MORPHOMETRICS MEASUREMENT OF MANGO DEFOLIATOR *Cricula trifenestrata* (F. LEPIDOTERA: SATURNIIDAE)

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ABSTRACT

Rono M. M. A., Ahad M. A., Hasan S. M., Uddin M. F. and Islam A.K.M.N. 2008. *Morphometrics Measurement of Mango Defoliator Cricula trifenestrata (F. Lepidotera: Saturniidae).* **Int. J. Sustain. Crop Prod. 3(3):45-48**

A study was conducted in the laboratory of Department of Entomology, Hajee Mohammad Danesh Science and Technology University (HSTU), Dinajpur during April to July, 2007 at 25 ± 2ºC and 75 ± 5 % RH (at room temperature and humidity) to study the morphological measurement of mango defoliator *Cricula trifenestrata*. The results of morphometric measurement reveal that the average length and breadth of eggs were 2.27 and 1.86 mm, respectively. The mean length and breadth of 1st, 2nd, 3rd, 4th and 5th instar larvae were 4.08, 13.90, 30.09, 61.37, 81.49 and 2.17, 5.09, 7.23, 11.22, 15.51 mm, respectively. The average length and breadth of male and female cocoon were 41.98, 50.89 and 12.31, 16.22 mm whereas the length and breadth of male and female pupa were 31.64, 35.57 and 10.61, 12.58 mm, respectively. The average length and breadth of male and female moth were 22.35, 32.48 and 32.02, 74.14 mm, respectively.

Keywords: Morphometric measurement, mango defoliator, *Cricula trifenestrata*

INTRODUCTION

Mango *Mangifera indica* L. is one of the king of fruits of the world (Butani, 1979). It is the most popular fruit among millions of people in the orient and has a great economic importance in the tropical and the sub-tropical regions. (Mondal *et al.* 2004). It is considered to be the choicest of all indigenous fruit and one of the important fruits in Bangladesh. It is the tops of the list in terms of production and second among the fruits in Bangladesh. It is grown under a tropical and sub-tropical climate in all parts of the country, but production of quality mango is confined to the northwestern part of Bangladesh, particularly in the districts of greater Rajshahi and Dinajpur (Matin *et al.*, 2006). Bangladesh produces 187220 metric tons of mangoes annually from 124715 acres of land (Anonymous, 2000); which is very poor as compared to the neighboring countries. The most important reasons for this decline of mango production are the infestation of different insect pests. It has been reported that over 175 species of insects infests damage mango regularly (Fletcher, 1970; Veva, 1969 and Nayar *et al.*, 1976). Mango defoliator, mango hopper, mealybugs, bark-eating caterpillars, stem borers, scale insects, fruit flies, stone weevils, gall midges etc. are the common insect pests of mango. Among them, mango defoliator *Cricula trifenestrata* Helfer is one of the most important destructive insect pests of mango. Its caterpillar is a major pest of mango and destroying 13 to 51 % leaves (Ahmad and Alam, 1994). It is also infested Daruchini plant *Cinnamomum zeylanicum* and caused almost complete defoliation (Ahmad and Ahmad, 1991; Yadav and Kumar, 2003) and cashew *Anacardium occidentale* (Pal and Medda, 2006) and plantation crops (Das *et al.*, 1999).

The common name, defoliator refers to the larval habit of defoliating the leaves of mango plant. Mango defoliator is also known in Bengali as Amer Pata Kheko Shua Poka or 'Am Patar Bichcha Poka' (Hossain, 1989) and Wild Silk Moth (Pal and Medda, 2006). The larvae are seen feeding voraciously on leaves, resulting complete defoliation with only the mid-ribs being left. If left uncontrolled, the larvae can defoliate the whole plant as it moved from one side of the plant to another (Pal and Medda, 2006). Recently, mango defoliator has been found to cause serious damage to the mango plants in different parts of Bangladesh. Management of this pest is now of great importance to the mango growers. Before developing suitable control measures for any pest, detailed information regarding the biology, leaf consumption behavior of the larvae is most essential. But the biology, leaf consumption behavior and its control measures have not been studied adequately in Bangladesh and review of this connection is also limited. On the other hand the study of morphology provides information about the amount of insecticide, types of insecticide and spray method. Besides this, environmental conditions of Dinajpur are different from other areas of the country. So, the present work was undertaken to study the morphological measurement of this pest.

