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Studies on Lipids Content in the Healthy Full Grown Larval Haemolymph, Silkglands and Food Leaves of *Antheraea proylei* Jolly (Saturniidae: Lepidoptera)

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ABSTRACT: The estimation of lipids content in the healthy full grown larval haemolymph, silkglands and food leaves of *Antheraea proylei* Jolly was determined by extraction with chloroform and methanol following a standard method. The lipids content in the larval haemolymph varies from 65.69 to 67.21 mg/ml with a mean value of 66.54 ± 0.151 and 0.1430 to 0.1436 mg/mg fresh weight with a mean value of 0.1433 ± 0.00006 in the silkglands. While the lipids content in the food leaves *(Quercus serrata)* ranges from 0.0232 to 0.0264 mg/mg dry weight with a mean value of 0.0249 ± 0.00038. The multiple correlation co-efficient of silkglands on haemolymph and food leaves was found to be R^2 = 72.0% and significant at 5% level.

Key words: Lipids, Haemolymph, Silkglands, Food leaves, *A. proylei*

Introduction

The Oak tasar silkworm, *Antheraea proylei* Jolly is an economically important insect. It feeds on the leaves of *Quercus serrata* Thumb (Oak) and was endemic to Manipur. In order to procure healthy cocoons and better yield, they need proper care, healthy appropriate quality of the food leaves and understanding of certain aspects of digestive physiology and feeding habits in correlation with their food leaves. Lipids have an important role in cellular structures, energy storage transport and metabolic control. Lipids are the main source of energy for several physiological processes viz., embryogenesis, metamorphosis and reproduction (Gilbert, 1967; Pant, 1984). According to Gupta and Pathak, 1984, the fifth instar mature (spinning) larva contains the highest amount of lipids. Lipids content in the body of silkworms like *Antheraea mylitta, A.assama, Bombyx mori* and *Philosamia ricini* as well as in the silkglands of *B.mori* have already been reported by many workers (Goel et al. 1988; Dhinakar et al. 1991; Sarma et al. 1994; Khanikor, 1999) and many others in different insects. However, estimation of the lipids content in *Antheraea proylei* larval haemolymph and silkglands has not been worked out so far. The present study, therefore, aims with the determination of the lipids content in the haemolymph, silkglands and food leaves of this oak tasar silkworm. The results of the present study are reported in this paper.

Material and Methods

The experimental insect, full grown (fifth instar) mature larvae of *Antheraea proylei* and food leaves were collected from the Regional Tasar Research Station, Mantripukhri. The haemolymph as well as extract of silkglands were prepared as quickly as possible when they were still alive.The estimation of lipids content was determined by extraction with chloroform, methanol following the method of Folch et al. 1957.

Results and Discussion

The results on lipids content in the larval haemolymph, silkglands and food leaves are given in the Table-1.The present observations revealed that lipids content in the haemolymph of mature *A.proylei* larvae varies from 65.69 to 67.21 mg/ml with a mean value of 66.54± 0.151. The results obtained in the present investigations are in agreement with those reported by Sarma et al. 1994, who studied the lipid content in *Bombyx mori* larvae (71.680±1.277 mg/ml). Lipids content was found to vary from 0.1430 to 0.1436 mg/mg fresh weight in silkglands of *Antheraea proylei* larvae with a mean value of 0.1433±0.00006. The present studies were carried out during spring crop season (March –April) during which the rearing for first group of oak tasar silkworm was undertaken. The lipids content of the silkglands was higher in spring larvae than the autumn larvae. This seems to have influenced the biosynthesis activities of the tissues and hence the rate of spinning. This may probably the reason that spring crop in present case gives that better harvest. Almost similar observations were made by Dhinakar et al. 1991, who also studied seasonal changes in the composition of silkglands in *Bombyx mori*. In view of these results, it suggests that higher percentage of humidity in the atmosphere with low photoperiod and cool temperature seems to generate favorable activities for the silkglands. In contrast, higher photoperiod and higher temperature with low humidity seem to generate unfavourable conditions for the activity of silkglands in oak tasar silkworms. The lipids content in the food leaves of *A. Proylei* was found to be in the range of 0.232 - 0.264 mg/mg dry weight with a mean value of 0.0249 ± 0.00038. The data recorded in the present study was in aggrement with the results reported by Pandey and Goel,1991.

