

EFFECT OF PRIMARY FOOD PLANTS ON MUGA (*Antherea assamensis*, Helfer)

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ABSTRACT

It is believed that muga culture originated in the Brahmaputra Valley of Assam, India. About 6% of the natural silk produced in the world is obtained from muga (*Antherea assamensis* Helfer). It is sole product of India. Muga food plants are perennial tree and are available in wide range of geographical region in North Eastern part of India. While *Persea bombycina* Kost (Som) and *Litsea monopetala* Roax (Soalu) are predominantly used as the primary food plants for rearing of muga silkworm. The nutritive value of host plants and their seasonal variability are closely related to that of the silk worm (Yokoyama, 1963). The success of muga culture mainly depends on the accessibility of food plants and their leaf nutritional status besides environmental condition during rearing period resulting quantity and quality in terms of pupation or silk content. Importance of these food plants and their preference on muga silkworm rearing is thus mainly characterized by foliar constituents like moisture, nitrogen, protein, minerals, fat, crude fiber, sugar and starch content etc. So quality leaf gives us quality silk. Present investigation showed that during Spring season Muga silkworm fed on Som plants (April-May) showed better results in terms of economic traits Viz. yield (7000 cocoons/100 dfls), better coupling behavior, Average Fecundity (180/layings) and hatching %(>80%), etc. than silk worm fed on Soalu plants. The study reveals that, as per biochemical analysis suggested that Som leaves is more nutritious than Soalu during April-May.

Key Words: Host plant, som ,soalu, rearing, April crop, silk.

INTRODUCTION

The success of Sericulture industry is mainly based on leaf quality and appropriate environmental conditions for silkworm rearing. Food plants leaves are exclusive source of nutrition because of leaf protein converted into silk protein. Sericulture is unique in its vast employment and income generating potentialities. From a mere traditional practice, it has now shaped into a viable agro industry. India is the second largest producers of silk in the world ranking next only to China. Out of the total 35,261MT of Raw Silk produced in India, Muga constitute 0.66 percent (232MT) during 2018-19, According to John Ruskin, "Quality is never an accident; it is always a result of high intentions, sincere efforts, intelligent directions and skillful executions". Production of quality silk is also not an exception. Sericulture in India is an important agro-based cottage industry providing employment to millions in the villages and contributing roughly to 5% of GDP.

The Muga silkworm *Antheraea assamensis* Helfer is essentially semidomesticated, polyphagous and multivoltine survives a large numbers of food plants out of which Som (*Persea bombycina* Kost) and Soalu (*Litsea monopetala* Roxb) are two primary host plants abundantly found and grown in North Eastern part of India. Muga silkworm reared in outdoor and hence naturally susceptible to vagaries of nature and pest and predators besides other factors such as quality of leaves and its nutritional composition.

The growth and development of silkworm larvae and economic characters of cocoons are influenced largely by the nutritional quality of leaves fed. Matsumara *et al.* (1958) reported that out of the various characters responsible for success of crop leaf stood first (38.2%) followed by climate (37%), rearing techniques (9.30%), silkworm race (4.02%), Silkworm eggs (3.10%) and other factors (9.60%) etc. Nearly 70% of the silk protein produced by the silkworm is directly derived from the protein of the host plant leaves (Fukuda *et al.*, 1959). Not only that the nutrition value of host plants and their seasonal variability are closely related to that of the silk worm (Yokoyama,1963) Hence, choice of host plant(s) suitable for healthy growth of silkworm is one of the important factors in sericulture. According to Dutta *et al.*(1997) Som leaves contained total soluble ,total reducing sugar ,crude fibre, is 4.36 +- 0.66%,2.56%,27.18% respectively where in soalu plant it is 4.09 +- 0.66%, 2.33%, 15.49% respectively.

It is clear from the above that som leaf is more viable than soalu leaf during rearing of April crop any other factor may constant in different stages. Quality of leaf is one of the major problems behind the problems of silkworm rearing in tropics (Suranayanana, 1988; Nomani, 1988) and the poor quality of leaf is one of the important factors attributed to the poor productivity of silk per unit area (Nagarajan and Radha, 1990). The quality of leaf varies significantly with the factors such as soil fertility, agronomical practices, planting system, environmental condition (Bongale *et al.*, 1991, Datta, 1992).

