

OCCURRENCE AND BIOLOGY OF *CATOPSILIA PYRANTHE* LINN. ON INDIAN SENNA (*CASSIA ANGUSTIFOLIA* VEHL) IN GUJARAT

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ABSTRACT – *Catopsilia pyranthe* Linnaeus is one of the major pests of Indian senna (*Cassia angustifolia* Vehl.). Studies on population dynamics and life cycle of the pest were attempted in the agro-climatic conditions prevailing in Gujarat. Incidence of *C. pyranthe* was observed through out the year in Gujarat, except winter months of December to February. The activity of the pest was more during Second fortnight of June to October and maximum population of adult as well as eggs and larvae were observed during September and October coinciding with southwest monsoon (June-September). Studies on Life history of the pest revealed that development period from egg to adult emergence spanned over 20-29 days with several overlapping generations in the study area.

Key words : *Catopsilia pyranthe*, *Cassia angustifolia*, seasonal occurrence, biology.

INTRODUCTION

Indian senna (*Cassia angustifolia* Vehl.) is a small 1-2 m high under shrub, whose leaves and pods contains sennosides commonly used as natural laxatives. It is cultivated in Tamil Nadu, Andra Pradesh, Rajasthan, Gujarat, Maharastra, Karnataka, West Bengal and Tripura (Maiti and Kumar, 2001). The crop was reported to be attacked by green leaf caterpillars (*C. pyranthe* (L.) and *Eurema hecabe* (L.)), Aphids (*Toxoptera odinae* Treit. and *Aphis gossypii* Glover), spiny pod borer (*Etiella zinckniella* Treit.) and Red gram pod fly (*Melanagromyza obtusa* Malloch) in field and Cigarette beetle (*Lasioderma sericorne* Fb.) in storage (Murali et al, 2008 and Rani and Kalyanasundram, 2006). *C. pyranthe* is reported to be the major pest of senna in the region (Patel and Yadav, 1991). Its host range includes *Cassia* sp. (Caesalpinaceae) as a whole (Atluri et al, 2004). The larvae infest leaves and severe infestation resulted into complete defoliation of plant. Therefore for developing suitable management strategies studies on field population of different stages and life history of the pest were carried out.

MATERIALS AND METHODS

The study was carried out at CR farm, Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand in 2007-2008.

In a plot of 4.5x50m² where senna was maintained, 20 plants in all was scored for number of eggs, larvae and pupae present on these plants every month for a year and for adults' arbitrary criteria such as common, less

common, abundant and absent on visual basis was used. The life cycle study of *C. Pyranthe* was taken up during September-October when fresh eggs along with leaves were brought to laboratory and placed in petridish at room temperature. Daily observation on the life-history sequence and length of larvae were recorded with the help of hand lens and centimeter graph paper (Freidrich, 1986). The larvae were provided with fresh leaves of senna daily. Based on skin casting the different instars were identified.

RESULTS AND DISCUSSION

Population dynamics of *C. pyranthe* (Fig. 1 & Table 1)

Adult population was common in the study area throughout the year except in the winter months of December to January when mean minimum and maximum temperature ranged between 10.08 to 14.02 and 27.46 to 29.45 °C, respectively (Av. total Temp. 19.26 to 21.4 °C) (Table 1 & Fig. 1). The population of larvae (the only economical stage) was low during April to March, when the average min. and max. temperature ranged between 18.83 to 26.85 and 36.38 to 39.15 °C, respectively (Av. total 27.6 to 33.0 °C) and RH between 47.5 to 49.0 percent with almost nil rainfall (Fig. 2). With the slight decrease in temperature and increase in humidity due to onset of monsoon rains in the mid June the activity of pest started increasing and the adult population and number of egg per plant (15 eggs per plant) were higher during Ist fortnight of June. However, in July-August the adult population and no. of eggs (5-6 per plant) relatively

Table 1 : Mean Population of *Catopsilia pyranthe* on Indian senna (*Cassia aungustifolia*)