Table 1. Changes in lipids content of the haemolymph, silkglands and food leaves of full grown *A. proylei*

No of observations	Haemolymph(C_1) mg/ml	Silkglands (C_2) mg/mg fresh weight	Food leaves(C_3) mg/mg dry weight
1	66.73	0.1433	0.0240
2	66.80	0.1436	0.0264
3	65.69	0.1430	0.0256
4	66.71	0.1433	0.0253
5	66.39	0.1432	0.232
6	67.09	0.1433	0.0263
7	66.34	0.1431	0.0235
8	66.50	0.1433	0.0250
9	67.21	0.1435	0.0259
10	65.93	0.1431	0.0238
Range	65.69-67.21	0.1430- 0.1436	0.0232-0.0264
Mean	66.539	0.1433	0.0249
S.E.	±0.151	± 0.00006	±0.00038

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Correlation between the lipids content of larval haemolymph, silkglands and food leaves

Multiple regression of silkglands on haemolymph and food leaves

The regression equation is $C_2 = 0.124 + 0.000273\ C_1 + 0.0372\ C_3$

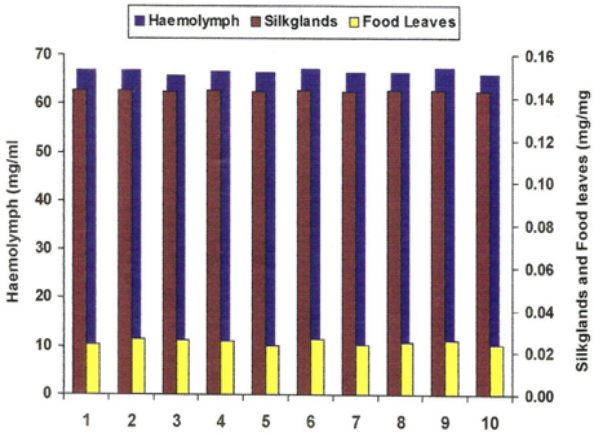
Multiple correlation coefficient of silkglands on haemolymph and food leaves is $R^2=72.0\%$

Analysis of variance for the data of table-1

Source of variance	Degrees of Freedom(DF)	Sum of square(SS)	Mean Square(MS)	Computed(F)	Percentage(P)
Regression	2	2.16770E-07	1.08385E-07	9.01	0.012
Error	7	8.42318E-08	1.20331E-08		
Total	9	3.01002E-07			

The multiple correlation coefficient of silkglands on haemolymph and food leaves has been found to be $R^2=72.0\%$ which indicates that 72.0% of the variation of silkglands is accounted by haemolymph and food leaves while 28.0% of the variation in the haemolymph is explained by some other factors not considered in the present analysis. The multiple correlation co-efficient is significant at 5% level.

Fig: Graph showing the lipids content in the haemolymph, silkglands, and food leaves of the host plant, Quercus serrata



The lipids content in the haemolymph, silk glands and food leaves of *Antheraea proylei* also showed a correlation. The multiple correlation coefficient of silk glands of haemolymph and food leaves has been found to be $R^2=72.0\%$ of the such variation in silk glands is accounted by both haemolymph and food leaves while remaining 28% of the variation of haemolymph is explained by some other factors not considered in the present analysis. The multiple correlations co-efficient is significant at 5% level. According to Benchamin and Anantharman, 1990, there are direct correlation between mulberry leaf quality and the larval development and growth in *Bombyx mori*. However, Siva Sai and Rao in 1992, also studied the total lipids content in the nematode *Primasubulura alata* parasitic in *Peridicula asiatica* and reported that the difference in the lipids content can be due to difference in diet. Hence, there appears to exist a relationship between lipids content of parasitic and nutrient content in its environment and also reported that the lipids content varies from species to species and in some cases within the species.

Conclusion

The study thus, revealed that almost all the investigated physiological parameters depend entirely on the food leaves which ultimately influence the haemolymph and silkgalnds and all these ultimately help this silkworm in producing healthy cocoons.

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