***Original Research Article***

# Rearing performances of different eco-races of eri silkworm (*Samia ricini* Boisd.) in Jorhat, Assam


## ABSTRACT

Eri silkworm (*Samia ricini* Boisd.) is a commercially exploited domesticated silkworm. In the present study an effort was made to evaluate the rearing performances of five eco-races of eri silkworm such as Borduar, Titabar, Dhemaji, Diphu and Kokrajhar in the circumstances of Jorhat district of Assam. The main objective behind this study was to find out the best performing eri silkworm eco-race for the Jorhat district to increase the income of the eri silkworm rearers of the region. To study each of the parameter for evaluating the rearing performances of the eco-races, the larvae were selected randomly from each of the three replication that were maintained separately for the eco-races by using Completely Randomized Design (CRD).The analysis was based on different larval and cocoon characters like larval weight (g), cocoon weight (g), shell weight (g), pupal weight(g), shell ratio (%), effective rate of rearing (ERR%). Out of these five eco-races of eri silkworm Titabar eco-race showed better performance followed by Borduar and Dhemaji in terms of all the aspects. The larval and cocoon parameters were found to be significantly different for each of the eco-race of eri silkworm.



*Key words: Eri silkworm; eco-race; rearing performance; cocoon parameters; larval parameters*




## 1. INTRODUCTION:

Eri silkworm (*Samia ricini* Boisd.) is a sericigenous insect belonging to the order Lepidoptera. Eri is a multivoltine polyphagous silkwormand they have economic importance. This silkworm is predominantly found in North-Eastern states of India especially in Assam and neighbouring states. Eri-culture is an age-old tradition ofthis region of India, being practiced mostly by the tribal peoples. The people of Assam practice this avocation as a lean season activity to earn additional income and to fulfill their own requirement of fabric from the time immemorial. The art of sericulture is rooted in life and culture of the Assamese people. Assam is holding the crown for producing the '*Golden Silk*' *i.e.* the'muga' silk along with the highest production of eri silk in the country. Assam is considered to be the origin of muga and eri silkworm. The silk produced by eri silkworm is considered as the third most vital silk in the world after mulberry and Chinese Tasar [1]. North-Eastern India contributes about 97 per cent of the national production of eri raw silk [2]. During the year 2022-23 the total production of raw silk was 36,582 MT, out of which eri silk production was 7349 MT. Eri silk contributes approximately 20% to the total silk production in India. Production of eri silk in the year 2022-23 in Assam including Bodoland Territorial Council (BTC) was 5487MT [3].

Being polyphagous in nature,eri silkworm feeds on a number of host plants. Castor (*Ricinus communis*) is the most preferred host plant for the eri silkworm. Other than Castor, Kesseru (*Heteropanax fragrans*), Borpat (*Ailanthus grandis*), Borkesseru (*Ailanthus excelsa*), Tapioca (*Manihot utilissima*) etc. are also the host plant of eri silkworm. In the North-East, 26 eco-races of eri silkworm are found with six different morphotype till date. Eri silkworm has different body colours and marking pattern and they have been recognized as a strain namely yellow plain (YP), greenish blue plain (GBP), yellow zebra (YZ), greenish blue zebra (GBZ), yellow spotted (YS) and greenish blue zebra (GBZ) [4, 5]. The selection of silkworm races suitable for particular location is very important for cocoon production [6, 7]. Therefore, screening of suitable race is of prime need for the upliftment of the sericulture industry. In the present study, attempts have been made to identify the superior eco-races of eri silkworm which are suitable for commercial rearing in Jorhat district of Assam.

## 2. MATERIALS AND METHOD:

The present experiment to find the rearing performance of five different eco-races of eri silkworm in the Jorhat district of Assam was conducted in the well-equipped rearing room of the Department of Sericulture, Assam Agricultural University, Jorhat during the year 2022-2023.The healthy disease free layingsof the five eco-races *i.e.*Borduar, Titabar, Dhemaji, Diphu and Kokrajhar wereused for research purpose. Eri silkworm larvae were reared on castor leaves by following the rearing method of Chowdhury, 1982 [8] from first to fifth instar under normal room temperature and humidity condition. After the second moult, three replications of 300 larvae for each of the five eco races were kept separately. The first and second instar larvae were fed with tender leaves, third insar with medium and late age worms were fed with mature leaves of castor. The quantity of food was increased with the advancement of the larval age to fulfill their requirements. To avoid contamination, injured and sick larvae were gathered and buried. To prevent over population, the ideal number of larvae were kept in each rearing tray. Weight of ten (10) numbers full grown and matured larvae from each replication were recorded in Digital weighing balance. Matured worms were mounted in the bamboo Chandraki with optimum spacing. The cocoons were harvested after the complete formation of cocoons by the ripe larvae. The rearing performance of different eco-races of eri silkworm was analyzed based on various rearing parameters like different larval and economic cocoon parameters. The different growth attributes like Larval weight (g), single cocoon weight (g), single shell weight (g), pupal weight (g), shell ratio (%), effective rate of rearing (ERR %) for each eco-race were recorded to find out the best performing one among them. The experiment was laid out in Completely Randomized Design (CRD) for various estimations of larval growth and cocoon characters of eri silkworm. The experimental errors of the various effects were determined by calculating their respective F-values as described by Panse and Sukhatme, 1989 [9].

