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Biochemical studies on normal and flacherie diseased mulberry silk worm (*Bombyx mori .L)*

P. Natarajan[1*], R. Jenni, R. Athiyaman & Oviya[2]

[1] Unit of Entomology, Dept. of Zoology & Biotechnology, AVVM Sri Pushpam College (Autonomous) Poondi- 613 503. India.

[2] Dept. of Bio-Technology, Periyar Maniammai University, Vallam Thanjavur. India

Abstract

A comparative study of biochemical estimations on flacherie diseased and normal silkworm *(Bomby mori.L)* was carried out. Samples of tissues viz. body tissue of flacherie diseased fifth instar larvae and normal tissue were used for this present study. The total body weight of fifth instar larvae, cocoon, pupa and shell were lower in the diseased than the normal larvae. The carbohydrate, protein and lipuid levels in the body tissue of the diseased larvae were less when compared to that of normal larvae.

INTRODUCTION

Sericulture has been one of the main branches of agriculture in Asiatic countries for more than hundred years. Silk has been under the use by human being for various purposes since time immemorial. Due to this great value and usefulness, there have been many attempts in various parts of the world for the large scale production of silk. One of the methods was the rearing of silkworm on large scale with great care in natural and collected condition.

The mulberry silk moth, *Bombyx mori L.* belonging to the family Bombycidae is used by the silk industry. Adult moth is cream in colour, about 2.5cm long and sluggish. It lives for two or three days only. Each female moth lays about 300 to 400 brownish white seed-like eggs in mass. Hatching takes place at 8 to 12 days; the full-grown caterpillar is elongate, about 5cm long, cylindrical, yellowish white in colour with a small horn. Larval period extends from 28 to 30 days; and total life cycle is completed in 6-8 weeks. A single caterpillar is capable of producing 650 to 1300 meters of silk thread (Goswami, *et al.,* 2006)

The success of sericulture industry depends upon two important aspects. *viz.,* superior breeds of silk worm and better understanding of diseases with special reference to preventive and control measures. Although sericulture has been practiced in India for nearly two thousand years, there are few reports about different diseases prevailing in various sericulture tracts of India (Chitra *et al.,* 1975). The major disease of silk worm are i). Pebrine (microsporidia) ii. Nuclear Polyhedrosis and cytoplasmic polyhedrosis (viral), iii. Flacherie (bacterial) and iv. Murcardine (Fungal). The diseases appear to take their toll depending upon the season, locality and the race of silkworm (Yokayoma, 1962). Several authors have studied the rate of spread of infection flacherie (Ishikawa and miyajima, 1964), and bacterial flacherie (Samson, 1987) in healthy silkworm population.

Since, the mulberry silkworm is a domesticated variety of silk worm, it is susceptible to disease and attack by pest and parasites. Silkworm rearing is continuous in tropical areas and seasonal in subtropical and temperate zones. Silkworm researches are carried out for preventing and controlling silkworm disease and pests in order to successfully gain commercial cocoon crops. The present work deals with the quantitative bio-chemical ie., carbohydrate, protein and lipid estimation of normal and flacherie diseased silk worms in order to understand the effects of the disease.

Material and Methods:

For the present study, the eggs of *Bombyx mori* were collected from sericulture training Institute, Thanjavur. As an essential prelude to this study, the rearing condition for the larvae and mulberry leaves (MR_2 variety) for feeding were standardized by rearing three consecutive larval forms. The chronology of development for this race of *Bombyx mori* has already been determined. Fresh mulberry leaves of MR_2 variety were collected every day in the morning and stored in wet gunny bags and were fed four times a day (6.00, 11.00, 16.00 and 22.00 hrs). Bedding and spacing were adopted carefully at the time of rearing. (Krishnaswamy *et al.*,1978). Enough care was taken to maintain the humidity (75-80%) and temperature (25-28°C) throughout the study period.

In *Bombyx mori,* of the total consumption of feed during their larval, over 80% are consumed during the final instar; The protein content of haemolymph and fat also too high in final instar. So the present experiments were restricted only to fifth instar larvae.

The level of protein, carbohydrate and lipid were estimated in the body tissue of fifth instar larvae of normal and diseased silk worms.

*Corresponding Author
email: natrajpushpam@gmail.com

RESULTS AND DISCUSSION

The present study was undertaken on the biochemical estimation of normal and flacherie diseased silkworm *Bombyx mori.*

In sericulture, there are different kinds of diseases in silkworm caused by fungi, bacteria, viruses, protozoan, mineral deficiencies and physiological disorders. Among these diseases, silkworm is highly affected by the bacterial disease flacherie.

