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A Study on Bio-Ecology of Grey Semilooper In Soybean

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Abstract

The biology of grey semilooper was studied in the laboratory. The total number of eggs laid by single female varied from 93 to 159. The eggs were spherical with a flat base. The hatching process observed during day time. Few hours before moulting larvae stopped feeding. The larvae passed through six instars. The period of different instars larvae ranged from 2 to 4 days. The full grown larva stopped feeding and crawled down from the plant on the soil and then rapidly buried itself under the soil. The full grown larva enters the prepupal stage within the cocoon. The pupa measured about 9-12 mm in length and about 3.5-4.5 mm in width. The moths were usually found to emerge out from the pupa during night time. The adults moths were measured 12 to 13 mm in length. The wing expanse was 23 to 26 mm. The male moth bearing a one prominent white spot on each fore wing, but it is absent in female. The life cycle was completed in 26 to 33 days.

***Key words** : Semilooper, Bio-ecology, Soybean.*

Introduction:

The luxuriant crop growth, soft and succulent foliage of soybean[6, 7, 8] attracts many insects and provides unlimited source of food, space and shelter. Soybean crop is reported to be attacked by about 350 species of insects in many parts of the world[1,4]. Among them some are fatal to this crop and have changed their severity of attack in last few years. Three hundred species of insect pests infesting soybean were reported in the past[2, 5].

Material and Methods

For studying the biology of pest, full fed caterpillars collected from the field of soybean crop and reared in glass jar and Petri dishes on soybean leaves and other plant parts. The matured larvae transformed into pupae. Pre pupal, pupal period, colour and size of pupae also recorded. Moths emerging from pupae were examined to determine their sexes. The moth kept under constant watch for studying mating, oviposition, egg laying and longevity of male and females. Freshly laid eggs counted and placed on fresh soybean leaves and observations were recorded on their colour, shape and incubation period and duration of each larval instar.

Results and Discussion

Copulation:

Copulation took place by end to end manner during this process moths vibrate their legs and antennae. The process of mating completed within 5-10 minutes. Female moth showed more activity after copulation than the male. Observations were recorded on the preoviposition, oviposition and post opviposition periods. Fecundity and longevity of adults are presented in (Table 1). The pre oviposition period was ranged from 1-2 days, whereas the oviposition period was recorded to be 2-3 days. After copulation female moth laid eggs on the lower surface of the leaves. Eggs were laid singly or in scattered groups (each group containing not more than eight eggs). The total number of eggs laid by single female varied from 93 to 159 (Table 1). The post oviposition period ranged 1-1.5 days[3].

Longevity of adults:

It was observed that longevity of male adults varied from 3 to 5.5 days. While in case of female it was ranged from 4 to 6 days.

Egg:

The eggs were spherical with a flat base. Freshly laid eggs were smooth, light

yellow in colour, which later on changed in colour with its age and become dark creamy yellowish at the time of hatching.

Hatching:

The hatching process observed during day time. Before hatching eggs become blackish. In the process of hatching young larvae ate egg shell and formed small hole in the anterior part of the egg shell, and wriggled out of an egg shell.

Moulting:

Few hours before moulting larvae stopped feeding. It became inactive and its colour became somewhat dull. The prothorax swelled and became broader than the head. At the time of moulting the next instar larvae moved its body and exert pressure to the weaker membranous cervix which resulted into break down of cervix skin. After that the larvae began to wriggled out gradually, thus forcing the old cuticle left behind by contraction and expansion of the body movement. Thus the exuvium of the head capsule and remainder body shed separately. The entire process of moulting completed within 6-8 hours. The newly moulted larva was grey in colour with light brown head. As the age advances, its colour changed.

Development of insect from egg to larval stage:

The larvae passed through six instars prior to copulation. The period of different instars larvae ranged from 2 to 4 days with an average of 2.5 to 2.8 days. The total larval period ranged from 15.5 to 19.5 days.

First larval instars:

The newly hatched larvae were grey in colour with light brown head capsule. Young larvae measured about 1.5-2mm in length and 0.15-0.20 mm in width and 2.5-3.5 mm in length and 0.30-0.35 mm in width when fully developed (Table 3). Mouth parts were reddish brown in colour. The thorax caries a pair of legs on each segment and the abdomen carries 3 pairs prolegs on fifth , sixth and tenth segment. The larvae of all the instars, which were about to moult stopped feeding.

