

# Estimation of Protein of Silk gland of *Philosamia ricini* reared in two food plants *Ricinus communis* and *Heteropanax fragrans* in two seasons

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## ABSTRACT

Biochemical analysis of Protein content of the silk gland of *Philosamia ricini* reared in two food plants *Ricinus communis* and *Heteropanax fragrans* during its fourth and fifth instar. It was found that protein content was higher in the silk gland of *Ricinus communis* fed silkworm than *Heteropanax fragrans*. fed silkworm in the 4<sup>th</sup> instar. However in the 5<sup>th</sup> instar 5<sup>th</sup> and 6<sup>th</sup> day *Heteropanax fragrans* fed *Philosamia ricini* showed more protein content than *Ricinus, communis* fed ones. The protein content was higher for both food plants during spring summer than winter.

**Keywords:** *Philosamia ricini*, *Ricinus communis* *Heteropanax fragrans*, silk gland, protein

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## 1. Introduction

The silk gland of silkworm is an organ where silk proteins get synthesized. They are modified salivary gland of the silkworm. The silk is made up of fibroin and sericin, Fibroin is an insoluble protein having large complex proteins, Sericin is a natural macromolecular protein which helps in binding the fibroin threads. Among all other growth ingredients protein is one of the most essential and chief growth factors which is correlated with the growth and development of the silkworm. The synthesis of silk protein during the growth of the silkworm larva was studied by A Noguchi et al (1978). The protein biosynthesis in silk gland have been shown to be influenced by photoperiod (Kerkut and Gilbert, 1985). In this study protein content of the silk gland was recorded high in the 4th day 4th instar of larvae reared in *Ricinus communis* however in the 5th and 6<sup>th</sup> day of 5th instar larvae reared in *Heteropanax fragrans* demonstrated very high protein content than castor fed larvae

### 1.1. Food plants

The primary food plant of *Philosamia ricini* is *Ricinus communis* (Castor) but being a voracious eater during scarcity of food they are fed in alternative food like *Heteropanax fragrans* (kesseru), *Manihot utilisima* (Tapioca), etc. All the silk producing insects show a great diversity of food habits preferring one kind of food over another. The insects of almost all groups are found to host specific but there are great many varieties which they consume (Brues, 1946). Studies on quantitative aspect of nutrition of any insect are very much essential for better understanding of the insect-plant relationship (Bhattacharya and Pant, 1976). The nutritional composition of plant tissues strongly influences the performance parameters, such as growth, development, survival and reproduction

associated with healthy condition of the larvae of phytophagous insects (Slansky and Scriber, 1985)

## 2. Materials and method

### Silk Gland:

- Experimental Procedure: Tissue homogenate of silk gland is prepared with equal volume of 10 per cent trichloroacetic acid which is added to precipitate the protein, and then kept at a low temperature of 10°C-15°C for about 30 minutes. It is then centrifuged at 6200 rpm and the residue is dissolved in required (appropriate) volume of 0.1N NaOH to dissolve the precipitate protein and then used for protein estimation
- Total soluble protein: Estimation of Protein was done by Folin - ciocalteau's method as modified by Lowry

### Reagents:

- Bovine-Serum Albumin (BSA) [Stock Solution] 5 gm BSA dissolved in 10ml of 0.1N NaOH Working standard 50µg BSA/1 ml 1 mm of stock solution diluted to 10 ml with 0.1N NaOH.
- Sodium hydroxide (0.1 N)- 0.4 g sodium hydroxide dissolved in 100 ml distilled water
- 2% Sodium carbonate (Solution A) 2 gm sodium carbonate dissolved in 100 ml sodium hydroxide (0.1 N).
- 0.5% Copper sulphate in 1% potassium sodium tartarate (Solution B):  
1 gm potassium sodium tartarate dissolved in 100 ml distilled water. 0.5 g copper sulphate added to the solution (Solution C)

To 100 ml solution A, 2 ml of solution B is added Folin-phenol reagent Folin-phenol reagent (2N) diluted with distilled water (1:1).

- Estimation of protein:

Suitable aliquots were pipetted out in a series of tubes and the volume made up to 1 ml with 0.1N Sodium hydroxide. To each tube 5 ml of solution C was added, mixed well and allowed to stand at room temperature for 10 minutes. Folin phenol reagent (0.5 ml) was added to each tube, the contents mixed well and allowed to stand for 30 minutes at room temperature. The color developed was measured at 650 nm. A reagent blank and standard solution of protein was also run simultaneously

## 3. Result

Table-1- Protein (mg/gm wet weight) in the silk gland of castor and Kesseru fed Eri silkworm (*Philosamia ricini*) in two seasons.

	4 <sup>th</sup> instar(C)	4 <sup>th</sup> instar(K)	5 <sup>th</sup> Instar (C)		5 <sup>th</sup> Instar (K)	
	4 <sup>th</sup> day	4 <sup>th</sup> day	5 <sup>th</sup> day	6 <sup>th</sup> day	5 <sup>th</sup> day	6 <sup>th</sup> day
Spring summer	28.85 ±0.89	19.84 ±1.98	17.86 ±0.77	10.62 ±0.78	48.44 ±1.88	23.24 ±1.32
Winter	24.44 ±0.55	14.00 ±1.43	15.78 ±1.29	9.034 ±0.42	34.28 ±1.53	20.21 ±1.12

Each value corresponds to mean ± S.D. (N = 5)

## 4. Discussion

Protein content in the Silk of 4<sup>th</sup> and 5<sup>th</sup> instar of castor fed and kesseru fed larvae of *Philosamia ricini* during spring summer and winter:

- (i) The protein content in the silk gland increased from the 4<sup>th</sup> day of 4<sup>th</sup> instar to the 5<sup>th</sup> day of 5<sup>th</sup> instar (Table-1) in both castor and kesseru fed larvae and then decreased on the 6<sup>th</sup> day.
- (ii) However, the difference in elevation from 4<sup>th</sup> day of 4<sup>th</sup> instar to 5<sup>th</sup> day of 5<sup>th</sup> instar in kesseru fed larvae is very high in castor fed larvae the protein content was high in the 4<sup>th</sup> day of 4<sup>th</sup> instar, but the 5<sup>th</sup> and 6<sup>th</sup> day of 5<sup>th</sup> instar kesseru fed larvae recorded high protein content
- (iii) Winter recorded a lower protein content than spring-summer.

## 5. Conclusion

The protein content in the silk gland of 4<sup>th</sup> day of 4<sup>th</sup> instar was found to be high in castor fed larvae compared to kesseru fed larvae. However, in the 5<sup>th</sup> and 6<sup>th</sup> day of 5<sup>th</sup> instar, silk gland of kesseru fed larvae demonstrated high protein content than castor fed larvae. Spring-summer demonstrated higher protein content in the silk gland of both Castor fed and Kesseru fed larvae.

The protein content in the silk gland of both Castor and kesseru fed larvae during winter is found to be less than that of spring summer. As mentioned earlier protein biosynthesis in silk gland is influenced by photoperiod. Higher photoperiod during Summer

induces higher protein biosynthesis and low photoperiod during winter induce lower protein biosynthesis (Kerkut and Gilbert, 1985). Dhinkar et al, (1991) reported that high percentage of humidity in the atmosphere with low photoperiod and cool temperature seems to generate favorable activities for silk gland. In contrast, high photoperiod, and hot temperature with low humidity seems to generate unfavorable conditions for the activities of silk gland. Thus, Spring-Summer seems to be ideal for silk-protein synthesis. The amount of protein in the silk gland was found to increase commiserating with the developmental age of different silk worms.

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