Here is an effort is done to comparative studies on rearing performance of muga silkworm on two primary host plants: Som (*Persea bombycina* Kost) and Soalu (*Litsea monopetala* Roxb) with special reference to economic traits. during Spring crop (April-May) in Boko area, Kamrup, Assam. Here some objectives which reflects following points-

- Seasonal variation on rearing performance of *A. assama* with reference to two host plants : Som & Soalu
- Comparative analysis of host plant effect with reference to Som and Soalu growth, life cycle and production parameters of *A. assama* (both cultivated and wild population).

MATERIALS AND METHODS

The present investigation was carried out during 2016-2018 in the April crop at the P2 Farm Dhupguri, Boko, Assam, India (latitude 24°98'N and longitude 91°23'E), with the aim to evaluate the Performances of muga silkworm on two primary host plants: Som and Soalu with special reference to economic traits during Summer crop(April-May) in Boko area, Kamrup, Assam.

The detail methodology adopted during the course of investigation is given below.

Meteorological Condition:

- The rearing was conducted in Spring season i.e. in the month of April –May
- Average temperature & humidity recorded during silkworm rearing in Spring season (April-May) are 26.6°C & 79.9%, respectively.
- Average rainfall recorded during silkworm rearing Spring season is 266.5 mm.

Experimental food plant species :

1. Som (*Persea bombycina* Kost),(S3 & S6 morphotypes)
2. Soalu (*Litsea monopetala* Roxb)

Characteristics of Experimental species- *Antheraea assamensis* Helfer

Treatment-I

Silkworm larvae were reared with Som plant throughout larval duration.

Treatment-II

Silkworm larvae were reared with Soalu plant throughout larval duration.

After completion of the rearing and mounting operation, the cocoons were harvested on eighth day and the parameters such as larval duration, larval weight, effective rate of rearing, single cocoon weight, single shell weight, shell ratio , melting percentage and cocoon yield were recorded,

Following standard formulae are used to calculate various parameters.

$$1. \text{SR}\% = \frac{\text{Shell Weight}}{\text{Green Cocoon Wt.}} \times 100$$

$$\text{Number of melted cocoons} \times 100$$

$$2. \text{Melting \%} = \frac{\text{Number of melted cocoons} \times 100}{\text{Total number of Cocoons}}$$

$$\text{Total number of Cocoons}$$

$$3. \text{Effective Rate of Rearing (ERR)} =$$

$$\frac{\text{Total number of cocoon harvested} \times 100}{\text{Total number of larvae brushed or counted after III}^{\text{rd}} \text{ moult}}$$

$$\text{Total number of larvae brushed or counted after III}^{\text{rd}} \text{ moult}$$

Further Biochemical evaluation of som and soalu leaves (tender, semi mature & mature leaves) like moisture percentage, moisture retention capacity after 6 hours, total soluble sugar and total soluble protein were also assessed .

❖ Moisture percentage was calculated by using the formula,

$$\text{Moisture Percentage} = \frac{(\text{Leaf fresh weight} - \text{Leaf dry weight}) \times 100}{\text{Leaf fresh weight}}$$

❖ Moisture retention capacity after 6 hours was calculated by using the formula,

$$\text{MRC} = \frac{(\text{Wt. of leaves after 6 hour} - \text{leaf dry weight}) \times 100}{(\text{Leaf fresh weight} - \text{Leaf dry weight})}$$

On the other hand total soluble sugar is determined by Dubios *et al.* (1956) and total soluble protein was determined in fresh leaves as described by Lowry *et al.* (1951).