Second larval instar:

Freshly moulted second instar larvae measured about 3.5-4.5 mm in length and 0.35-0.40 mm in width and 6-7mm in length and 0.50-0.55 mm in width when full fed (Table 3). The body colour was light green. The head was dark brown in colour.

Third larval instar:

Length and width of young larvae measured to be 6.5-7.5 mm and 0.55-0.65 mm respectively. The larvae were enlarged to 9-12.5mm in length and 0.65-0.75 mm in width (Table 3). The body colour turned into greenish with light brown head capsule. The head capsule was broader than body. At the end of the stage, the larvae stopped feeding and it wriggled away.

Fourth larval instar:

The fourth instar larvae measured about 11.5-13.5mm in length and 0.75-0.95 mm in width in the beginning but later increased to about 14-18 mm in length and 1.20-1.45 mm in width (Table 3). The head capsule was pale greenish with yellowish tings. It was more prominent and wider than the body.

Fifth larval instar:

It measured about 17-20.5mm in length and 1.40-1.55 mm in width in the beginning and enlarged to 19.5-24.5 in length and 1.50-1.90 mm in width (Table 3) before moulting. The body colour was shiny green. A blackish dot present on dorsal side and lateral sides of each segment of the body.

Sixth larval instar:

The young larvae were 24-25 mm in length and 1.80-1.95 mm in width, but when fully grown reached the maximum size of about 25.5-28 mm in length and 1.90-2.3 mm in width (Table 3). The body was dark green in colour. A blackish dot present on the dorsal side and lateral sides of each segment of the body.

Process of cocoon formation:

The sixth instar (full grown) larva stopped feeding and reduced its body. At the end of the feeding stage the larvae crawled down from the plant on the soil and then

rapidly buried itself under the soil. The larvae usually moved to corner, where it built a protective cocoon of silk before pupation.

Prepupal period:

The full grown larva enters the prepupal stage within the cocoon. The body length reduced and it curved in "C" shape. The body colour changed from light to darker in later part of the stage. The prepupal period ranged from 1 to 1.5 days (Table 4). After prepupal period the formation of the pupa is completed. Pupation took place, generally in the night.

Pupa:

The pupal period was ranged from 5-7.5 days (Table 4). The pupa measured about 9-12 mm in length and about 3.5-4.5 mm in width (Table 3). The pupa was soft and dark green when newly formed, but it changed to dark reddish brown in colour and hard in texture. Male pupa was somewhat smaller than the female pupa.

Emergence of adult:

The moths were usually found to emerge out from the pupa during night time. At the end of the pupal period, fully developed adult exerting pressure on the pupal cuticle, as a result of which part of the pupal case got ruptured. In the beginning the adult was small with folded wings, but soon afterwards the wings got fully expanded.

The adults moths were measured 12 to 13 mm in length. They were dusky to deep brown in colour. The wing expanse was 23 to 26 mm (Table 3). The forewing was deep brown in colour and hind wings were creamy yellow with large marginal smoky areas. The thorax and abdomen were creamy white with yellow tings. Three pairs of legs were present which were also covered with small hairs. The anal segment was provided with prominent hairs.

The male moth could be distinguished by bearing a one prominent white spot on each fore wing. But female moth did not bear characteristic white spot on fore wings.

Total life cycle period:

Total length of life cycles from egg to adult was found to vary from 26 to 33 days (Table 3).

Table 1 Preoviposition, oviposition and post oviposition periods and longevity of grey semilooper