The normal and flacherie disease larval characters, pupal characters, cocoon characters, carbohydrate, protein and lipid content of the silkworm *Bombyx mori* were recorded.

The symptoms of these diseases are the larva does not feed after molting and its body shrinks. The body of the larva shrinks since it does not feed. In most cases the body becomes black, but sometimes it turns red owing to the presence of *Bacillus prodisionsus* or green because of *Bacillus pyocyanens* mixed propagation or a few bacteria may show some other colour.

The larval weight, cocoon weight, silk gland weight, pupal weight and shell weight were compared with normal and flacherie diseased silkworm and were given in Table-1.

In the flacherie diseased larvae, when compared to the normal larvae, weight, cocoon weight, silk gland weight, pupal weight and shell weight were decreased.

The normal larval weight was 10g whereas that of the diseased was 9g ; Cocoon weight in normal was 1.066mg and in flacherie diseased was 0.80mg. The silk gland weight of normal was 0.511 and that of diseased was 0.475mg. The pupal weight in normal was 0.89mg and that in the diseased was 0.78mg. The shell weight of normal was 0.171mg and that of diseased silkworm was 0.102mg.

The results of the biochemical studies of normal silkworm and flacherie diseased silkworm are presented in Table-2.

The carbohydrate, protein and lipid levels of the body tissue of the diseased larvae were decreased when compared to that of the normal larvae. Similar results were observed in *Euproctis fraternal* (Durairasu 1987)and in *Anaphelis stephensis* (Revanasiddaiah and Rathnagiri, 1982).

The larval weight, cocoon weight, pupal weight, shell weight and silk gland weight of fifth instar larvae of normal silkworm and flacherie diseased silkworm *Bombyx mori L*

Tab.1.

Content	Larval weight (g)	Cocoon weight (mg)	Pupal weight (mg)	Shell weight (mg)	Silk gland weight (mg)
Normal Larvae	10	1.066	0.89	0.171	0.511
Flacherrie Diseased Larvae	9	0.88	0.78	0.10	0.475

Carbohydrate, Protein, and Lipid levels of the body tissue of normal and flacherie disease infected fifth instar larvae of *Bombyx mori L*

Tab.2

S.No.	Content	Carbohydrate Level (mg/g)	Protein Level (mg/g)	Lipid level (mg/g)
1.	Normal Larva	58	63.2	62.10
2.	Flacherie diseased Larva	43	43.04	32.02

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Plate 1

Fig. a

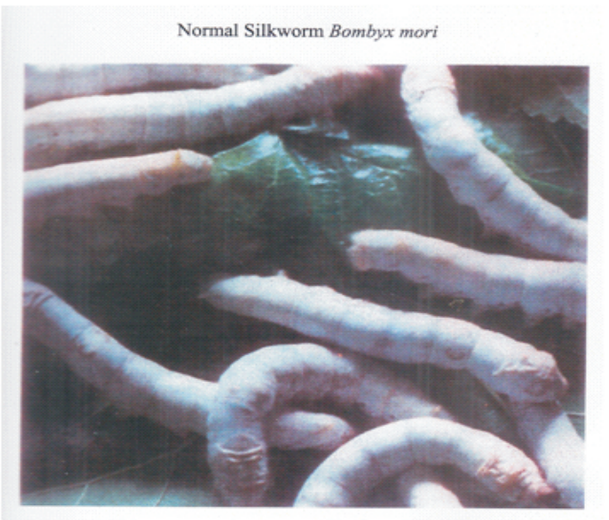

Fig. b

Fig. c

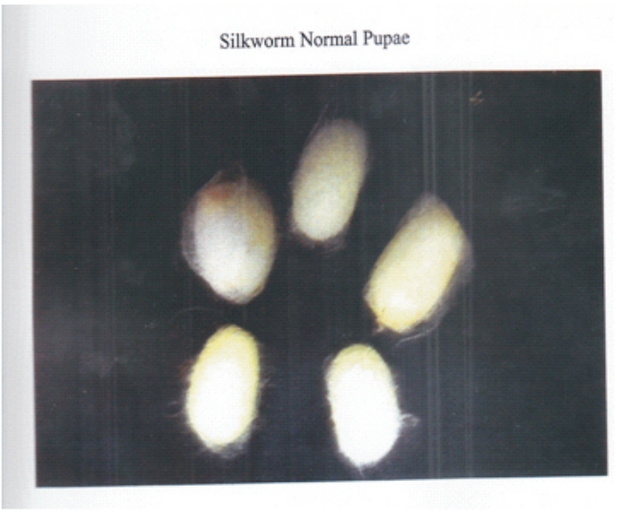

Fig. d