
**BIOLOGY OF CITRUS LEAF MINER, *Phyllocnistis citrella* Stainton
ON KAGZI LIME****PATEL, R.K.* ; PAWAR SWAPNIL AND JADHAV, K.M.**

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ABSTRACT

The citrus leaf miner moth lays minute, flattened, transparent eggs on the lower surface of the young leaves near the midrib. Newly hatched larvae mine into the leaf tissue and form galleries. The average incubation period was 2.47 ± 0.47 days with a hatching percentage of 74.60 ± 3.44 . . The total development period of larva was 7.10 ± 0.76 days. The adult moth was tiny and silvery in colour with whitish forewings and white hind wings.. The average fecundity of female moth was 56.95 ± 10.10 eggs. The longevity of male and female was 4.50 ± 0.43 and 6.55 ± 0.42 days, respectively. The sex ratio of male : female was 1 : 1.2. The total life period of male and female was 24.16 ± 1.09 and 26.32 ± 1.52 days, respectively.

KEY WORDS Biology, Leaf miner, *Phyllocnistis citrella* Stainton, Citrus

INTRODUCTION

In India, the cultivation under citrus is about 0.56 million hectares with production of 5.67 million tonnes. In Gujarat, the total area under citrus cultivation is about 27,931 hectares contributing 2,85,258 tonnes production during the year 2004-05 (Anon., 2005). The consumption of kagzi lime is increasing day by day in all parts of the country. Kagzi lime fruit fetch a high price in big cities mostly in Northern India and there is an appreciable expansion of kagzi lime cultivation in Gujarat during recent

years. Citrus leaf miner, *Phyllocnistis citrella* Stainton (Phyllocnistidae : Lepidoptera) is a major insect pest inflicting severe damage in citrus orchard. The average infestation rate of citrus leaf miner varied from 17 to 57 per cent (Boughdad *et al.*, 1999). The citrus leaf miner moth lays minute, flattened, transparent eggs on the lower surface of the young leaves near the midrib. Newly hatched larvae mine into the leaf tissue and form galleries. The mature larvae settle down in enlargements of galleries near the leaf margin. By the time, they spin cocoons for pupation and the leaves get twisted or folded over and retarded the growth of plant, which caused reduction in yield of citrus. Loking to the importance of this insect the present investigations on biology of citrus leaf miner (*Phyllocnistis citrella* Stainton) on kagzi lime was carried out in the laboratory of Department of Agricultural Entomology, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar.

MATERIALS AND METHODS

Large number of infested branches of kagzi lime with citrus leaf miner larvae were collected from the Horticultural Instructional Farm, C.P. College of Agriculture, Sardarkrushinagar. The branches were wrapped with moist cotton wool on the cut portion and put in the conical flask containing water. Large numbers of such flasks were prepared for mass rearing of citrus leaf miner in the laboratory. Such flasks were kept in iron cage and black muslin cloth was covered on it. The adult moth emerged out from the pupae were collected carefully by opening the iron cage with the help of small plastic vials. Male and female moth was identified with their typical morphological characters and paired. Five kagzi lime seedling were placed in iron cage for oviposition . Twenty five pairs of male and female moth of citrus leaf miner were introduced in a iron cage for oviposition. Honey solution (5 %) was provided in a fresh sponge twice in a day as a food for adult moths.

