ORIGINAL RESEARCH PAPER

Zoology

KEY WORDS: Eri silkworm, kesseru, rearing performance, seasonal variation.

SEASONAL VARIATION OF THE REARING PERFORMANCE OF ERI SILK WORM, SAMIA RICINI (DONOVAN) ON *KESSERU, HETEROPANAX FRAGRANS* (ROXB.) SEEM

Dhiramani Bhuyan Research Scholar, Department of Zoology, Gauhati University, Assam, India - Corresponding author

Dr. M.C. Sarmah Scientist- D, CMER&TI, Central Silk Board, Lahdoigarh, Jorhat, Assam, India.

Prof. K. Dutta Department of Zoology, Gauhati University, Assam, India. 781014

ABSTRACT

Eri silk, *Samia ricini* (Donovan) is the most popular domesticated silkworm among Vanya silks. It is multivoltine and polyphagous in nature feeding on a number of host plants namely *Castor, Ricinus* communis Linn; Kesseru, *Heteropanax fragrans* (Roxb.) Seem; Tapioca, *Manihot esculanta Crantz;* Payam, *Evodia flaxinifolia* Hook; Borpat, *Ailanthus grandis* Prain; Borkesseru, *Ailanthus excelsa Roxb;* Gulancha, *Plumeria acutifolia* (Poir); and several others (Sarmah, 2004). Among them castor and kesseru is considered as major food plant. It is observed that in the rearers' field condition, performance of eri silkworm rearing using kesseru foliage is not uniform in all the seasons. Hence, an experiment was undertaken to study rearing performance in different seasons. It was observed that autumn season was best in respect of rearing performance followed by spring season. Further, during scarcity of castor leaves during winter season kesseru is considered as suitable food plant for eri silkworm rearing. The rearing performance was compared with castor in all the season and it was observed that ERR% was above 81% in all the seasons and for all the treatment groups. Other two commercial parameters, which are shell weight and shell ratio also, did not differ much amongst the treatment groups. The mean shell weight and shell ratio were 0.38, 0.38, 0.43 and 12.50%, 13%, 13.54% in winter, summer and autumn respectively. Therefore, considering the commercially important parameters it may be concluded that the kesseru can be utilised effectively for eri silkworm rearing during scarcity of castor leaves.

1.Introduction:

Silk is the symbol of elegance and luxury worldwide. Clothing made of silk is adored also in India including Assam since time immemorial. Out of the five commercially utilised silk worm species four are available in Assam. Eri silk, *Samia ricini* (Donovan) is one of them. Eri silk worm is believed to be originated in Assam and its adjoining foot hill areas (Sarmah, 2011). It is mainly cultured in the Brahmaputra valley of Assam generally by the tribal communities living there. This silk is cultured not for luxury but for the production of warm clothing for the winters in this area. The pupa of the silk worm is enjoyed by the rearers as a favourite delicacy. Eri culture needs very minimum infrastructure and investment. It is reared indoors mostly as a part time job by the females of the tribal communities. Therefore this silk is also known as 'poor man's silk' (Patil and Savanurmath, 1994). Though castor plant is the main host plant for the culture of the eri silk worm giving the best yield of silk , yet there are several other host plants, upon which it can be reared, viz. Kesseru, Tapioca, Borpat, Borkesseru, etc. In Assam, no castor cultivation is done for the rearing of the eri silk and its leaves become scanty during the winter spell of the year. For rearing of eri silk farmers collect the leaves from the wild as well as from the homestead to feed the worms resulting very less quantum of rearing during this season. This is not a healthy practice for the commercial point of view. Hence, using of a perennial host plant is need of the hour. Kesseru is regarded as another primary perennial host plant. In this experiment, an attempt of comparative observation has been made to study the commercial viability of eri silk worm rearing exclusively on Kesseru as well as mixed rearing on Castor and kesseru. For mixed rearing, the first two instars were fed on Castor and the remaining instars, where voracious eating of larvae need large amount of host plant leaves, were reared on Kesseru. Moreover, this study also includes the observation of seasonal variations of the commercial parameters of differential rearing to find out the commercially unviable parameters in a certain season. Another associated problem with the rearing of eri silk worm only upon Castor is its recurring cost in plantation of Castor plants. Being an annual type of plant, Castor needs annual cultivation for the collection of sufficient amount of leaves for effective rearing of the eri silk worms which lessens the profit in the rearer's part. Therefore, considering the above stated problems, this study will definitely help to establish for effective utilization of a perennial host plant in appropriate season for the rearing of the silk worm without much compromising with the quality and quantity of the production of silk per crop.

