



# Reviving the Legacy: Indigenous Silkworm Races of West Bengal

Harishkumar Jayaram<sup>1</sup> and Vijay Settu<sup>2</sup>

<sup>1</sup>CSB - Silkworm Seed Production Center, National silkworm Seed Organization, Berhampore, West Bengal-742101.

<sup>2</sup>CSB-Silkworm Seed Production Centers, National Silkworm Seed Organization, Dakshinbawanipur, West Bengal-733132.

\*Correspondence author: [harishkumarjayaram@gmail.com](mailto:harishkumarjayaram@gmail.com)

## Abstract

West Bengal, a state known for its vibrant culture and diverse landscapes, holds a treasure trove of natural wealth and historical significance within its boundaries. From the majestic Himalayas in the north to the pristine beaches along the Bay of Bengal in the south, West Bengal's geographical diversity is matched only by its rich cultural heritage. In this heritage lies the tradition of sericulture, an ancient practice that has shaped the lives and livelihoods of countless generations in the region. Sericulture, the art and science of rearing silkworms for silk production, has been practiced in West Bengal for centuries. The state's conducive climate, fertile soil, and abundant mulberry plantations make it an ideal location for silk production. Over the centuries, sericulture emerged as a thriving industry in West Bengal, providing employment and economic opportunities to rural communities across the state. Silk produced in West Bengal became renowned for its quality and craftsmanship, fetching high prices in domestic and international markets. The silk industry played a crucial role in the economic development of the region, contributing significantly to its prosperity and growth.

**Keywords:** Silkworm ,West Bengal and Sericulture.

One of the distinguishing features of sericulture in West Bengal is the diversity of mulberry silkworm races found in the region. These indigenous silkworm breeds have adapted to the local climatic conditions with their unique characteristics and qualities. All races of domesticated and most races of wild silkworms found on the mulberry belong to the first two classes such as European silkworm (*Bombyx mori*), Barapalu (*B. textor*), Nistari or Madrasi or Canary Silkworm (*B. craesi*), Deshi or Chhotapalu silkworms (*B. fortunatus*), Cheenapalu (*B. sinensis*) (Mukerji, 1919). However, as time marched forward and modernization swept across the land, these indigenous silkworm races faded into obscurity, their delicate threads lost amidst the clamor of progress. Yet, in the quiet corners of

West Bengal, a gentle breeze of change whispers of their return.

## Landraces of West Bengal (Table 1 and 2):

### 1. Chhota polo/ Chhotapalu:

Chhotapalu silkworm thrives in colder seasons, making it particularly well-suited for regions with harsher climates. Despite this difference, like Nistari, Chhotapalu exhibits polyvoltinism, enabling multiple generations within a year. However, one notable distinction lies in the developmental timeline of its larvae. Chhotapalu larvae undergo a longer maturation period, lasting approximately 22 days in summer and extending to 57 days in winter. This prolonged duration translates to a slightly longer spinning time for its

cocoons compared to Nistari. Chhotapalu silk is valued for its strength and durability, making it ideal for the production of high quality silk fabrics.

## **2 . Bara polo / Barapalu:**

Bara Polo was reared in Assam and Bengal, but its cultivation has declined due to challenges in cocoon production. While Barapalu follows a univoltine pattern, completing its life cycle within a single year. The peculiarity of Bara polo is a ten-month hatching period, hence it called 'lehemia or slow' during which eggs are carefully nurtured until the emergence of young worms. On the other hand, it showcases unique adaptations to spring seasons, where European races struggle. Additionally, different races of cocoons, such as dhali and bulu, serve various purposes in textile production. Barapolo silk stands out for its robustness, with longer filaments and higher tenacity, making it ideal for specialized textile applications requiring strength and resilience. The silk's value reflects its rarity, fetching high prices in the market.

## **3 . Cheena polo/ Cheenapalu:**

Cheenapalu silkworm shares polyvoltinism with Nistari but presents distinct characteristics of its own. Cheenapalu silk production requires a longer spinning time compared to Chhotapalu.

## **4. Nistari:**

Nistari traditional multivoltine silkworm race originating from West Bengal, and utilized in the silk industry for over a century, particularly in the Gangetic plains region. Despite being known for relatively lower silk productivity and fiber quality compared to some other breeds, Nistari has been valued for its adaptability to adverse climatic conditions and specific regional requirements. These races thrive in warm and rainy seasons, exhibiting polyvoltinism and reared 8 times in a year. The fecundity ranges from 457 to 492, the

total larval period from 22.00 to 22.87 days, and the weight of 10 mature larvae ranges from 6.29 to 6.49 grams. Additionally, the effective rate of rearing varies from 23.53 to 26.05, while single cocoon weight ranges from 7.704 to 8.738 grams. The number of cocoons per kilogram (Chitt) varies from 934 to 1028 (CSGRC, Hosor). These ranges reflect the diversity among nistari silkworm strains and the importance of understanding their variability in cocoon characteristics for effective silk production and breeding programs.