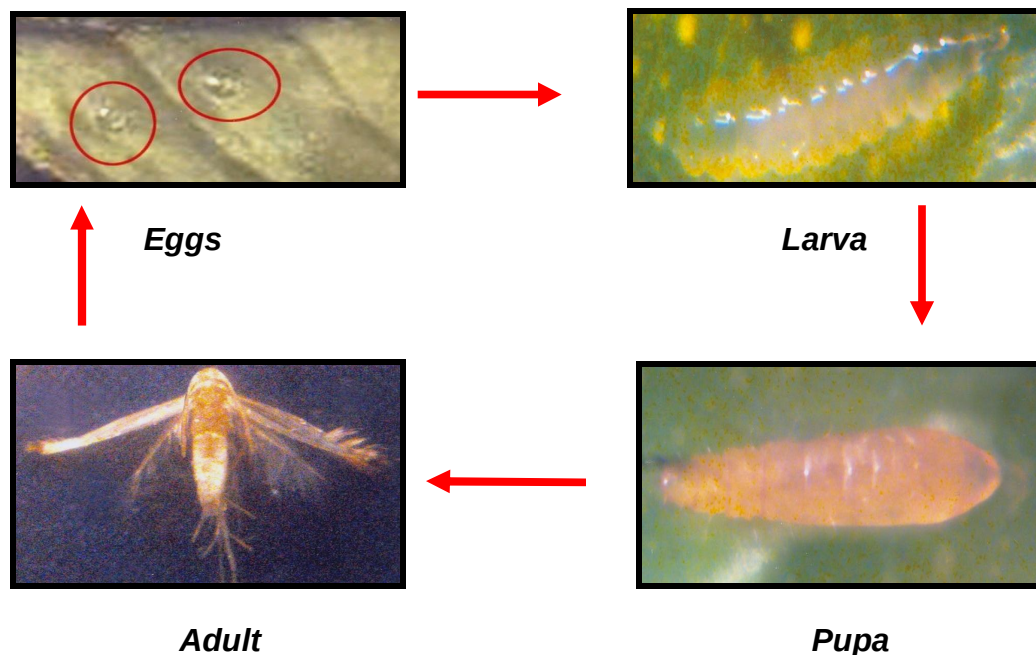
Eggs laid by female moths on the leaves of kagzi lime were marked and numbered. Only one egg/leaf was maintained and rest of the eggs were removed. The eggs were observed everyday to know the further development. The incubation period and length and breadth of egg was worked out. The length and breadth of larva and larval period was also worked out by cut opened the leaf lamina carefully. The leaf having pupa was kept in glass Petri containing moist blotting paper till the emergence of moths from pupae. The length and breadth of pupa and pupal period was also worked out. To know the fecundity of female moth and longevity of adults, freshly emerged moths were paired and transferred in a glass chimney containing kagzi lime seedling. The length and breadth of adult moth was measured by using ocular micrometer after calibrating it with stage micrometer using millimeter scale.

RESULTS AND DISCUSSION

The study revealed that the eggs were minute, transparent and oval in shape. From the Table 1 and 2 it can be seen that the average length and breadth of egg was 0.31 ± 0.01 mm and 0.21 ± 0.01 mm, respectively. The average incubation period was 2.47 ± 0.47 days with a hatching percentage of 74.60 ± 3.44 . The newly hatched first, second and third instar larvae were flat in shape and pale yellowish in colour. While, fourth instar larva was cylindrical in shape. The first, second, third and fourth instar larva measured on an average of 0.73 ± 0.01 , 2.26 ± 0.01 , 3.79 ± 0.01 and 4.98 ± 0.01 mm in length and 0.33 ± 0.01 , 0.52 ± 0.01 , 0.76 ± 0.01 and 1.03 ± 0.01 mm in breadth, respectively. The average duration of first, second, third and fourth instar larva was 1.22 ± 0.22 , 1.25 ± 0.23 , 2.25 ± 0.23 and 2.75 ± 0.24 days, respectively. The total development period of larva was 7.10 ± 0.76 days. The freshly formed pupa was cylindrical in shape and yellowish brown in colour. The average length and breadth of pupa was 3.31 ± 0.21 mm and 0.54 ± 0.02 mm, respectively. While, average pupal period was 10.95 ± 0.88 days. The adult moth was tiny and silvery in colour with whitish forewings having brown stripes and