2. Materials and Method:

The Muga and Eri Host plant Germplasm centre of Central Muga Eri Research & Training Institute (CMER&TI) located at Chenijan, Jorhat was utilized as source of material and location of experiment. Eri silkworm rearing using high yielding race *viz.*, Borduar recommended by CMER&TI was conducted using kesseru plant of germplasm bank of the institute by following standard methodology of the institute (Sarmah, 2004). Rearing was carried out maintaining 3 replications and 300 worms were kept per replication. Rearing data was recorded in 3 seasons viz., June- July, September- October and December-February for 2 crops. In each season castor (*Ricinus communis*) was maintained as control following standard Package of Practices (Sarmah, 2004).

To study the impact of feeding of Kesseru leaves one group of larvae was reared only on Kesseru and another was reared by feeding Castor at the young instars (1st & 2nd instars) and a Castor fed larvae group was kept as control. To study the nutritional impact on the insect following parameters were considered with are important for the commercial production of the silk. The studied parameters were: Larval weight (g) of 5th instar full grown worm, Larval duration (days), Cocoon weight (g), Shell weight (g), Shell ratio (SR %), Number of cocoons harvested and Effective rate of rearing (ERR %). Statistical analyses were done using standard package.

3.Results and Discussion:

3.1. Larval wt. (g) of 5th instar full grown worm:

Larval weight was measured in grams for the fully matured larvae of 5th instar. It was found to be the highest in the autumn season, where as castor fed larvae giving the best result, followed by mixed fed and Kesseru fed larvae. Larval weight always differs significantly with the season at 0.05 confidence levels. But treatment wise there is no significant difference.

3.2.Larval duration (days)

Larval duration is always longer during the winter season and shorter during the summer season. Larval period is completed in an average of 56 days and 19 days in winter and summer respectively. It was observed that there is not much variation amongest the different feeding groups. There is significant mean difference in larval durations reared on different food plants and seasons at 0.05 level.

3.3. Cocoon wt. (g)

It is the weight of the whole cocoon after 6-8 days of spinning with the interior live pupa intact. Cocoon weight differs significantly with the season as well as the treatments. Significant difference is also seen between the two treatment groups at 0.05 level. Though the control group gives the best result, yet, Castor+ Kesseru fed cocoons give better result than the kesseru fed ones.

3.4. Shell wt. (g):

More important than the cocoon weight is the weight of cocoon shell. It is the shell that yields silk. Higher the shell weight, greater the silk yield from it. Shell weight significantly differs amongst the treatments and also according to the seasons as well as treatments. The best result is obtained from the castor reared worms, followed by the mixed treatment group.

3.5. Shell ratio (SR %):

The shell ratio indicates the quantity of silk that can be spun from a lot of fresh cocoons. It is calculated by the following formula:

$$\text{Shell ratio} = \frac{\text{weight of Cocoon shell}}{\text{Weight of the whole cocoon}} \times 100$$

Significant difference in SR% is seen amongst the control and experimental crops at 0.05 level. But no significant difference was there amongst the seasonal variations. It is always higher in the control group.

3.6. Number of cocoon harvested:

Number of good harvested cocoon is the most important criteria of silk worm rearing in rearers' point of view, because a good harvest means more benefit to the rearers. Therefore, eri silk worm rearers shall prefer the food plant which would give them maximum benefit.

Though the no. of cocoon harvested is always more for the Castor fed larvae yet significant difference is seen between the cotrol and Kessru reared crops. According to the seasons, autumn gives the best result. Harvest is more for the mixed feeding culture than only Kesseru fed harvest.

3.7. Effective rate of rearing (ERR %):

Calculating the ERR% we come to know about the effectiveness of the experimental feeding provided to the larvae by comparing the results of the experimental yield to the control yield. ERR% is calculated by the following formula.

$$\text{ERR\%} = \frac{\text{Number of cocoon yield}}{\text{Number of larvae brushed}} \times 100$$

Treatment wise significant difference amongst the mean values can be seen at 0.05 level in the ERR%. But no significant seasonal variation is seen.