TABLES

Table-1: Biochemical analysis of different variety of som and soalu leaves

Treatment	Leaf moisture (%)	Moisture retention capacity after six hours (%)	Total soluble sugar(mg/gm of fresh leaf)	Total soluble protein (mg /gm of fresh leaf)
Som (T-1)	67.22	85.21	11.68	20.75
Soalu (T-2)	62.95	81.54	11.65	16.78

Table -2 Performance of Treatment-I and Treatment-II on yield and cocoon character of muga on Spring season
(April-May)

Treatment	Average of 10full grown larval weight (gm)	Larval duration (Days)	E.R.R %	Single cocoon Wt (gm.)	Single Shell Weight (gm.)	SR %	Average fecundity (nos)	Hatching %
Som (T-1)	8.95	21	75	4.94	0.49	9.9	184	93
Soalu (T-2)	10.45	22	70	5.1	0.50	9.7	165	91

RESULTS AND DISCUSSION

A) BIOCHEMICAL ANALYSIS OF SOM AND SOALU LEAVES (TABLE-1)

Biochemical analysis of som and soalu suggested that maximum leaf moisture in som i.e (67.22%) , moisture retentions capacity after 6 hours (85.21%) , total soluble sugar (11.68 mg/gm of fresh leaf) and total soluble protein (20.75 mg/gm of fresh leaf) Biochemical analysis suggested that som plant is more nutritious than soalu plant.

B) PERFORMANCES OF MUGA SILKWORM REARING ON SOM & SOALU PLANT DURING SPRING SEASON (April-May) IN BOKO ,ASSAM (TABLE-2)

In case of som plant, the season Spring (April-May) feeding larvae with som leaves showed best performance in terms of larval weight (8.95gm for average of 10 full grown larvae) , single cocoon weight (4.94 gm) , single shell weight (0.49 gm) , SR% (9.9%) ,Average fecundity 184 nos ,Hatching % -93% and cocoon yield (7000 nos/100DFLs) . Effective Rate of Rearing 75% was highest in case of T1 the larval duration was 21 days (Table-2).

On the other hand in case of soalu plant, the season Spring (April-May) feeding larvae with soalu leaves showed (10.45gm for average of 10 full grown larvae) , single cocoon weight (5.1 gm) , single shell weight (0.50 gm) , SR% (9.7%) ,Average fecundity 165 nos ,Hatching 91%and cocoon yield (6000 nos/100DFLs) . Effective Rate of Rearing 70% was recorded in case of T2 the larval duration was 22 days (Table-2).

Present study clearly indicates that feeding with som leaves on spring season (April-May) to silkworms yields better result as compared to feeding silkworm larvae with soalu leaves. Suranayanana, 1988 and Nomani, 1988 told that quality of leaf is one of the major problems behind the problems of silkworm rearing in tropic and according to Nagarajan and Radha, 1990; the poor quality of leaf is one of the important factors attributed to the poor productivity of silk per unit area. Present study clearly reveals that nutritious quality of som leaves is better than soalu leaves which also affects the commercial characters of silkworm (*Antherea assamensis* Helfer). All the commercial characters showed better result when silkworm larvae were feed with som leaves. Present investigation showed that in case of som fed batch average 1000 nos cocoons/100 dfls can be harvested more in comparison to larvae fed with soalu batch .The main reason behind that in spring season (Apri-May) som plant has almost 5% more leaf moisture and 4% more moisture retention capacity than soalu plant.

Waldbauer (1968), Narayanprakash *et al.* (1985), Benchamin and Jolly (1986), Periaswamy (1994), Bongale and Chaluvachari (1995). Rahamathulla *et al.* (2006) highlighted the importance of dietary moisture content and reported that phytophagous insects usually required high water intake for normal development. They have also reported that food utilization, moulting ratio and larval weight were associated with host plant moisture. According to them there is a positive correlation between moisture content of leaf and larva to different variables like growth rate, larval weight, single cocoon weight, single shell weight .Besides that som leaves is having more soluble sugar and soluble Protein than soalu. Kishi (1954) suggested that higher carbohydrate content of the som leaves is favourable for the healthy growth of the silkworm larvae. Qader (1987) also reported that about 70% of the silk protein produced by the silkworm is directly derived from the protein of the leaves.

So it is clear that higher nutritional value of som plant helps to enrich all the commercial characters of silkworm races selected for that experiment.

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