Efforts have been made to enhance the productivity and quality of Nistari through various breeding programs. For instance, productive multivoltine breeds like LMP, LMO, DMR, and PO were isolated through line breeding approaches by crossing females with larval markings and males without crescent markings from the Nistari race. Additionally, Nistari has been utilized in the development of other multivoltine breeds with improved characteristics, such as MY, RD1, P2D1, B2D, and HS2B. These breeds have evolved by utilizing indigenous races like Nistari, Pure Mysore, and Sarupat. In recent years, Nistari has continued to play a role in the development of new breeds and hybrids. CSR & TI, Mysore, has evolved breeds like BL<sub>67</sub> and BL<sub>27</sub> from multi x bi-hybrid crossings involving Nistari. (Kumaresan *et al.*, 2004). Furthermore, new productive hybrids such as Sharavati, Cauvery, and Tippu have been developed by crossing Nistari-derived breeds like BL<sub>67</sub> with other races. Overall, Nistari remains an important contributor to the genetic diversity and breeding programs in the multi-voltine silkworm industry, despite its inherent limitations in silk productivity and fiber quality.

## **Other landraces:**

There are other races of silkworms Naya polo called *B. Arracanensis* reared in Burma, and

Table 1: Comparison of Silk Characteristics among Different Land Races of Silk Worms (Mukerji, 1919).

Land Races of West Bengal		Nistari	Chhotapalu	Barapalu	Cheenapalu
Local names		Madrasi / Canary/ Purani	Deshi	Lehemia	China worm
Scientific names		<i>Bombyx croesi</i>	<i>Bombyx fortunatus</i>	<i>Bombyx textor</i>	<i>Bombyx sinensis</i>
Suitable seasons		Warm and rainy seasons	Cold season	Spring	Warm and rainy seasons
Months of cultivation		April, June , July, September	March, April, June, July, October, November	February and March	January , February, march, April, may
No. of crops		8	8	1	8
Egg Duration		8 to 16 days	8 to 16 days	annual race	8 to 16 days
Voltinism		Poly	Poly	Uni	Poly
Cocoon colour		light -coloured cocoons		Sivery white , Greenish to blue (Race called Bulu Palu	light -coloured cocoons
5 <sup>th</sup> instar		2-3 days than cheenapalu	2-3 days more than Nistari	4-5 days more than chota palu Longest duration Spring 30	5-12 days Shortest
Larval duration	Summer	20	22		18
	Winter	55	57	-	53
Spinning	Summer			2-3 days	
	Winter			4-5 days	
Avg filament length		210	215	270	
Weight of reelable silk in each cocoon in milligrammes		36	45	60	-
Weight 6f unreelable portion in each cocoon in milligrammes.		16.5	16	20	-
Proportion of reelable silk in the fresh cocoon per cent		6	7.5	8	-
Diameter of the bave in millimeter		20	20.5	16.5	-
Denier		1 3/5	2	2 1/3	-
Tenansity		4	6.4/5	6 ½	-
Elasticity		12	2	2 ½	-
Bill of loss		25	30	24	-

**Table 2. Characteristics of Nistari Silkworm Strains and Cocoon Parameters (Saha *et al.*, 2011)**

Sl. No	Nistari strains	Larval marking	Cocoon Shape	Cocoon Color	Fecundity (no.)	5th stage	Total lar. period (day)	Wt. of 10 mat. lar. (g)	ERR by wt. (Kg)	Single cocoon wt. (g)	ERR (No.)	Cocoon weight (g)	Shell weight (g)	Shell (%)	Chitt (No. of cocoon/kg)
1.	Nistari (Mark)	Mark	Spindle	Yellow	457	94.91	22.30	6.33	23.53	7912	7.963	0.989	0.13	13.15	1028
2.	Nistari (Chalsa)	Mark	Spindle	Yellow	485	95.90	22.77	6.45	26.05	7849	8.651	1.077	0.145	13.42	953
3.	Nistari (Balapur)	Plain	Spindle	Yellow	490	96.32	22.00	6.29	24.23	8150	8.419	1.019	0.134	13.10	998
4.	Nistari (Shibnivas)	Mark	Spindle	Yellow	492	95.12	22.87	6.49	25.68	7947	8.487	1.054	0.158	14.98	970
5.	Nistari (Debra Mark)	Mark	Spindle	Yellow	469	96.22	22.83	6.48	24.85	7807	7.704	1.012	0.146	14.39	1008
6.	Nistari (Debra Plain)	Plain	Spindle	Yellow	487	95.17	22.62	6.43	24.38	7390	8.230	1.028	0.150	14.63	988
7.	Nistari (Plain)	Plain	Spindle	Yellow	485	95.29	22.37	6.35	25.79	7481	8.738	1.085	0.156	14.32	934