Life stages	Months											
	May	June	July	August	Sept.	October	Nov.	Dec.	Jan.	Feb.	March	April
Adult	CO	CO	CO	CO	ABU	ABU	LC	LC	AB	AB	CO	CO
Eggs	06	15	05	06	40	25	02	0	0	0	03	04
Larvae	04	05	10	07	17	35	01	0	0	0	02	03
*Pupae	0	02	01	0	0	0	02	0	0	0	0	0

CO: Common; ABU: Abundant; LC: Less Common; AB: Absent

Figures shows the pupa present on plant itself and not the pupae in the soil

decreased due to continuous rains (Average rain fall in July and August was 88.46 and 73.13 mm, respectively) (Table 1 & Fig. 1). With the receding rainfall during September (43.37 mm) and October, when the average minimum and maximum temperature ranged between 19.92 to 24.98 and 32.87 to 35.06 °C, respectively (Av. total 27.48 to 28.80 °C) and RH between 60.20 to 80.0 percent the activity of adults increased, as a result more number of eggs (upto 40 nos per plant) were laid during these months and correspondingly larval population was exceedingly high (upto 35 larvae per plant) (Fig 2). The infestation was noted as high as 87.6 to 100 percent during these months. The population showed decreasing trend from Nov. (02 mean larvae per plant), when the average minimum and maximum temperature was 15.83 and 33.23 °C, respectively and RH 54.0 percent with nil rainfall and reached to almost zero level during winter months of December to February (Fig. 2 & Table 1).

The findings revealed that the population of adults was relatively low during summer (March to May) and almost nil during winter (December to February). The population of adults started increasing with the onset of monsoon in the Region and hence eggs were laid in more number during Ist fortnight of June, but continuous rainfall from IInd fortnight of June to August hindered the activity of adult *Catopsilia*, as a result eggs laid were less during these months. With the receding rainfall during September and October the activity of adults increased and correspondingly number of eggs laid and larval population were maximum during these months, when the temperature was 28 ± 2 °C and RH was 60 to 80 percent. The results of present findings are in corroboration with the findings made by Alture *et al* (2004), which states that higher density of all stages of *C. pyranthe* quite closely corresponds with Southwest monsoon (June-September). Patel and Yadav (1991) also found that during rainy season the conditions were very conducive for the development of *C. pyranthe*.

Table 2 : Life stages and developmental durations of *C. Pyranthe* on Indian senna under laboratory conditions

Stage	Growth (mm)		Developmental duration (days)
	Mean \pm SE	Range	
Egg	2.4 ± 0.12	2-3	3-4
Larval Instars			
I	4.7 ± 0.19	4-6	2-3
II	10.3 ± 0.29	9-13	2-3
III	15.5 ± 0.27	14-17	3-4
IV	21.9 ± 0.53	20-25	4-5
V	32.2 ± 0.39	30-35	4-5
Pre-Pupa	27.1 ± 0.55	24-30	1-2
Pupa	20.9 ± 0.24	20-23	6-7

Life history & Developmental duration of *C. pyranthe* (Fig 1&2 & Table 2)

Adult *Catopsilia* breeds throughout the year, except in the winter months of December to February with several overlapping generations in the region. Copulation took place air and the paired couple sat on the plant, pairing lasted for few hours and female started laying eggs soon after pairing. Eggs were laid singly on both the side of leaves in a ratio of 50:50.

The eggs (Fig. 2c) were erect, fusiform (tapered at both end) laid singly on leaf, whitish in colour initially and turned creamy-white after one day, 2-3mm in length, incubation period 3-4 days, larvae hatch out by breaking egg shell.

