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Bionomics of *Dasychira mendosa* Hubner form *fusiformis* Walker.

B. P. MEHRA AND B. N. SAH

Indian Lac Research Institute, Namkum, Ranchi.

ABSTRACT

Although *Dasychira mendosa* Hubn. form *fusiformis* Walker (Lepidoptera : Lymantriidae) has been recorded as a minor pest of cultivated and forest plant species, it was observed to be doing considerable damage to the foliage of some important hosts of the lac insect, *Kerria lacca* (Kerr), namely kusum or the Indian Lac Tree (*Schleichera oleosa*, (Lour. Oken), ber or jujube or Chinese Date (*Ziziphus mauritiana* Lam.), ghont (*Ziziphus xylopyra* Willd.) and particularly *bhalia* (*Moghania macrophylla* (Willd. O.Ktze). The present studies were conducted on *M. macrophylla*. The pest is available in the field from July to March and disappears during April to June. Newly hatched larvae feed gregariously on the outer tissue of the tender and succulent leaves. Second instar larvae spread on other leaflets and make holes in them; third, fourth and fifth instar larvae eat away entire leaflets, leaving only the mid-ribs and thicker veins. Severe infestation checks the growth of the plants. Maximum damage of 8 per cent to the bushes was observed in September. The eggs are laid indiscriminately on the leaves. The pre-oviposition period varies from 1 to 2 days and the incubation period from 5 to 10 days. There are generally 5, but sometimes 6, larval instars and the larval period lasts from 13.2 to 33.8 days and 40.8 days respectively. The full grown larva pupates in a slightly silken and brownish-white cocoon on any part of the bush, after passing a prepupal stage for 1 to 3 days. Seven overlapping generations were reared in the laboratory during the seven months from July to January. The life-cycle varies from 27.0 to 65.5 days. Five tachinid endoparasites were collected from the larvae.

Introduction

The hairy caterpillar of *Dasychira mendosa* Hubn. form *fusiformis* Walker (Lepidoptera : Lymantriidae), although recorded as a minor pest of cultivated and forest plant species, was observed to be doing considerable damage to the foliage of some important lac-hosts, parti-

cularly *Moghania macrophylla* (Willd.) O.Ktze in the Institute arboretum. The pest is widely distributed throughout India, Burma, Ceylon, Java and Australia (Hampson 1892). A review of the literature shows that no detailed studies on the biology and bionomics of this pest have so far been carried out except for some observations by Hampson (1892), Fletcher (1914), Mukerji (1929), Sevastopulo (1938, 1942), Gardner (1938), Beeson and Chatterjee (1940) and Beeson (1941). The present studies were conducted on *M. macrophylla*.

Materials and methods

The pest for study was collected in the larval stages from *M. macrophylla* bushes in the arboretum, and reared on its leaves in glass Petri-dishes 10 cm in diameter. For oviposition a pair of adult male and female moths was introduced in a battery jar 10 cm in diameter and 30 cm deep containing a sheet of paper at the bottom, twigs of the food-plant and strips of paper for egg laying, which were removed and kept aside for incubation and replaced by fresh ones every 24 hours.

Food plants

The caterpillars were observed to feed on the tender and succulent leaves of *bhalia* (*M. macrophylla*), kusum or the Indian Lac Tree (*Schleichera oleosa* (Lour.) Oken), ber or jujube or Chinese Date (*Ziziphus mauritiana* Lam.) and ghont (*Ziziphus xylopyra* Willd.) in the Institute arboretum. During severe infestations in August and September, for the past few years, it was observed that the bushes of *M. macrophylla* suffered most. *D. mendosa* has been recognized as a polyphagous species since it has been recorded feeding on many plants in India Lefroy, 1909; Fletcher, 1914, 1917 and 1919; Mukerji, 1929; Sevastopulo, 1938; Ayyar, 1940 and Beeson, 1940 and 1941, Ceylon (Senior-White, 1919) and Burma (Shroff, 1919).

Nature and extent of damage

Newly hatched larvae nibble gregariously only the outer tissue of the tender and succulent leaves. Second instar larvae spread on other leaflets and damage them by making holes; third, fourth and fifth instar larvae eat away entire leaflets leaving only the thicker veins and mid-ribs.

In severe infestation the seedlings and young plants are completely stripped of their leaves which checks their growth.

To assess the damage caused by the pest to *bhalia*, 100 bushes were picked up at random and the number of damaged plants noted weekly during its most active period from June to December 1965 in the Institute arboretum. A larval survey of the pest was also carried out and a weekly record of the number of caterpillars collected from 100 randomly picked *bhalia* bushes was maintained. Table 1 records the percentage of damaged plants and number of caterpillars found on the bushes from June to December 1965, from which it will be observed that the maximum damage related to the maximum number of caterpillars in September.

TABLE 1

Extent of damage caused to 100 *M. macrophylla* bushes and the larval population of *D. mendosa* at Namkum.

