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**MORPHOMETRIC MEASUREMENT OF CABBAGE BUTTERFLY
PIERIS BRASSICAE LINN (LEPIDOPTERA: PIERIDAE) IN THE AGRO-
ECOSYSTEM OF MANIPUR**

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ABSTRACT

A study was conducted in the laboratory of Entomology, D.M. College of Science, Imphal during 2008-2009 at $25 \pm 2^{\circ}\text{C}$ and $75 \pm 5\%$ relative humidity to study the morphological measurement of cabbage butterfly, *Pieris brassicae* Linn. The results of morphometric measurement reveal that the average length and breadth of eggs were 1.06 ± 0.04 and $0.86 \pm 0.04\text{mm}$ respectively. The mean length and breadth of first, second, third, fourth and fifth instar larvae were 4.4 ± 1.2 , 12.3 ± 0.38 , 15.9 ± 1.07 , 27.6 ± 2.47 , $39.74 \pm 1.98\text{mm}$ and 0.86 ± 0.04 , 0.76 ± 0.04 , 1.24 ± 0.02 , 1.7 ± 0.09 , 2.74 ± 0.25 , $4.12 \pm 0.22\text{mm}$ respectively. The average length and breadth of pupa were 24.36 ± 1.3 and $8.42 \pm 0.20\text{mm}$ whereas the length and wing expansion of male and female butterflies were $20.7 \pm 0.41\text{mm}$ and 59.98 ± 0.47 and $24.98 \pm 0.19\text{mm}$ and $70.16 \pm 0.06\text{mm}$ respectively.

Key words: Morphometric Measurement, Cabbage Butterfly and *Pieris Brassicae*

INTRODUCTION

Among the vegetables, cabbage and cauliflower were taken to be the most delicious items of foods for human beings. These have a peculiar taste which is like by all sections of the people. These have a good source of vitamin A, B, C, protein, carbohydrate, fat, minerals, etc. Over and above, these are the vegetables of winter season. In Manipur there are no homestead land without growing cabbage and cauliflower. These played an important role in family economy. But such nutritious and inevitably important vegetables were facing from insect pest incidence. The insect pests commonly found in Manipur were cabbage butterflies viz., *Pieris brassicae*, *P. canidia*, *P. rapae*, *P. napi* and *P. daplidice*. The incidence of *P. brassicae* were found to be very high in Manipur. The cabbage cultivation was damaged by varieties of insects (Sachan et al., 1975). Out of which the cabbage butterflies were regarded as serious pest. Many researchers such as Chandra and Lal (1975), Devi (2003), Rataul (1959) etc., studied on the biology of the cabbage butterfly, *Pieris brassicae*. But no such study were taken up anywhere by any workers. Therefore, it was felt necessary to make a depth study of the incidence, bionomics and morphometric measurements of this pest to adopt certain control measures using eco-friendly insecticides.

MATERIALS AND METHODS

A study on the morphometric measurements of the cabbage butterfly, *P. brassicae* was conducted in the laboratory of Entomology, D.M. College of Science, Imphal during the period of October-February 2008 and 2009 at $25 \pm 2^{\circ}\text{C}$ and $75 \pm 5\%$ RH. The male and female adult cabbage butterflies were collected from the cabbage field of Lilong, Thoubal district. Five pairs of butterflies consisting of equal sex ratio was released in the potted plants in the laboratory and covered with thin net for mating. The adult females were observed regularly at eight hour interval for their oviposition. After mating the female butterflies laid eggs in cluster on the ventral side of the cabbage 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 five petridishes, one in each petridish. The cabbage leaves were supplied to each petridish as food and the leaves were renewed at 12 hours interval. Wet cotton was used to keep

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them fresh. The data were carefully measured the size of eggs, larvae, pupae and adults. For the measurement of length and breadth of the eggs an oculomicrometer were used. The experiment was conducted using completely randomized design with 5 replications. The data were analysed statistically.

RESULTS AND DISCUSSION

Egg: The average length of eggs was 1.06 ± 0.04 mm with minimum size of 1.0mm and maximum size of 1.2 mm. On the other hand the average breadth of the egg was 0.86 ± 0.04 with minimum and maximum size of 0.8-1.0mm respectively (Table 1).