The first instar larvae (Fig. 2d) start feeding immediately after hatching. It feed mainly by scraping paranchymatous tissue of leaves leaving behind venation. It grows to the length of 4.0 to 6.0 (4.7 ± 0.19) mm. Body

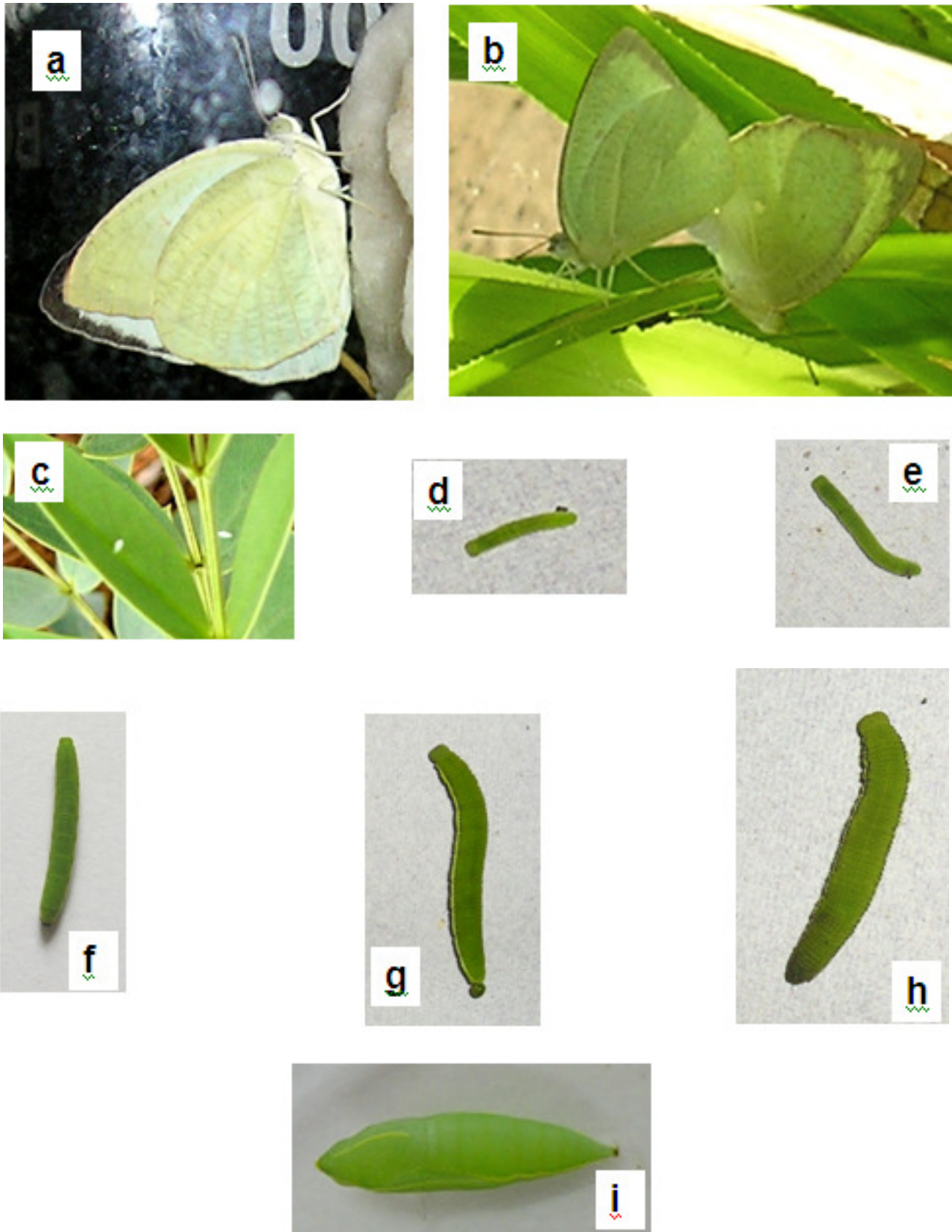


Fig. 3 : Life stages of *Catopsilia pyranthe*. a. Adult; b. pairing; c. eggs; d. Instar-I; e. Instar-II; f. Instar-III; g. Instar-IV; h. Instar-V; i. Pupa.