S. no.	Moths emerged on		Preovipositi on in days	Number of eggs laid during the oviposition period				Ovipositi on period in days	Post Ovipositi on in days	Moths died on		Longevity of moths in days	
	Male	female		1	2	3	Tot al			Male	female	Mal e	femal e
1	13.8.20 12	13.8.20 12	2	38	45	53	136	2.5	1	17.8.20 12	19.8.20 12	4	5.5
2	13.8.20 12	13.8.20 12	2	45	49	41	135	2.5	1.5	18.8.20 12	19.8.20 12	4.5	6
3	13.8.20 12	13.8.20 12	1	53	68	38	159	2.5	1	17.8.20 12	18.8.20 12	3.5	4.5
4	14.8.20 12	14.8.20 12	1	43	64	-	107	2	1	17.8.20 12	18.8.20 12	3	4
5	14.8.20 12	14.8.20 12	1	37	52	45	134	3	1.5	18.8.20 12	20.8.20 12	4	5.5
6	14.8.20 12	14.8.20 12	2	44	49	-	93	2	1	19.8.20 12	19.8.20 12	4.5	5
7	14.8.20 12	14.8.20 12	1.5	51	57	43	151	2.5	1	18.8.20 12	19.8.20 12	3.5	5
8	15.8.20 12	15.8.20 12	1.5	57	54	-	111	2	1.5	19.8.20 12	20.8.20 12	4	5
9	15.8.20 12	15.8.20 12	1.5	48	40	44	132	3	1.5	21.8.20 12	21.8.20 12	5.5	6
10	16.8.20 12	16.8.20 12	1	47	51	42	140	2.5	1	19.8.20 12	21.8.20 12	3	4.5
Total			14.5	463	529	306	1298	24.5	12			39.5	51
Avera ge			1.4	46. 3	52. 9	43. 7	142.9	2.4	1.2			3.9	5.1

Table 2 Oviposition, hatching and moulting period of grey semilooper

S. No.	Date of oviposition	Date of hatching	Incubation period in days	Duration of larval instars						Total larval period in days
				1	2	3	4	5	6	
1	15.8.2012	17.8.2012	2	3	3	2.5	2	2.5	2.5	15.5
2	15.8.2012	17.8.2012	2	2.5	3	2.5	2.5	3.5	2	16
3	14.8.2012	17.8.2012	2.5	2.5	2	3	3	2	3	15.5
4	15.8.2012	17.8.2012	1.5	3	2.5	3	3	2.5	2	16
5	15.8.2012	17.8.2012	2	2.5	2	3	2.5	3	2.5	15.5
6	16.8.2012	19.8.2012	2.5	2.5	2	2	2.5	3.5	2	14.5
7	16.8.2012	19.8.2012	2.5	3.5	3.5	3	2.5	3	2	17.5
8	17.8.2012	20.8.2012	2.5	3.5	3.5	2.5	3	3.5	3.5	19.5
9	17.8.2012	19.8.2012	1.5	3.5	2.5	3.5	2	2	3	16.5
10	17.8.2012	20.8.2012	3	2	2.5	3.5	2	2.5	3.5	16
Total			22	28.5	26.5	28.5	25	28	26	162.5
Average				2.8	2.6	2.8	2.5	2.8	2.6	16.2

Table 3 Measurement of different larval instars and adult of grey semilooper

Stage	Length (mm)	Width (mm)
1st instar larvae: Young	1.5-2	0.15 -0.20
Matured	2.5-3.5	0.30 -0.35
2nd instar larvae: Young	3.5-4.5	0.35 -0.40
Matured	6-7	0.50 -0.55
3rd instar larvae: Young	6.5-7.5	0.55 -0.65
Matured	9-12.5	0.65 -0.75
4th instar larvae: Young	11.5-13.5	0.75 -0.95
Matured	14-18	1.20 -1.45
5th instar larvae: Young	17-20.5	1.40 -1.55
Matured	19.5-24.5	1.50 -1.90
6th instar larvae: Young	24-25	1.80 -1.95
Matured	25.5-28	1.90 -2.3
Pupa	9-12	3.50-4.50
Adult	12-13	23-26*

Table 4 Duration from pupal formation to adult emergence

Date of pupation	Prepupal period in days	Date of emergence	Pupal period in days	Total period from egg to adult
4.9.2012	1	10.9.2012	6	26
5.9.2012	1	10.9.2012	5	26
3.9.2012	1	9.9.2012s	6	26
4.9.2012	1	11.9.2012	6.5	27
5.9.2012	1.5	11.9.2012	5.5	27
6.9.2012	1.5	14.9.2012	7.5	29
8.9.2012	1	15.9.2012	7	30
13.9.2012	1.5	19.9.2012	5.5	33
8.9.2012	1	14.9.2012	6	28
9.9.2012	1.5	15.9.2012	6	29

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