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A study on the seasonal variation of the post cocoon parameters of eri silk worm Samia ricini (Donovan) reared on Kesseru *Heteropenex fragrance* (Roxb.) Seem

Biological Science

KEYWORDS: season, feeding, yarn, production

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ABSTRACT

The multivoltine eri silk worm is a polyphagous insect and castor is its main host plant followed by Kesseru. Rearing of eri silk worm is traditionally done in the rural areas of Assam as well as in some north eastern states of India. The silk worm being a domesticated insect is reared indoors by the reares and is fed with collected leaves from the wild or the homestead gardens. No exclusive food plant cultivation is done for eri worm rearing and therefore eri silk production decreases during the winter months as castor leaves are very much scanty during the spell of the year. Though Kesseru is the second primary host plant for the silk worm, rearing of the worm on Kesseru leaves are done only to keep the seed crop during the winters. Season specific post cocoon data for eri silk worm reared on Kesseru are less available. Therefore an attempt has been done in this paper to produce some season specific data regarding this. The post cocoon parameters of the eri silk reared on Kesseru at different seasons was compared and no significant difference was found between the quality and quantity of the silk produced at various seasons.

1. Introduction:

Eri silk worm is a multivoltine polyphagous silk worm found in the north eastern part of India specially Assam. The silk worm is traditionally reared under domestic conditions on different host plant leaves like castor, kesseru, tapioca, payam, borkesseru etc, depending on the availability of the host plant leaves. Though the established chief food plant of eri silk worm is castor followed by kesseru but the secondary or tertiary host plants are used during the scarcity of castor leaves. The rearers of eri silk worm are generally the tribal people of Assam and they collect the necessary host leaves from the wild or the homestead gardens. Plantation of castor is never done for eri worm rearing in Assam. Therefore, during the scarcity of castor leaves rearers must move for secondary or tertiary food plants to maintain the seed crop specially during the winters. Various studies on the rearing performance on different host plants have been published so far; but very limited literature is available on the season specific post cocoon parameters of the silk producing insect reared on Kesseru. Being the second most important host plant it becomes essential to generate data on the post cocoon characters of the silk worm in different seasons, because post cocoon characters determines the commercial value of the silk qualitative and quantitatively. Kesseru is a perennial host plant for eri silk worms and the leaves are available almost in all the seasons if the homestead kesseru plantation is maintained well by proper pruning of the stems. In the present study an attempt has been done to observe the post cocoon parameters of the eri silk in different seasons reared on Kesseru and to find out whether the rearing of eri silk worms on Kesseru leaves in all the seasons are commercially viable or not.

2. Materials and Method:

The experiment was performed at the Muga and Eri Host plant Germplasm center of Central Muga Eri Research & Training Institute (CMER&TI) located at Chenijan, Jorhat, Assam. 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 (1^{st}- 3^{rd} instars) and Kesseru at later instars (4^{th}- 5^{th} instars) and Castor leaves was fed to a control group. For the study of the yarn properties following parameters were considered.

i)Degumming loss (%)
ii) Raw silk percentage or silk recovery percentage
iii) Waste
iv) Elongation

2.1: Degumming loss:

Degumming is a process of boiling the silk cocoon in a mild alkaline solution mainly to remove the gummy sericin to make the silk soft and shiny. For degumming of silk worm cocoons different recopies are followed in different areas. For post cocoon parameter study the standard method of CMER&TI, Lahdoigarh was followed. Clean and empty dry cocoon (free from pupae and dry chrysalis) are used to determine boil of loss. First the weight (gram) of the cocoon lot is taken (X1). Then it is subjected to boiling for one hour in a stainless steel or aluminium vessel in the following chemical solution-

1. Soda (Sodium Carbonate) – 1 GPL (Gram per Litre)
2. Soap (Sunlight soap) - 5 GPL (Gram per Litre)
3. Water- 1lit/ 30 cocoon

After one hour boiling, the wash liquor is drained and the cocoon shell is again boiled for one hour in the following solution –

1. Soda (Sodium Carbonate) – 0.5 GPL (Gram per Litre)
2. Soap (Sunlight soap) - 2 GPL (Gram per Litre)
3. Water- 1lit/ 30 cocoon

