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Analysis of Protein and moisture content of two food plants of *Philosamia ricini* (Erisilkworm), Castor (*Ricinus communis*) and Kesseru (*Heteropanax fragrans*) during different seasons

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ABSTRACT

Biochemical analysis of Protein and moisture content of the leaves of both the food plants of *Philosamia ricini* (Erisilkworm), *Ricinus communis* and *Heteropanax fragrans* where conducted in three seasons using three types of leaves tender, medium and matured. It was found that protein content was higher in *Ricinus communis* than *Heteropanax fragrans. But moisture content was found to be higher in* The moisture content in this study was found higher in the matured leaves of *Ricinus communis* whereas *Heteropanax fragrans* recorded high moisture content in tender and medium leaves. Winter season recorded low moisture content in both the food plants. The difference in the moisture content of *Ricinus communis* during Spring Summer and Winter was more pronounced in comparison to *Heteropanax fragrans*, where Spring-Summer and Rainy season exhibited almost equal moisture content.

1. Introduction

Silkworms are one of the most important, valuable and useful group of insects with significant economic value. India has the unique distinction of being the only country in the world producing all the four varieties of silk namely, Eri, Muga, Mulberry and Tassar. As a whole Sericulture is considered as one of the largest and very important cottage industry India, as it generate employment opportunities for the rural and the weaker sections of people. Assam, a north eastern state of India is the largest producer of Muga and Eri silk in the country. Ericulture in the north eastern region of India occupies a unique position in the socioeconomic life of the people. It is widespread particularly in this region on account of favorable climatic condition that have aided in the growth of different varieties of food plants in sufficient amount The cultural operations of the erisilkworm is comparatively easier and cheaper than the other sericultural practices because of its resistance to diseases and availability of host plants as well as efficient in-door rearing methods. Though eri culture is less remunerative occupation compared to the production of other silks, it has its own advantages. They require comparatively less care as they are neither as wild as 'Muga' and 'tassar' silkworm, nor so much domesticated as mulberry silkworm. The silkworm feeds primarily on castor (*Ricinnus communis*) and its secondary host plant is Kesseru (*Heteropanax fragrans*).

1.1. Food plants

Though the rearers of erisilkworm in Assam and other states of north east India mostly use castor leaves, the use of secondary food plants has become a regular practice amongst them at the time of scarcity of castor leaves. But in spite of the abundance of secondary food plants both in the hills and plains of the region, they are not being utilized effectively, which may be attributed to the lack of knowledge and hesitation amongst the rearers.

All the silk producing insects show a great diversity of food habits preferring one kind of food over another. Almost all insects are host specific and select/their most preferred food in order to extract the maximum benefit out of it, although most of them eat a great many varieties (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

- Estimation of Plant Protein:

Protein was estimated by Folin-ciocalteau's method as modified by Lowry et al 1951.

- Sample homogenate preparation:

The chlorophyll from leaves was removed and the extract was used for Protein estimation.. Folin-phenol reagent (2 N) diluted with distilled water (1:1). Bovine Serum Albumin (BSA) [Stock Solution] 5 mg BSA dissolved in 10 ml of 0.1N NaOH. working standard (50 mg/1 ml) 1 ml of stock solution diluted to 10 ml with 0.1 N NaOH. Experimental Procedure Suitable aliquots were pipetted out in a series of tubes and the

volume made upto 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 was added (0.5 ml) to each tube, the contents mixed well and allowed to stand for 30 minutess at room temperature. The blue color developed was measured at 650 nm. A reagent blank and standard solution of protein was also run simultaneously.

3. Result

Table-1- Protein content (mg/gm dry weight) in the food plants of eri silkworm in different seasons

	Tender leaves		**Medium leaves**		**Matured leaves**	
	C	K	C	K	C	K
Spring summer	12.400 ±0.44	8.450 ±0.92	10.320 ±0.54	8.120 ±0.62	9.365 ±0.38	7.300 ±0.39
Rainy	11.220 ±0.78	7.760 ±0.38	9.242 ±0.38	7.110 ±0.44	7.835 ±0.35	6.520 ±0.23
Winter	9.670 ±0.48	6.780 ±0.64	7.656 ±0.62	5.924 ±0.48	6.628 ±0.62	5.286 ±0.13

Each value corresponds to mean ± S.D. (N = 5
C- Castor
K- Kesseru

Table-2- Moisture content (percentage dry weight) in the food plants of eri silkworm during different seasons

	Tender leaves		**Medium leaves**		**Matured leaves**	
	C	K	C	K	C	K
Spring summer	69	71	65	70	79	68
Rainy	67	68	68	67	75	65
Winter	52	65	55	64	60	62

4. Discussion

The phytophagous insects utilize plant nutrients for their growth and development and any change in the nutritional quality of the food plant may result in adverse physiological adaptation. The environmental factors also have a direct impact on the food plants in different seasons . High amount of soluble protein and total phenol with higher phenylalanine ammonia lyase activity was observed in good quality leaves and on the other hand poor quality leaves contain lower quantities of soluble protein, total phenols as well as phenylalanine ammonia lyase (Hazarika el al., 1995). The body water content of an insect is directly influenced by dietary water (Scriber and Slansky, 1981). The higher growth in the mature larva of *Antheraea assama* and *Philosamia ricini* are influenced by dietary water and which also plays a decisive role in the selection of food. The protein concentration in *R. communis* was recorded higher than *H. fragrans* in the three seasons. Protein content was high during Spring-Summer than Rainy and Winter for both the food plants.(Table-1) The moisture content in this study was found higher in the matured leaves of *R commmis* whereas *H. fragrans* recorded high moisture content in tender and medium leaves. Winter season recorded low moisture content in both the food plants. The difference in the moisture content of *R communis* during SpringSummer and Winter was more pronounced in comparison to *H. fragrans*, where Spring-Summer and Rainy season exhibited almost equal moisture content (Table 2).

5. Conclusion

Variations were observed between tender and mature leaves. Tender leaves contain higher protein content in both the cases. It is found to be higher in Castor leaves than Kesseru.

The moisture content was demonstrated to be high in the mature leaves of castor and in the tender Kesseru leaves in all the seasons. During winter and rainy season Kesseru leaves reported high moisture content than Castor. Sericulture in India considered as one of the largest and important cottage industry, as it generates employment for the rural and weaker section of people. A systematic study of the silkworm and its food plants are very essential to have an improved variety of silk crop. The biochemical constituents of the food plants present in different concentration play a decisive role in food selection by the silkworm and the quantity of silk produced by the silkworm.

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