MATERIALS AND METHODS

A study on the morphological measurement of mango defoliator *Cricula trifenestrata* were conducted in the laboratory of Department of Entomology, Hajee Mohammad Danesh Science and Technology University (HSTU), Dinajpur during the period of April to July, 2007 at 25 ± 2ºC and 75 ± 5 % RH (at room temperature

and humidity). Male and female moths of *C. trifenestrata* were collected from the mango plant of HSTU, Dinajpur campus. Five pairs of moths consisting of equal sex ratio were released in a small mango tree of HSTU campus and covered with thin net for mating. The adults female were observed regularly at eight hours interval for their oviposition. After mating the female moths laid eggs in rows at the edge of the mango leaves. The eggs were allowed to hatch. Then the newly hatched first instar larvae were carefully collected with the help of a soft camel hair brush and were individually transferred in ten Petridishes (one larva in each Petridis). Medium aged fresh mango leaves (var. Fazlee) were supplied every morning to each Petridis as food and the leaves were renewed at 12 hours interval. Wet cotton was used to keep them fresh. Data were carefully measured the size of eggs, the larvae, pupae, cocoon and the adults. For the measurement of length and breadth of the eggs an oculomicroscope (oculomicrometer) was used. The length and breadth of different larval instars and adult moths are measured with the help of millimeter scale. The experiments were conducted using Completely Randomized Design (CRD) with 10 replications. The data were analyzed statistically.

RESULTS AND DISCUSSION

Egg

The average length of eggs was 2.27 ± 0.15 mm with minimum size of 1.5 mm and maximum size of 3 mm. On the other hand the average breadth of eggs was 1.86 ± 0.12 mm with a minimum and maximum size of 1.1 mm and 2.3 mm, respectively (Table 1). Ahmed and Alam (1994) observed that the eggs were 1.98 mm length and 1.52 mm breadth.

Larva

It was observed that the larvae of *C. trifenestrata* passed through five instars with four moults. The measurment of different instars was given below-

First instar

After hatching, the soft bodied larva was light yellow to yellowish brown, which later turned to yellowish red with prominent dark brown head. The thoracic segments were distinct and each segment with a pair of legs and the tiny larva appeared densely clothed with hairs. The abdomen possessed five pairs of prolegs, which were present on the third to the sixth and in the tenth abdominal segments. The results highlighted that the length of the 1st instar larvae measured from 3.5 to 5 with an average of 4.08 ± 0.15 mm and the breadth varied from 1.5 to 3.1 with a mean of 2.17 ± 0.18 mm, respectively (Figure 1). Ahmed and Alam (1994) mentioned that the standard size of the 1st instar larvae was 3.72 mm.

Second instar

The 2nd instar larva came out by leaving the exuviae of the 1st instar larvae. The body of the larva was clothed with tuft of long whitish and short blackish hairs arising from the tubercles. The general body colour of the larvae was combination of bands of red, yellow and black. The length of the 2nd instar larva was 13.2 to 14.5 with an average of 13.90 ± 0.13 mm and the breadth was 4 to 6.2 with a mean of 5.09 ± 0.24 mm, respectively (Figure 1). Ahmed and Alam (1994) pointed out that the average size of the 2nd instar larva was 14.10 mm.

Third instar

At this instar the larva was more active, feed more and increased in size gradually than the two previous instars. The body color of the larva was reddish yellow with a blackish red head. There was a dense growth of softer whitish hairs, arising irregularly from the mid-dorsnl area and the sides of each segment. Legs and prolegs were brick red in colour. Ventral side of each segment was red.

The length of the 3rd instar larva was 29.2 to 31.2 with an average of 30.09 ± 0.21 mm**;** the breadth was 6.1 to 8.1 with a mean of 7.23 ± 0.20 mm, respectively (Figure 1). Huq *et al.* (1991) mentioned that the average size of the 3rd larval instar was 29.2 mm.

Fourth instar

After third moulting, the 4th instar larvae came out of the exuviae of the 3rd instar larvae. The 4th instar larvae were similar to 3rd instar in color but they differ in size and shape as well. In this instar the larvae seemed to be full grown lepidopterous larvae as their size became remarkably large and fed more voraciously.

The body length of the 4th instar larva was 60.2 to 63.5 mm with an average of 61.37 ± 0.33 mm**;** the breadth was 10.1 to 12.3 mm with an average of 11.22 ± 0.22 mm (Figure 1). Huq *et al.* (1991) cited that the average size of the 4th instar larvae was 50.5 mm.

Fifth instar

The full grown fifth instar larva was elongate, cylindrical and robust. The thorax and abdomen were brilliantly coloured by symmetrically arranged transverse alternating bands of black, yellow and red on the dorsal side of each segment.

The results pointed out that the body length of the 5th instar larva was 80.5 to 82.8 mm with an average of 81.49 ± 0.23 mm; breadth was measured 14.5 to 16.4 mm with an average of 15.51 ± 0.21 mm, respectively (Figure 1). Huq *et al.* (1991) mentioned that the average size of the 5th instar larva was 78.2 mm

Pre-pupa

At the beginning of the pre-pupal period, the larva stopped feeding became less active and did not move fast, and selected a hiding place such as surface of the leaves or stems or petridishes for pupation. The caterpillar made a golden silken cocoon with the help of secretion in which the larval transformation took place.

Pupa

The pupa was the ultimate transformation of pre-pupa and a non feeding stage. It was obtect form with a robust body and a gradually tapering abdomen. The body colour was chestnut brown. The female pupa was longer and wider than male.