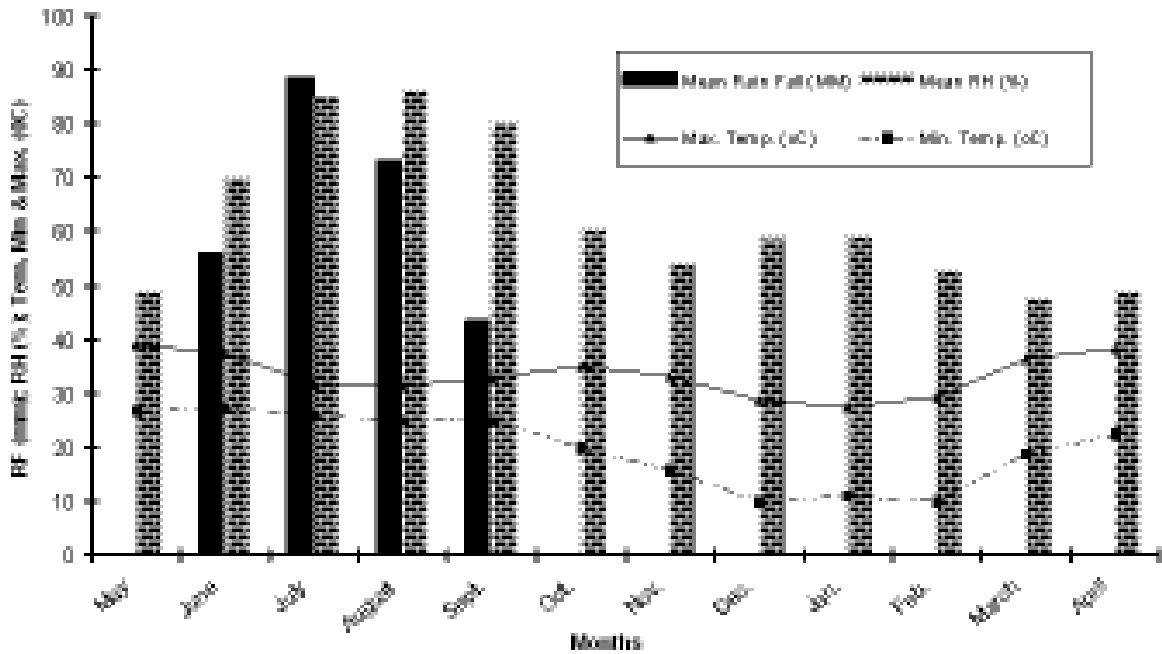


Fig. 1 : Monthly Rainfall, Relative Humidity and Temperature of the Study area during the period of investigation.