another race called Barapat reared in Assam to belong to the *B. Textor* race. The silkworms reared in Manipur are also Barapalu or *B. textor*. Indeed, there is a tradition in Bengal that the Barapalu originally came from Manipur. In Midnapore, there is a race of silkworms called Bulu or Blue with small greenish-white cocoons. Bulu and Chhotapát of Assam seem to belong to the *B. Sinensis*. Among the landrace of mulberry cocoons, the Theophillas make good reelable cocoons, while Ocinará, Trilocha, and Rondotia spin very inferior cocoons which are called *Bombyx arracanensis* (Mukerji, 1919).

### **Challenges Faced by Indigenous Silkworm Races**

Despite their historical significance, indigenous silkworm races in West Bengal have faced numerous challenges in recent years. The rapid industrialization and urbanization of the state have led to the loss of traditional silk-producing areas, as land is converted for other uses such as real estate development and infrastructure projects. Additionally, changing weather patterns and the spread of diseases have affected the health and productivity of silkworms, leading to a decline in silk production. Another challenge faced by indigenous silkworm races is the competition from exotic breeds that are often favored for their higher silk yield and faster growth rates. The silk fabric contained in Bengal cocoons was also inferior in quality. The average weight of a cocoon and average weight of reelable silk contained 1800 and 200 milligrams respectively, Bengal cocoons were only 600 and 40 milligrams. The average length of each fibre was 600 and 200 metres respectively. As a result, many farmers have switched to cultivating exotic silkworm races of *Bombyx mori*, leading to a decline in the population of indigenous breeds. Although the yield attributes of multivoltine

silkworms are very poor, because of their resistance to various stresses under the tropical conditions of West Bengal, the majority of the silk production is multivoltine-oriented. Hence, maintenance of multivoltine silkworm breeds in original is highly essential to meet desired objectives of the breeder for effective commercial exploitation.

### **Efforts towards Conservation and Revival**

Despite these challenges, there is renewed interest in conserving and reviving indigenous silkworm races in West Bengal. Various, research institutions like entral Sericulture Germplasm Resurce Center and Central Sericulture Research and Training Institute, Berhampore are maintaining some of the Indigenous breeds and preserving their genetic diversity i.e., Nistari Plain, marked, Chalsa and Debra. These centers also conduct research on indigenous silkworm races, with aim of developing new breeds that are resistant to diseases and environmental stresses. Although other productive breeds are developed across West Bengal and major breeds are Nistari Parentage breeds i.e., Nistari X ( $Sk_6 \times Sk_7$ ), Nistari X M12W and reciprocals. In recent days two Silkworm seed production centers (SSPCs) and 3 Basic Seed Farm of Central Silk Board, Department Of Textile (Sericulture) and 165 Registered seed producers (RSPs) recognized by CSB to manage the conservation and production of DFLs to supply to the farmers of West Bengal. Additionally, government is striving to raise awareness among consumers about the value of indigenous silk fabrics and the importance of supporting local sericulturists.

### **Conclusion**

Conservation and revival of indigenous silkworm landraces in West Bengal are essential for preserving the state's rich cultural heritage and

promoting sustainable rural development. By supporting local sericulturists and investing in research and conservation efforts, we can ensure that future generations continue to benefit from the beauty and craftsmanship of indigenous silk fabrics. Together, revive the legacy of West Bengal's sericulture industry and ensure its prosperity for years to come. Further, diverse mulberry silkworm races found in West Bengal are a testament to the region's rich biodiversity and cultural heritage. These indigenous breeds have been cultivated and cherished by generations of sericulturists, contributing to the state's economic prosperity and cultural identity.

## References:

- Saha, L. M., Chanda, S., Kar, N. B., Das, N. K., & Mondal, K. (2011). Identification of potential multivoltine breeds based on multiple trait analysis for future breeding program in West Bengal. *Bulletin of Indian Academy of Sericulture*, 15(1), 1-10.
- Mukerji, N. G. (1919). *Handbook of sericulture*. Bengal secretariat Book Depot.
- Kumaresan, P., Sinha, R. K., Mohan, B., & Thangavelu, K. (2004). Conservation of multivoltine silkworm (*Bombyx mori* L.) germplasm in India-An overview. *International Journal of Industrial Entomology*, 9(1), 1-13.