## 3. RESULTS AND DISCUSSION:

The larval weights and economic cocoon parameters of five different eri eco-races are shown in the Table 1 and Fig. 1.

### 3.1 LARVAL WEIGHT(g):

Larval weight is an important factor to decide other larval growth parameter and economic cocoon characters [10]. In the present experiment a significant variation in terms of larval weight for both the full grown and mature larva was observed among the five selected eco-races of eri silkworm. The highest full grown larval weight was observed in Titabar eco-race (8.726 g) followed by the Borduar (7.986 g), Dhemaji (7.919 g), Diphu (7.405 g) and Kokrajhar (6.501 g). Similar trend was observed in case of mature larval weight. The highest matured larval weight was recorded in Titabar eco-race (5.959 g) followed by Borduar (5.834 g), Dhemaji (5.737 g), Diphu (5.507 g) and Kokrajhar (4.365 g). The findings are consistent with Kumar and Elangovan, 2012 [11] who recorded highest larval weight in Titabar eco-race followed by Borduar. Swathiga *et al.*, 2022 [10] also reported that Titabareco-race is one of the best performed eco-race in terms of the growth attributes.

### 3.2 SINGLE COCOON WEIGHT(g):

Cocoon weight is the key indicator of both the health of the silkworms and also the potential quality and quantity of silk production. It is the key commercial character that impacts the price fixation of cocoon [10]. It was evident from the result that the mean value of the weight of the single cocoon was higher in Titabar eco-race (4.821 g) followed by Borduar (3.640 g) and the lowest was recorded in Kokrajhar eco-race (2.589 g). The cocoon weight of these five eco-races of eri silkworm differed significantly. The present investigation is supported by the findings of [11] who reported the same trend in case of Titabar and Borduar eco-race.

### 3.3 SINGLE SHELL WEIGHT(g):

Perusal of the data presented that the shell weight of the five selected eco-races of eri silkworm differ significantly. In consistence with the larval and cocoon weight of the eco-races shell weight also found to higher in case of Titabar eco-race (0.671 g) followed by Borduar (0.547 g) and least was recorded in Kokrajhar eco-race (0.439 g).

### 3.4 PUPAL WEIGHT (g):

The mean values of pupal weight were found to be higher in Titabar eco-race (3.041 g) followed by Borduar (2.965 g). Similar to that of other larval weight pupal weight of the eco-races showed significant variation.

### 3.5 SHELL RATIO (%)

To know about the amount of silk can be extracted from a cocoon it is crucial to determine the shell ratio (%). Among the different eco-races of eri silkworm Titabar was found to be superior in terms of shell ratio (12.142%) followed by Borduar(11.115%) and the lowest was recorded in Kokrajhar eco-race (9.596%).

### 3.6 EFFECTIVE RATE OF REARING (ERR %)

ERR is an imperative physiological criteria for selecting the superior silkworm hybrids [12]. It has direct impact on efficiency and success rate of silkworm rearing which is ultimately reflected in cocoon yield. The mean value for ERR (%) shows the similar trend that of other parameters. It was found to be maximum in Titabar eco-race (97.083 %) followed by Borduar (96.667 %) and the lowest was recorded in case of Diphu eco-race (92.833 %).

The research findings of Singh *et al.*, 2003 [13] and Chakravorty and Neog, 2006 [14] supported the present investigation that the cocoon weight and maximum shell weight, highest shell ratio (%) and effective rate of rearing (EER %) is found in Titabar eco-race of eri silkworm. In the present study all the parameters selected for evaluation of rearing performance of the five eco-races showed significant difference among them which are of great importance in the field of eri-culture.

