 6).

Basu and Chatterjee (1969) reported similar results of longevity of the moths and varied from 2 to 7 days on soybean. Whereas, Goel and Kumar (1987) reported the longevity of male and female moths were 7.40 and 6.4 days respectively during their study, which confirms the present findings.

Total life cycle of green semilooper

The data presented in table 7 revealed that the total life cycle was completed in 34.3 days. Earlier worker, Bhattachrya *et al*. (1977) reported the green semilooper completed total life cycle in 37 days on soybean which confirm the present findings (fig. 1 and plate 2).

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