Larva: It was observed that the larvae of *Pieris brassicae* passed through five stages or instars with four moultings. The morphometrics of different stages was given below:

First instar: After hatching the soft bodied larva was light yellowish in colour with prominent 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 abdominal segments possessed prolegs. The length of the first instar larvae measured from 2.0-5.0mm with an average 4.4 ± 1.2 mm and the breadth varied from 0.5-1.0mm with a mean of 0.76 ± 0.05 mm respectively (Table 1).

Second instar: The second instar larva came out by leaving the exuviae of the first instar larva. The body of the larva was clothed with blackish hair arising from the tubercles. The length of the second instar larva was 11.0-13.0mm with an average of 12.3 ± 0.38 mm and breadth was 1.2-1.3mm with a mean of 1.24 ± 0.02 mm respectively (Table 1).

Third instar: At this instar the larva was more active, feed voraciously and increased in size gradually than the two previous instars. The general body colour was in combination of yellowish with black dots. The length of the third instar larva was 14.0-20.0mm with an average of 15.9 ± 0.07 mm, the breadth was 1.5-2.0mm with an average of 1.70 ± 0.09 mm respectively (Table 1).

Fourth instar: After the third moulting the fourth instar larvae came out of the exuviae of the third instar larvae. The fourth instar larvae were similar to third instar in colour but they differed 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 fourth instar larva was 20.0-35.0mm with an average 27.6 ± 2.47 mm; the breadth was 2.0-3.5mm with an average of 2.74 ± 0.25 mm (Table 1).

Fifth instar: The full grown fifth instar larva was elongate, cylindrical and robust. The thorax and abdomen were brilliantly coloured. The results pointed out that the body length of the fifth instar was 35.5-39.2mm with an average of 39.74 ± 1.98 mm; breadth was measured 3.8-5.0mm with an average 4.12 ± 0.22 mm respectively (Table 1).

Table 1: Morphometric measurement of different stages of cabbage butterfly, *Pieris brassicae* Linn

Life stages	No. of insect measured	Length (mean \pm S.E.)mm	Breadth (Mean \pm S.E.)mm
Egg	5	1.06 ± 0.04	0.86 ± 0.04
1st Instar larva	5	4.4 ± 1.20	0.76 ± 0.05
2nd Instar larva	5	12.3 ± 0.38	1.24 ± 0.02
3rd Instar larva	5	15.9 ± 1.07	1.70 ± 0.09
4th Instar larva	5	27.6 ± 2.47	2.74 ± 0.25
5th Instar larva	5	39.74 ± 1.98	4.12 ± 0.22
Pupa	5	24.36 ± 1.31	8.42 ± 0.18
Adult			Wing expansion
Male	5	20.7 ± 0.41	59.98 ± 0.47
Female	5	24.98 ± 0.19	70.16 ± 0.06

Pupa: The pupa was the non feeding stage. It was chrysalis with yellow, gray, green and speckled brown. A sharply angled, keel like projection was evident dorsally on the thorax and dorso -laterally on each side

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if the abdomen. The chrysalis was anchored by the tip of the abdomen to the silk pad and a strand of silk is loosely spun around the thorax. The length of pupa was 20.2-28.1mm with an average of 24.36 ± 1.31 mm and the breadth was 8.0-9.0mm with an average of 8.42 ± 0.18 mm respectively (Table 1).

Adult: The butterflies are diurnal and they are pale white in colour. The female possessed two black spots on the fore wing and one black spot on the hind wing. The male have no such spots on both the wings. The body of the butterflies was covered with dense hair. The length of male butterflies was 20.2-21.2mm with an average of 20.7 ± 0.41 mm and wing expansion was 58.3-61.2mm with an average of 52.98 ± 0.47 mm while the length of female was 24.5-25.2mm with an average of 24.98 ± 0.19 mm and the wing expansion was 70.1-70.3mm with an average of 70.16 ± 0.06 mm respectively. No literature was found to discuss with the present finding of the study. The management of the pest is now of great importance to the farmers of Manipur. Before starting suitable control measures detailed information regarding the biology, leaf consumption behavior of the larvae was highly essential but the review of this line was very limited. Moreover the study of morphology provides information about the amount of insecticide, type of insecticide and method of spray. On the other hand the environmental conditions of Manipur are quite different from other parts of the country. Therefore, the present work was undertaken to study the morphometric measurement of this pest.

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