Indian Journal of Hill Frmg 16(1&2) : 35-37 (2003)

BIOLOGY OF LEAF MINING FLEA BEETLE, *SEBAETHE* FULVIPENNIS (CHRYSOMELIDAE:COLEOPTERA) - A MAJOR PEST OF ASSAM LEMON IN MEGHALAYA

A N Shylesha, K Rajasekhara Rao and K A Pathak
ICAR Research Complex for NEH Region, Umroi Road, Umiam, Meghalaya
Email: anshylesha@rediffmail.com

ABSTRACT

Sebaethe fulvipennis Lliger is one of the most important insect pests infecting Assam lemon plants. The brick-red coloured adult beetles measured 2.5 - 3.0 mm in length and 2.5 mm in width feed on the newly emerged leaves by nibbling the leaf margins. The grubs feed as leaf miner, mining the leaf in between the epidermal layers. There are two generations in a year one starting in February flush and the other during November flush. On an average 19-.30 twigs were found to be damaged per plant. Raking the soil below the plant canopy and exposing the pupae was found to minimize the damage by the pest.

INTRODUCTION

Assam lemon is one of the important fruits used in the daily diet of people in north eastern India. Sebaethe fulvipennis is one of the major insect pests infesting the new flush (Padamanaban et al, 1990). The brick-red coloured adult beetles measuring 2.5 - 3.0 mm in length and 2:5 mm in width feed on the newly emerged leaf by nibbling the leaf margins. The grub feed as the leaf miner. There are two generations in a year one starting in February flush and the other during November flush. This communication deals with the biology of this flea beetle on Assam lemon.

MATERIALS AND METHODS

Field collected adults of Sebaethe fulvipennis were reared in insect cages 40 x 40 x 40 cm on young Assam lemon twigs in the laboratory. The observations on fecundity, incubation period, duration of larval instar, pupal period and adult longevity were recorded (Table 1). Morphometrics of different stages were recorded through ocular and stage micrometers. The biology was studied during October-February.

RESULTS AND DISCUSSION

The citrus leaf miner, Phyllocnistis citrella Stainton is regarded as serious pest in most of the citrus growing areas causing considerable loss in foliage growth. However, Sebaethe fulvipennis adults and grubs also cause damage to the citrus plants in the north eastern hill region of India. The adult beetles make small windows by feeding on the tender shoots and the grubs feed as leaf miners skeletonizing the entire leaf.

Egg : Each female beetle laid 65-188 eggs in groups of 30-61 on backside of the young leaves. Eggs are elongated, cylindrical, cream coloured, finely sculptured and covered by some abdominal secretions in the shape of 'S'. Eggs measured 0.71 +/- 0.008 mm in length and 0.20 +/- 0.001 mm in width and took 6-8 days for hatching. The young grub hatched and scraped some small portion of the lower epidermis and then entered into the leaf lamina.

Grub : the grubs had four instars with a total duration of 22-23 days (Table 2). The grubs are creamy white and fed gregariously between the two epidermal layers of the new flush. Younger grubs fed on the tender leaves and as they grew up they selected the older leaves for feeding skeletonizing the whole twig before attaining the full length of 9.86 mm after which they dropped down to soil and pupated.

Pupa : The pupae are excrete and are found covered in a round soiled cocoon. Pupa measured 8.92 mm and total pupal period was up to 75-86 days in both the generations.

Adult : Sebaethe fulvipennis belongs to the sub-family Halticinae of Chrysomelidae that comprises of the group phytophagous Coleoptera popularly called flea beetles owing to their extraordinary power of jumping. The femora of the hindlegs are much thickened; the antennae are always placed between the inner margins of the eyes and anterior coxac are not conicaly prominent at the apex. Body ovate, measuring 2.5-3.0 mm in length and 2.5 mm in width. Colour pitch- brown, elytra dark-brown to red. The scutellium shares the colour of the pronotum. Head with vertex impunctate; frontal tubercles with an impressed longitudinal line between them and separated from the vertex by a transverse impressed line in the inter-ocular space; inter-antennal carina well developed. Antennae extending to about the middle of the elytra; first segments long and club-shaped. Second segment small, third longer and fourth longer than previous ones. From the eighth to the eleventh, the segments are somewhat thinner, and are about equal to each other in length. Prothorax broader than long, sides rounded with margins somewhat explanate and reflexed, anterior lateral angles thickened and each of the four angles bearing a fine seta; surface smooth, shining extremely finely and sparsely punctate. Scutellum triangular, with apex rounded and surfaces smooth impunctate. Elytra hardly broader at the base than prothorax, surface confusedly and finely punctate; the punctures not very close to each other and stronger than those in the pronotum. Underside covered with fine hairs.

Adults emerged during the month of February and fed on the new leaves. Peak emergence was observed during the second week of March and an average of 4 adults/twig was observed during the period. Pre-mating period ranged from 1-3 days and pre-oviposition period from 1-2.5 days (Table 1). The incidence of this beetle was first recorded from Arunachal Pradesh (Padmanaban et al, 1990). Among the 35 lines of citrus germplasm, it was known to feed on mandarin oranges and rough lemon. The present observation is that it preferred to feed on Assam lemon Pommello (Citrus grandis) and citron compared to mandarin oranges.

Damage : The adults as and when they emerged start feeding on the new flush by biting small holes and nibbling the leaf margins. Two to five adults were found on the lower side of the new twigs. At ICAR, Barapani (Meghalaya) Farm, all the new shoots emerged during the November flush had atleast 2-3 adults feeding thus inflicting severe damage to the new flush. The grubs entered into the leaf and fed gregariously and scraped the leaf chlorophyll between the two-epidermal layers making the whole leaf into a transparent blotch and the whole new twig was skeletonized. On an average, 19-30 twigs were found to be damaged per plant with a damage to 8-10 developed leaves per twig. This along with the citrus leaf miner, Phyllocnistis citrella damaged the whole flush during November and March.

Natural enemies : Black earwigs were found to be predating on the grubs. Two to three earwigs were observed per infested twig. Earwigs colonized on the leaf and both adults and nymps were found feeding on the grubs.

ACKNOWLEDGEMENTS

Thanks are due to the Director, ICAR Research Complex for NEH Region, Umiam for providing facilities and to Shri Moloy Sarmah and Shri Kajol Suklabaidya for their technical help during the study.

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Table 1. Observation on the biology of *Sebaethe fulvipennis*

Observation	Mean	Range
Pre-mating period (days)	1.7	1-3
Pre-oviposition period (days)	1.75	1-2
Number of eggs/group	41.7	30-61
Fecundity	122.2	65-188
Incubation period (days)	5.9	6-8
Hatching (%)	78.8	78-92
Larval period (days)	22.2	22-23
Pupal period (days)	72.3	75-86

Table 2. Morphometric measurements of different stages of *Sebaethe fulvipennis*

Measurment	Length of body (mm)	Head casule width (mm)	Period (days)
Egg	0.71 ± 0.008	0.02 ± 0.001	6-8
I Instar larva (fresly hatched)	0.75 ± 0.012	0.25 ± 0.001	
I Instar larva	1.95 ± 0.06	0.04 ± 0.011	4-5
II instar grub	3.88 ± 0.009	0.65 ± 0.002	5-6
III instar grub	5.79 ± 0.008	0.75 ± 0.002	6-7
IV instar grub	9.86 ± 0.05	0.90 ± 0.03	6-8
Pupa	8.92 ± 0.02		78