prominent black spot near the apical margin. The hind wings were white in colour. Both the pair of wings were fringed with minute hairs. The male is distinguished by the presence of brush like tufts of scales on the last abdominal segment, which was absent in female moth. The female moth was comparatively bigger in size than the male moth. The male adult measured on an average 1.26 ± 0.04 mm in length and 3.91 ± 0.02 mm in breadth with wing expansion. Whereas, adult female was 1.77 ± 0.05 mm in length and 4.28 ± 0.03 mm in breadth with wing expansion. The average pre-oviposition, oviposition and post-oviposition periods were 1.23 ± 0.20 , 3.22 ± 0.22 and 1.24 ± 0.20 days, respectively. The average fecundity of female moth was 56.95 ± 10.10 eggs. The longevity of male and female was 4.50 ± 0.43 and 6.55 ± 0.42 days, respectively. The sex ratio of male : female was 1 : 1.2 in laboratory condition. The total life period of male and female was 24.16 ± 1.09 and 26.32 ± 1.52 days, respectively.

LIFE CYCLE OF CITRUS LEAF MINER



SUMMARY

Citrus leaf miner, *Phyllocnistis citrella* Stainton (Phyllocnistidae : Lepidoptera) is a major insect of citrus causing 17 to 57 per cent damage. Newly hatched larvae mine into the leaf tissue and form galleries. They spin cocoons for pupation and the leaves get twisted or folded over and retarded the growth of plant, which caused reduction in yield of citrus. The total life period of citrus leaf miner completed for 24.16 ± 1.09 (male) and 26.32 ± 1.52 (female) days from egg to the death of adult.

REFERENCES

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Table 1 Measurement of different stages of citrus leaf miner, *P. citrella*

Stages		Length (mm)			Breadth (mm)		
		Min.	Min.	Max.	Min.	Min.	Max.
Egg		0.30	0.32	0.31 ± 0.01	0.20	0.22	0.21 ± 0.01
Larva	I instar	0.72	0.74	0.73 ± 0.01	0.32	0.33	0.33 ± 0.01
	II instar	2.25	2.27	2.26 ± 0.01	0.51	0.53	0.52 ± 0.01
	III instar	3.78	3.80	3.79 ± 0.01	0.75	0.77	0.76 ± 0.01
	IV instar	4.97	5.00	4.98 ± 0.01	1.02	1.04	1.03 ± 0.01
Pupa		3.03	3.52	3.31 ± 0.21	0.50	0.56	0.54 ± 0.02
Adult	Male	1.20	1.30	1.26 ± 0.04	3.87	3.93	3.91 ± 0.02
	Female	1.70	1.85	1.77 ± 0.05	4.25	4.32	4.28 ± 0.03

Table 2 Period of different stages of citrus leaf miner, *P. citrella*

Sr. No.	Particulars		Period (Days)		
			Min.	Max.	Av. $\pm$ S.D.
1.	Egg period		2.0	3.0	2.47 $\pm$ 0.47
2.	Larval period	I instar	1.00	1.50	1.22 $\pm$ 0.22
		II instar	1.00	1.50	1.25 $\pm$ 0.23
		III instar	2.00	2.50	2.25 $\pm$ 0.23
		IV instar	2.50	3.00	2.75 $\pm$ 0.24
3.	Total larval period		6.0	8.0	7.10 $\pm$ 0.76
4.	Pupal period		10.0	12.0	10.95 $\pm$ 0.88
5.	Adult period	Male	4.0	5.0	4.50 $\pm$ 0.43
		Female	6.0	7.0	6.55 $\pm$ 0.42
6.	Pre-oviposition period		1.0	1.5	1.23 $\pm$ 0.20
7.	Oviposition period		3.0	3.5	3.22 $\pm$ 0.22
8.	Post-oviposition period		1.0	1.5	1.24 $\pm$ 0.20
9.	Total life period	Male	22.50	26.00	24.16 $\pm$ 1.09
		Female	24.50	29.00	26.32 $\pm$ 1.52
10.	Temperature ($^{\circ}$ C)		21.60	27.75	24.59 $\pm$ 1.47
11.	Relative humidity (%)		42.50	69.00	53.61 $\pm$ 6.34