Table: Seasonal variation in rearing performance of eri silk worm on Kesseru and Castor

Treatment	Larval wt.(g)	Larval Duration (days)	Cocoon wt.(g)	Shell wt.(g)	SR%	Avg. no of cocoon harvested	ERR%
Winter season							
Kesseru						414.17	
Castor+ Kesseru						424.17	
Castor						431.33	
Mean	6.70	55.95	2.98	0.38	12.50	423.22	84.65
Standard Deviation (±)	0.99	0.54	0.29	0.05	0.46	8.62	1.73
Confidence Level (95.0%)	2.47	1.34	0.71	0.12	1.15	21.41	4.29
Summer season							
Kesseru						408.34	
Castor+ Kesseru						416.50	
Castor						421.67	
Mean	8.75	19.78	2.82	0.38	13.00	415.50	83.00
Standard Deviation (±)	0.20	0.42	0.07	0.06	1.54	6.72	1.36
Confidence Level (95.0%)	0.50	1.05	0.16	0.14	3.82	16.70	3.38
Autumn season							
Kesseru						418	
Castor+ Kesseru						418.67	
Castor						428.67	
Mean	9.02	21.12	3.10	0.43	13.54	421.78	84.35
Standard Deviation(±)	0.16	0.86	0.35	0.07	0.80	5.98	1.19
Confidence Level (95.0%)	0.40	2.13	0.88	0.18	1.98	14.85	2.96

4. Conclusion:

After the analysis of the data all the commercial parameters were found to be best for the larvae reared only on Castor which is an established fact Choudhury, S.N. (1982). But after the study of the critical differences, satisfactory observation was obtained for the commercial aspects of the silk worm reared only on Kesseru and mixed rearing on Castor and Kesseru. Significant difference were found for larval duration, cocoon weight, shell weight, SR%, Number of cocoon harvested and effective rate of rearing. For the commercial point of view number of harvested cocoons and effective rate of rearing are the most important, as these two parameters are directly related to generation of profit on the rearers' part. In our study, results for both these aspects were found to be satisfactory. It is a known fact that silk production varies with the seasons. The seasonal variation in rearing performance occurs due to seasonal fluctuation of nutritional composition in the leaves of the host plants and was experimentally proved in case of Muga silk worm- *Antheraea assama Ww (Ghosal et al, 2007)*. In a study on Tropical tasar silkworm, *Antheraea mylitta* seasonal effect on the silk worms were seen (Bhatia and Yushuf, 2014).Temperature difference in different seasons was seen to influence the rearing performance of F1 hybrids produced by crossing *Samia ricini* and *Samia Canningi* (Bramha,2015). In our study, ERR% was above 81% for all the feeding groups in all the seasons. Again, the mean cocoon harvests were 423.22, 415.50 and 421.78 in winter, summer and autumn respectively without much difference among the feeding groups. Therefore, conclusion may be drawn from the above study that, Kesseru can be exclusively utilised as a feeding plant for the eri silk worms during unavailability of castor leaves as well as mixed feeding of castor and Kesseru leaves may be done during scarcity of Castor leaves without compromising with production of silk

Plate1: Kesseru Plant. Plate2: Experimental Rearing of Eri silk worm

REFERENCES

1. Brahma D. (2015). Effect of rearing seasons on the economic parameters of Crossbreed silkworm between samia ricini and samia canningi int j pharm bio sci 2015 oct; 6(4): (b) 875 – 881.
2. Ghosal, M.; Chaudhuri, N.; Senapati, S. K. Seasonal variation in rearing performance of muga silkworm (Antheraea assamaWw). Journal of Plant Protection and Environment 2007 Vol. 4 No. 2 pp. 41-46 ISSN 0973-1717
3. Bhatia N. K. And Yousuf M. Effect of rearing season, host plants and their interaction on economical traits of tropical tasar silkworm, Antheraea mylitta Drury- an overview. International Journal of Industrial Entomology. 2014. Sep,

29(1): 93-119.
4. Patil, G.M. and Savanurmath,C.J. 1994. Eri Silkworm- The poor man's friend. Indian Silk. 33(4): 41- 45.
5. Sarmah M.C. (2004) Eri host plant cultivation and silkworm rearing technique. Compiled & Edited in English. Published by the Director CMER&TI, Lahdoigarh, Jorhat, Assam.
6. Sarmah M.C. (2011) Eri pupa: a delectable dish of North East India. Current Science, Vol. 100, No.3, 10.
7. Sarmah, M.C. 2011."Eri Pupa: A delectable dish of North East India". Current Science, Vol. 100, No. 3, : 279