The length of male pupa was 30.3 to 34 mm with an average of 31.64 ± 0.37 mm and the breadth was 9.1 to 12.5 mm with an average of 10.61 ± 0.31 mm, while the length of female pupa was varied from 34.2 to 38.1 with an average of 35.57 ± 0.40 mm and the breadth was 11.1 to 14.2 with an average of 12.58 ± 0.31 mm, respectively (Table 1). Huq *et al.* (1991) experienced that the length and breadth of male and female pupae were 29.5, 34.2 mm and 11.8, 14.1 mm, respectively.

Cocoon

The length of male cocoon was measured 40.5 to 45.3 with an average of 41.98 ± 0.55 mm and breadth was 10.7 to 14.3 mm with an average of 12.31 ± 0.29 mm, while the length of female cocoon was 48.5 to 53.3 mm with an average of 50.89 ± 0.43 mm and the breadth was 14.3 to 18.2 mm with an average of 16.22 ± 0.31 mm, respectively (Table 1).

Moth

The moths are nocturnal and they are yellowish or reddish in colour. The male possesses two dark spots on the forewing; the smaller one is anterior to the oblique line, and the larger one to just below the anterior margin. The females had 3 large irregularly transparent spots on the forewings and a single one on the hind wing. Near the base of forewings a dark wavy line appeared. Head, thorax, abdomen and appendages of the moth was covered with scales, which were yellowish brown. The bi-pectinate antennae were long with indefinite number of segments. The antenna of male was broader than that of female. The female moth was larger than male in size, and the last abdominal segments of female were broader than that of the male.

The results clarified that the longevity of male moth was 1 to 5 days with an average of 2.90 ± 0.38 days while the longevity of female moth was 3 to 7 days with an average of 4.20 ± 0.42 days, respectively .The average total longevity of moth was 3.55 ± 0.40 days. Yadav and Kumar (2003) observed as the longevity of male and female moth was 4.08 ± 0.64 and 5.60 ± 0.87 days, respectively.

The length of male moth was 21 to 24.2 with an average of 22.35 ± 0.31 mm and breadth was 31 to 33.4 mm with an average of 32.02 ± 0.28 mm, while the length of female moth was 31.10 to 34.20 mm with an average of 32.48 ± 0.34 mm and the breadth was 72.10 to 76.20 mm with an average of 74.14 ± 0.36 mm, respectively (Table 1). Huq *et al.* (1991) experienced that the length and breadth of male moth were 32.10 and 17.70 mm whereas female moth were 40.00 and 80.70 mm, respectively.

Table 1. Numerical data of morphological measurement of different stages of mango defoliator

Life stages	No. measured	Length (Mean ± SE) mm	Breadth (Mean ± SE) mm
Egg	10	2.27 ± 0.15	1.86 ± 0.12
Pupa			
Male	10	31.64 ± 0.37	10.61 ± 0.31
Female	10	35.57 ± 0.40	12.58 ± 0.31
Cocoon			
Male	10	41.98 ± 0.55	12.31 ± 0.29
Female	10	50.89 ± 0.43	16.22 ± 0.31
Moth			
Male	10	22.35 ± 0.31	32.02 ± 0.28
Female	10	32.48 ± 0.34	74.14 ± 0.36

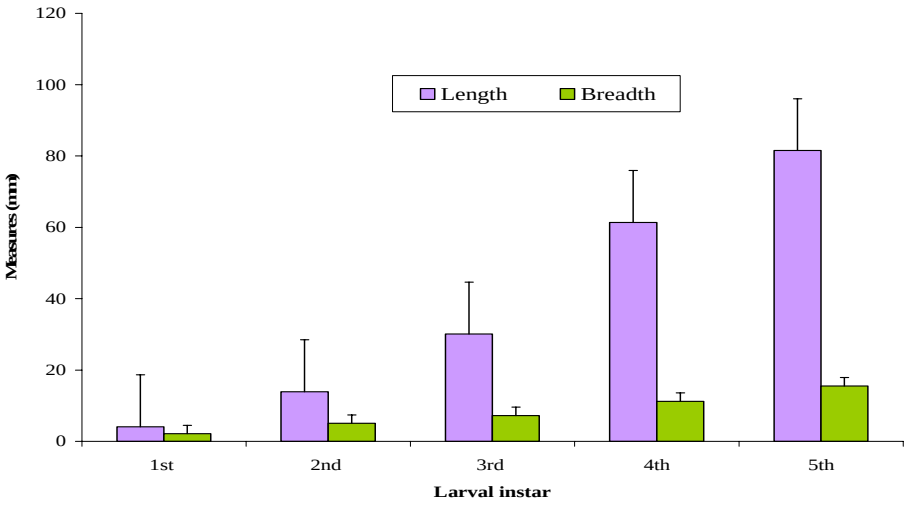

Figure 1. Graphical representation of the data of morphological measurements of different larval instars (mean ± SE) of *C. trifenestrata*

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