Month	Average percentage of damaged plants	Number of caterpillars found
June 1965	1.0	10
July 1965	4.0	56
August 1965	6.0	82
September 1965	8.0	96
October 1965	4.0	52
November 1965	1.0	24
December 1965	Nil	5

LIFE-HISTORY

Oviposition

Eggs were laid indiscriminately, generally during night, on the foliage of the food plant, the paper strips supplied for the purpose, the paper at the bottom of the battery jar, as well as on its wall. In the field, the eggs were laid during night on upper or lower surface of the leaf of the food plant, usually in batches of 15 to 100.

Egg

The egg is spherical, 0.73 mm in diameter with upper pole flattened and lower pole attached to the stratum. Micropylar area and a ring round the top is pale butter-yellow and three-fourth of the egg towards the lower pole is pale-creamy. Later, the micropylar area becomes depressed. A day before hatching, the colour changes to bluish-grey and the head of the larva is seen through the depressed portion.

The incubation period lasts for 5 to 10 days during July to January (Table 2). Hatching generally occurs in the small hours of the morning. Beeson (1941) reported the incubation period to occupy 5 days in September and Sevastopulo (1942) 8 days in December.

Larval instars

There were usually five instars except in some instances in the sixth generation where there were six. The larvae in all the instars are nearly similar. Hence only the newly hatched larva is described here in detail with the characteristic features of the other larvae.

First-instar larva: Newly hatched larva is dark grey. Head is black and somewhat round. There are eight segments in the abdomen. There are, as usual, three pairs of thoracic legs, and five pairs of prolegs on abdominal segments 3 to 6 and 8. Each segment has a pair of greyish black lateral tufts including a long black hair arising from the raised tubercle of the first thoracic segment bearing subdorsal pencils of black hair pointing forward. There are minute white setae on brown tubercles of second and third thoracic segments. Abdominal segments 1 to 4 and 6 to 8 are with short dorsal black hair and segments 5 with a white hair. Dorsal skin between abdominal segments 1 to 4 and 6 to 8 is black, and between 5 and 6 brown. A dorsal pencil of black hair pointing backwards is present on abdominal segment 8. Thoracic and abdominal legs are dark grey. The larva measures 2.0 mm in length. This instar lasts from 2.1 ± 0.1 to 8.3 ± 0.66 days (Table 2).

Second-instar larva: Head is black and body creamy grey. Prothoracic segment has a subdorsal orange tubercle with a tuft of grey hair. Abdominal segments 1 to 4 and 8 are with dorsal tufts of grey hair. Skin between abdominal segments 1 to 4 and 6 to 8 is blackish dorsally. Segment 5 is orange coloured with white tubercle. Two dull-white circular spots are present on segments 6 to 7. Extremity of the body is orange coloured. Thoracic legs are

TABLE 2

Duration of different stages of *D. mendosa* form *fusiformis*.

Generation	Date of oviposition	Number under observation	Egg stage (days)	Total larval stage (days)	Pre-pupal stage (days)	Pupal stage (days)	Date of adult emergence	Duration egg to adult (days)
First	—	8	—	—	1.5 (1-2)	7.5 (3-8)	4.7.1965 to 11.7.1965	—
Second	5.7.1965	13	5	13.5±0.24	1.0±0	7.5±0.21	31.7.1965 to 2.8.1965	27.0±0.25
Third	3.8.1965	18	5	13.6±0.14	1.0±0	7.8±0.21	29.8.1965 to 1.9.1965	27.5±0.24
Fourth	2.9.1965	18	5	13.2±0.17	1.4±0.12	10.2±0.26	30.9.1965 to 4.10.1965	29.9±0.57
Fifth	6.10.1965	13	6	15.5±0.75	1.0±0	8.2±0.34	2.11.1965 to 8.11.1965	30.6±0.52
Sixth (i)	8.11.1965	11	8	33.8±0.64	2.8±0.2	16.0±0.58	4.1.1966 to 10.1.1966	60.1±0.42
(ii)	8.11.1965	6	8	40.8±1.1	2.3±0.3	15.1±0.3	10.1.1966 to 18.1.1966	66.5±1.38
Seventh	7.1.1966	17	10	29.1±0.26	1.6±0.12	10.0±0.26	15.2.1966 to 18.2.1966	50.8±0.19

black and prolegs grey. They are beset with minute white setae. The length of the larva is 5.0 ± 0 to 5.5 ± 0.12 days (Table 2).

Third instar larva: General body colour is grey. Head is black. Thoracic segments are with white tubercles beset with white setae. There is a subdorsal yellow line and a sublateral whitish-grey line. Lateral tufts of hair on abdominal segments 1 to 4 are black. The larva measures 7.5 mm in length. This instar lasts from 2.0 ± 0 to 6.0 ± 0.17 (Table 2).

Fourth-instar larva: Head is black. Prothorax bears subdorsal pencils of dark grey hair on black tubercles. White tufts of hair are found on white tubercles on all the three thoracic segments. Abdominal segments 1 and 2 are with short dorsal grey hair and 3 with white hair. Skin between abdominal segments 1 to 4 and 5 to 8 is velvety black. Segment 2 has lateral tufts of grey hair. Ground colour is grey. There is a lateral series of light yellow spots on a white line. Abdominal segments 1 to 8 are with subdorsal series, and segments 5 to 7 bear additional dorsal pair of dull white spots. Dull white circular spots on segments 6 and 7 of the previous instar turn yellow. Thoracic legs and prolegs are yellow. The larva measures 12.0 mm in length. This stage lasts from 2.3 ± 0.12 to 5.8 ± 0.29 days. (Table 2).