After that, 2 hot wash & 1 cold wash is given to the cocoon shell. It is followed by drying. After drying, the cocoon shell weigh (gram) is X2. The Boil of Loss will be as follows-

$$\text{Degumming loss [Boil of loss (g)]} = X1 - X2$$

$$\text{Degumming loss\% (Boil of loss \%)} = \frac{X1 - X2}{X1} \times 100$$

2.2: Raw silk percentage or silk recovery percentage:

Silk recovery is the yarn produced from a single cocoon after degumming which is expressed in percentage. It is calculated by the following formula.

$$\text{Raw Silk (\%) OR Silk recovery (\%)} = \frac{\text{Weight of raw Silk reeled}}{\text{Weight of raw Silk reeled} + \text{Weight of Waste}} \times 100$$

2.4: Waste percentage:

Waste is the amount of raw silk which is unwindable for silk thread production. It is the floss which comes out from the uppermost layer during reeling and calculated during reeling process and expressed

in percentage.

$$\text{Waste (\%)} = \frac{\text{Weight of the un- reelable si}}{\text{Weight of the raw silk reeled}} \times 100$$

2.4: Elongation:

Elongation is the maximum stress of a cocoon fibre before it breaks. It is expressed in percentage and expressed as:

$$\Sigma = \frac{L_1 . L_0}{L_0} \times 100$$

Where,

L_1 = length after the fibre is stretched

L_0 = original length o f the fibre

Results and Discussion:

Table1: Seasonal variation of post cocoon characters of Kesseru fed cocoons

Treatment	Season	Degumming loss (%)	Yarn recovery (%)	Waste (%)	Elongation (%)
Kesseru	Winter	8.17 ±0.65	76.77 ±1.07	15.07* ±1.44	28.928 ±2.32
	Summer	11.35 ±0.42	77.16 ±0.98	11.49 ±0.96	26.246 ±1.49
	Autumn	8.33** ±1.09	79.08* ±0.55	12.59 ±1.55	29.796 ±3.10
Castor+ Kesseru	Winter	9.28 ±0.61	77.13 ±1.64	13.59* ±1.50	27.164 ±2.04
	Summer	10.52 ±1.08	77.96 ±1.46	11.53 ±2.17	26.64 ±2.69
	Autumn	8.61* ±0.44	80.77* ±0.88	10.63 ±1.06	29.128 ±1.99
Castor	Winter	11.73 ±0.81	78.16 ±1.11	10.12 ±1.71	27.528 ±1.06
	Summer	9.25 ±1.46	79.23 ±0.81	11.52 ±1.79	27.44 ±1.86
	Autumn	7.59** ±0.77	81.63** ±0.41	10.79 ±0.86	28.298* ±0.87

Values having superscript * has significant difference & ** has very high significant difference in different seasons ($P<0.05$)

It is well established that castor is the best primary food for rearing of eri silk worm in all the seasons (Rajesh et al., 2010). Kesseru being its best alternative host plant scanty data are available regarding its post cocoon performance. From the above table 1 it is clear that the autumn is the best season for rearing of Eri silk worm on Kesseru leaves like that of the Castor leaves. After performing one way ANOVA for different feeding groups in different seasons, significant difference for some post cocoon was found at 95% confidence level. Autumn season gives maximum yarn recovery followed by winter and summer for Kesseru fed eri silk worms. Shingh (2010) also found that the autumn season gives the best performance for the Kesseru fed eri silk worms. Minimum waste and maximum reelable silk is significantly generated during this season. Significant difference in reelable silk and waste silk in different seasons is also established for muga silk (Barah, 2010). Elongation shows no significant difference in the cocoons from Kesseru fed worms in different seasons, which means the similar quality of the silk threads in all the seasons. From the above experiment it is clear that post cocoon parameters of the cocoons harvested from the Kesseru fed groups are almost at par in all the seasons other than autumn. Therefore, it may be concluded here that Kesseru is the best alternative of Castor in all the seasons for rearing of eri silk worms. Eri silk worm rearers may go for establishing small homestead gardens of Kesseru for collection of host leaves whenever needed.

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