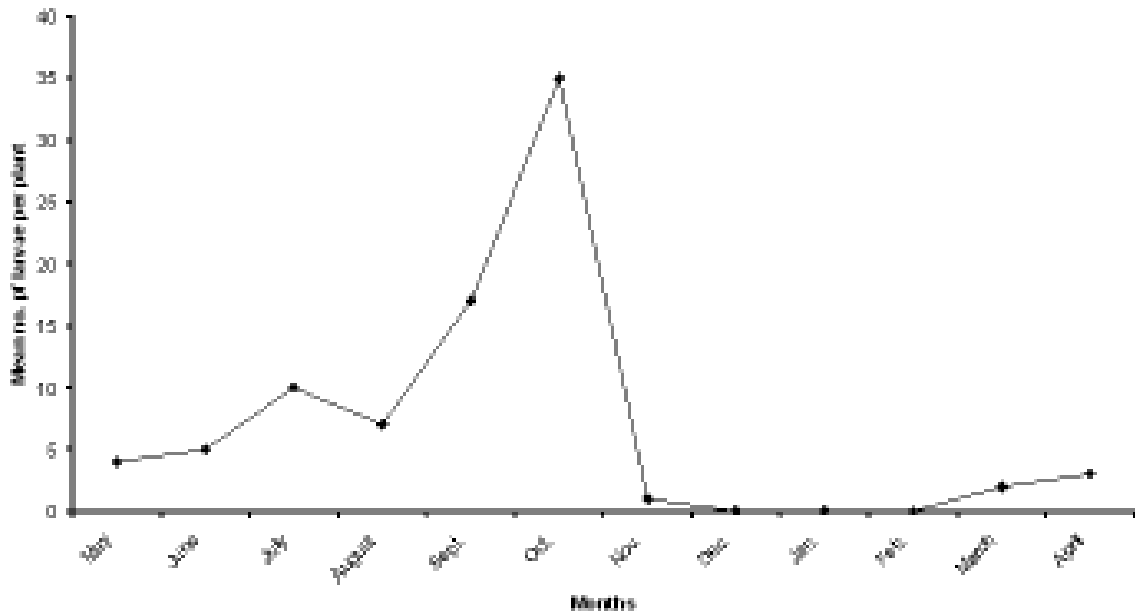


Fig. 2 : Larval population of *C. pyranthe* on Indian Senna (*Cassia aungustifolia*)

cylindrical and pale green in colour. Damaging potential of Ist instar larvae is less but due to gregarious feeding habit when present in exceedingly high number as reported during September and October removal of parenchymatous tissue along with chlorophyll certainly affect the plant growth. It lasted for 2-3 days.

Second instar larvae (Fig. 2e) grows to the length of 9.0 to 13.0 (10.3 ± 0.29) mm. Body colour pale green and lateral yellow line less pronounced. Abdominal prolegs

were less distinct. Damaging potential is more than Ist instar as it started feeding from margin of leaves. IInd instar lasted for 2-3 days.

Third instar larvae (Fig. 2f) grows to the length of 14.0 to 17.0 (15.5 ± 0.27) mm. Body colour pale green and lateral yellow line more pronounced. Abdominal prolegs were distinct and clearly visible. Food requirement is more than IInd instar as it started devouring whole leaflet leaving behind midrib only. IIIrd instar lasted for 2-4 days.

Forth instar larvae (Fig. 2g) grows to the length of 20.0 to 25.0 (21.9 ± 0.53) mm. Body colour green and lateral yellow line broad and distinct. Abdominal prolegs were distinct and clearly visible. Damaging potential maximum as food requirement was more and defecation frequency was also quick. IVth instar lasted for 3-4 days.

Fifth instar larvae (Fig. 2h) grows to the length of 30.0 to 35.0 (32.2 ± 0.39) mm. Body colour green, lateral yellow line broad and distinct and segmentation clearly visible. Abdominal prolegs were distinct and clearly visible. Damaging potential more. Vth instar lasted for 4-5 days.

During Pre-pupation stage the larvae stopped feeding and became thick and reduced in length, 24-30 (27.1 ± 0.55) mm. The pre-pupation stage lasted for one day. Before transformation into pupa the pre-pupa attached itself to the entire length of body on the substratum. The pupa (Fig. 2i) appeared like a shell. Its length ranged between 20-23 (20.9 ± 0.24) mm and diameter in the middle broadest part 7-8 (7.6 ± 0.09) mm. Pupal stage lasted for 6-7 days. After hatching adults kept itself attach on the support and after hardening of wing it started flying.

Adults of *C. pyranthe* breeds throughout the year except in the winter months of December to February in the study area. Eggs were laid singly on both the surface of leaf in the ratio of 50:50. Larvae passed through five larval stages before being transformed into pupae and it took 20-29 days in the development from egg to adult. Atluri *et al.*, 2004 also reported that the eggs are laid singly on both the surface of leaf developed into adult

after passing through five larval and pupal stages in 22-29 days. Singh and Rao (1989) in Lucknow condition found that adult lay eggs singly on both the surface of leaf but larval and pupal period lasted for 10-12 and 3-7 days, respectively i.e. developmental period from egg to adult was less in Lucknow conditions.

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