**Table No. 1. Larval weight and cocoon characters of different eco-races of eri silkworm**

| Eco-races | Larval weight (g) | | Cocoon weight (g) | Pupal weight (g) | Shell weight (g) | Shell ratio (%) | ERR (%) |
|---|---|---|---|---|---|---|---|
| | Full grown | Mature | | | | | |
| Kokrajhar | 6.501 | 4.365 | 2.589 | 1.751 | 0.439 | 9.596 | 93.417 |
| Titabar | 8.726 | 5.959 | 4.821 | 3.041 | 0.671 | 12.142 | 97.083 |
| Dhemaji | 7.919 | 5.737 | 3.304 | 2.604 | 0.448 | 10.118 | 96.667 |
| Borduar | 7.986 | 5.834 | 3.640 | 2.965 | 0.547 | 11.115 | 92.833 |
| Diphu | 7.405 | 5.507 | 3.022 | 2.592 | 0.331 | 9.814 | 95.500 |
| C.D. | 1.046 | 1.069 | 0.534 | 0.739 | 0.204 | 0.469 | 1.788 |
| SE(d) | 0.463 | 0.474 | 0.237 | 0.327 | 0.091 | 0.211 | 0.802 |

The result of present study shows the superiority and suitability of Titabar eco-race followed by the Borduar over the other eco-races of eri silkworm. The variation in the results may be due the abiotic and other related factors. It is important to produce good quality cocoons, in order to produce good quality raw silk [7]. Therefore, selecting a high yielding and superior race is crucial for the production of quality silk and to become economically viable. Titabar race can be selected for rearing and for production on quality seed due to the better performance in terms of silk yield in Jorhat district of Assam. The best rearing performance of eco-races is mainly dependent on the combined action of hereditary potential of the race and the degree to which these potentials are allowed to express in the environment in which they are reared [11].

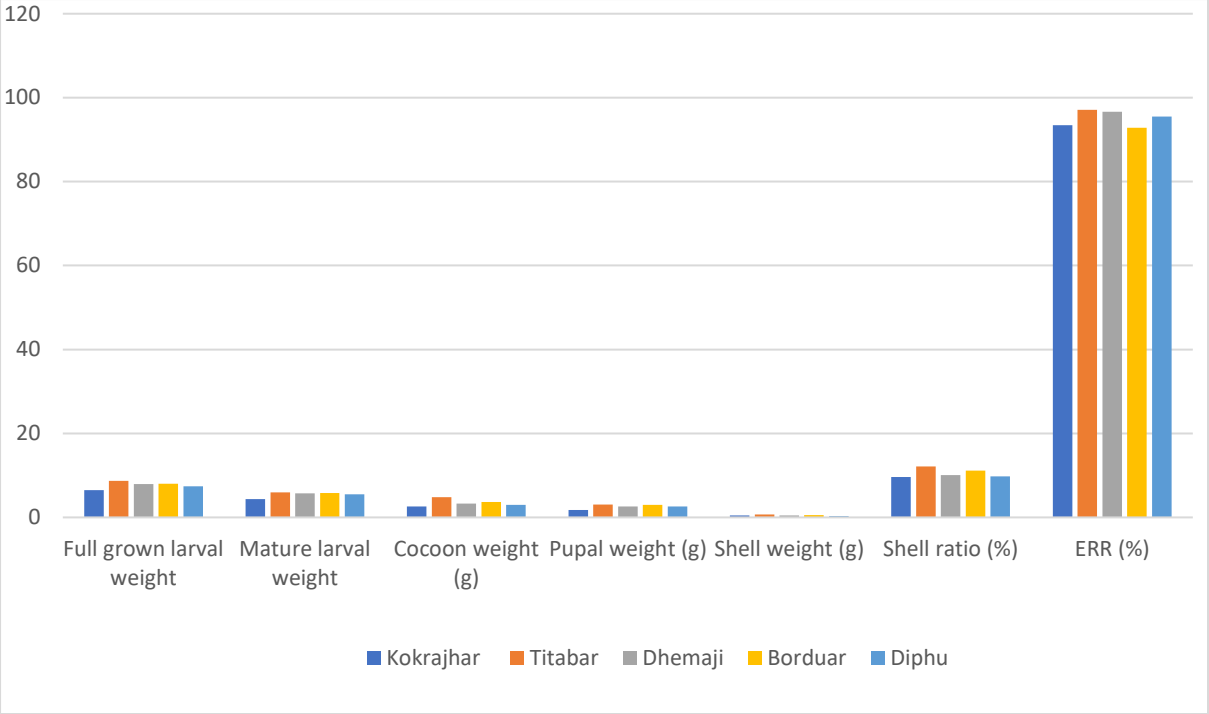


**Fig 1: Larval weight and cocoon characters of different eco-races of eri silkworm**

## 4. CONCLUSION:

The findings of the work depicted that the rearing performance of the different eco-races of eri silkworm are quite different from each other in terms of the different growth attributes and cocoon parameters. Titabar eco-race outperformed the other four eco-races by having superiority in different larval and cocoon characters. Identification of superior silkworm races is crucial for increasing the yield of silk and it has become the fastest growing area for sericultural research for the betterment of this sector. From the present investigation it could be inferred that Titabar and Borduar eco-race can be used for increasing the yield of eri silk which will contribute to the economy of the country. These two eco-races can be explored for commercial seed production to make this industry more vibrant.

## Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

## CONFLICTS OF INTEREST

Authors declare no conflict of interest.

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