Fifth-instar larva: General body colour is grey. Head, legs and last pair of prolegs are crimson. Subdorsal tufts of dark grey hair on prothorax are bigger than in previous instar. Minute white setae are present dorsally on prothorax and white lateral tufts of hair on meso- and metathorax. Abdominal segments 1 to 4 have short dorsal creamy hair. Abdominal segment 2 has a lateral tuft of white hair. A

lateral series of crimson spots on a white line is present. Abdominal segments 1 to 8 have a subdorsal series and segments 5 to 7 bear an additional dorsal pair of red spots. An interrupted crimson median line bearing a pair of black spots is present on segments 5 to 7, and a yellow spot on segments 6 and 7. The larva measures 30.0 mm in length. This stage lasts from 3.2 ± 0.11 to 9.5 ± 0.39 days (Table 2).

Sixth-instar larva: This instar larva is similar to the previous instar larva but lasts for 3.8 ± 0.65 day. (Table 2).

The total larval period with 5 instars lasts from 13.2 ± 0.17 to 33.8 ± 0.64 days, and with six instars for 40.8 ± 1.1 days (Table 2).

Prepupa

The larva before pupating passes through a prepupal stage lasting 1.1 ± 0 to 2.3 ± 0.3 days (Table 2), when it stops feeding and starts spinning a slightly silken cocoon, oval in shape and brownish white in colour. This stage has also been recorded by Fletcher (1914). The prepupa then molts into a pupa. In the field pupation takes place on any part of the bush. The cocoon is composed of larval hairs loosely gummed with thin layer of silk.

Pupa

The pupa is dark brown dorsally up to abdominal segment 3. Wing pad and ventral surface are greenish-white. The first three abdominal segments bear patches of golden pubescence. Brown elliptical spiracles are visible on abdominal segments 2 to 8. White setae, pointing posteriorly, are distributed all over the body. The number of dorsal setae

are more on abdominal segments 4 to 8 than on the rest of the body. Last segment tapers posteriorly and bears a hooked cremaster. The puparium is thin and transparent. The male pupa measures 11.0 mm in length and 4.0 mm in breadth across the wing-pads. The female pupa is similar in structure to the male pupa, but bigger in size and measures 15.0 mm in length and 5.0 mm in breadth,

The pupal period varies from 7.5 ± 0.21 to 16.0 ± 0.58 days during July to January (Table 2). Mukerji (1928) and Sevastopulo (1938) recorded a pupal period of 8 days during March and December from a single larva, whereas Beeson (1941) reported it to range from 7 to 10 days during June to August and 7 to 11 days during September.

Adult

Moths generally emerged from the pupae during night. They have been described in detail by Hampson (1892). The female is bigger than the male. The female measures 15.5 mm in length with a wing expanse of 45-50 mm, whereas the male measures 13.3 mm in length with a expanse of 30-35 mm.

Sex-ratio

Sexes are represented in the ratio of 5 females to 7 males in the laboratory-bred specimens (44 females and 60 males) and both emerged simultaneously (Table 2).

Mating

Mating was observed in the laboratory during any time of the day lasting from 4 to 12 hours.

Longevity

The longevity of the male was found as 3.3 ± 0 to 5.8 ± 0.36 days while that of the female as 3.0 ± 0 to 5.0 ± 0.34 days when fed on 10 per cent solution of table sugar soaked in cotton.

Pre-oviposition and oviposition periods

The female started ovipositing 1 to 2 days after mating and continued for 2 to 4 days.

Fecundity

The number of eggs laid by a female in the laboratory varied from month to month, the average being 363 during July, 444.6 during August, 481 during September, 245.5 during October, 273.8 during November and 385 during January. The maximum number of eggs laid by a female was 520 and minimum 171.

Seasonal history

The pest is available in the field throughout the year except during summer, i. e., April to June. The moths of the first generation begin to appear in the field in July. The pest is more active from July to October when favourable conditions, including abundance of foliage, are available. Its activity is retarded with the approach of cold weather from October to December with less number of larvae in the field. Only a few stray caterpillars are found during January to March, and the pest completely disappears from April to June. Seven generations were reared from the first week of July 1965 to mid-February 1966. Overlapping of different stages and generation was observed. The duration of life-cycle varies between 26 to 71 days. Beeson (1941) reported five or six generations of this pest passing through a year with a life-cycle of 26 to 55 days.

Natural enemies

Five tachinid endoparasites, namely *Tricholyga* sp., *Carcelia medicella* Wulp., *Carcelia* sp. nr. *illota* Curr., *Drino* (*Pasturmia*) sp. and *Sisyrofa formosa* Mensil, were recorded from the fifth instar larvae. The parasitic larvae generally emerged from the host when they were passing through a prepupal stage. The adult parasites emerge after 7 to 10 days.

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