

## BDR 10: Yellow Larval Daba Bivoltine Race of Tropical Tasar Silkworm, *Antheraea mylitta* D. (Lepidoptera: Saturniidae)

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### Abstract

Tasar silkworm, *Antheraea mylitta*, is an economically important serigenous insect. The tasar silk industry sustains livelihood of many rural tribal families across the tasar belt of the country. Commercially important tasar ecoraces are Daba and Sukinda. In 2018, new Daba bivoltine race BDR 10 of yellow larval type was authorised. Multilocation trials across the country have proved the superiority of BDR 10 over Daba bivoltine (DBV). BDR 10 have better commercial cocoon characters and viral resistance as compared to DBV. Thus, the present review deals with various aspects of tasar silk worm and stress the need to popularise the new race among the farmers and stakeholders of the tasar sericulture.

**Keywords:** BDR 10, Bivoltine, Daba, Tasar silkworm

### Introduction

India is blessed with a unique diversity of wild serigenous insects including various species of genus *Antheraea* like *A. mylitta*, *A. assamensis*, *A. roylei*, *A. proylei*, *A. compta*, *A. frithi*, *A. andamana*, *A. rubicunda*, *A. paphia*, *A. helferi*, *A. cernyi*, *A. insularis*, *A. meisteri*, *A. kynvetti*, etc. Amongst them, *A. mylitta* (Indian tropical tasar silkworm) is economically and commercially exploited to yield coarse and heavy tasar silk yarn that owns national and international repute. The moth has developed parapatric populations and is known to have 44 ecoraces (geographically isolated populations adapted to a particular set of ecological conditions, climate, and habitat) (Sinha, 2011). Amongst the various ecoraces, Daba and Sukinda are commercially exploited. Further, depending on the elevation and climatic conditions prevailing, Daba bivoltine and trivoltine races are reared under semi-domesticated conditions (Chandrashekharaiyah *et al.*, 2019). Few popular ecoraces of tropical tasar silkworm include, Modal, Bogai, Nalia, Similipal, Sukinda, Omarkote, Boudh (Odisha), Raily (Bastar, Chhattisgarh), Laria, Sarihan (Jharkhand), Bhandara (Maharashtra), Andhra local (Andhra Pradesh), etc. (Chandrashekharaiyah *et al.*, 2021). The genetic variations within the various ecoraces can be identified using various molecular markers as SSR (Renuka

and Shamitha, 2016) or RAPD/SCAR markers (Saha and Kundu, 2006). The tasar belt in India includes states like Odisha, Jharkhand, Chhattisgarh, Bihar, West Bengal, Andhra Pradesh, Maharashtra, Telangana, etc. (Chandrashekharaiyah *et al.*, 2021). The major food plants of tasar silkworm are Arjuna (*Terminalia arjuna*), Asan (*T. tomentosa*), Sal (*Shorea robusta*), Jarul (*Lagerstroemia speciosa*), etc. Traditionally, tasar silk and cocoons are harvested by the local rural tribal communities and marketed as plant based minor NTFPs (Non-timber forest products). The tasar sector, apart from producing the rough tasar fabric, yields employment to approximately 3 lakh people in the tasar belt (Chandrashekharaiyah *et al.*, 2019). Additionally, keeping in view the global challenges of climate change, tasar silkworm host plants having huge carbon sequestration potential, need to be propagated. Further, the entire system gain high remuneration to the farmers with low investment.

### Colour Morphs of Tropical Tasar Silkworm

The tasar silkworm lays yellowish or off-white creamy oval eggs. The larvae show colour polymorphism, is holometabolous, polyphagous and exhibits bivoltinism/trivoltinism. The larvae are of four colours (Green, Yellow, Blue, and Almond). Further the colour morphism is governed by dominant and recessive alleles (YYBB - Green,

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YYbb - Yellow, yyBB - blue, yybb - Almond) and is inherited as per Mendelian laws. However, the occurrence of the green colour morphs is more prominent under natural conditions favouring mimicry and camouflage protecting the larvae against biotic stress factors. Thus, colour morphs in tasar silkworm protect them against predation (Chandrashekharaiyah *et al.*, 2021).

### BDR 10: A New Race

BDR 10 is a newly authorized Daba bivoltine silkworm race reared in a semi-domesticated manner and developed through recurrent selection. It was developed at BSMTC (Basic Seed Multiplication and Training Centre), Boirdadar, Chhattisgarh. The larvae are yellow colour morph (Figure 1). It was developed by the continuous selection of only the yellow larval colour morph for 26 generations (directional selection), removing the off-types or larvae of other colours. It is recorded to have a 21% higher productivity and yields approximately 52 kg cocoons/ 100 dfls (Chandrashekharaiyah *et al.*, 2019).



Figure 1: (A) Neonate, (B) Third instar and (C) Fifth instar larvae of BDR 10 (Adopted from Chandrashekharaiyah *et al.*, 2019)

### Commercial Characters

The race was authorized by the HAC (Hybrid Authorization Committee) in June, 2018 and is recommended for majority of the states across the tasar belt of the country. The commercially significant characters of the race are represented in table 1. The 1<sup>st</sup> crop must be brushed by mid-July and the 2<sup>nd</sup> crop is brushed by last week of September. The race was further mass multiplied and popularized by supply to states like Odisha, Jharkhand, West Bengal, apart from Chhattisgarh (Chandrashekharaiyah *et al.*, 2021). Figure 2 represents the performance of BDR 10 across various locations of the country in percentage.

Table 1: Commercial characters of race BDR 10	
Character	Specification of BDR 10
Larval colour	Yellow
Cocoon colour	Grey
Fecundity	215-230 eggs
Average hatching percentage	84.42%
Cocoon weight	10.5-15 g
Shell weight	1.5-1.9 g
Filament length	900-1100 m
Denier	9-10
Reelability	50-60%
Silk recovery	60-65%

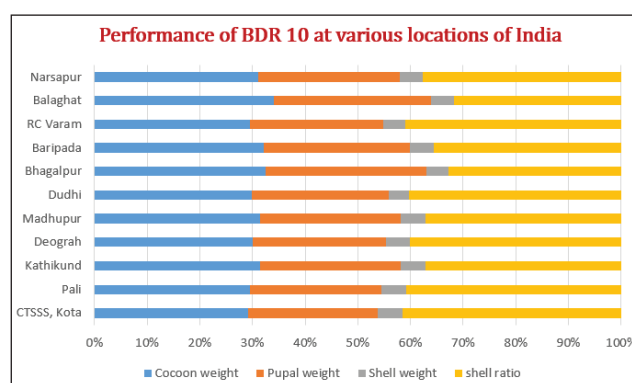


Figure 2: Performance of BDR 10 in percentage at various locations of India (Chandrashekharaiyah *et al.*, 2019)

### Response of BDR 10 to Diseases

Various comparative studies to test the susceptibility of BDR 10 and DBV recorded that the BDR 10 race has higher immunity and the overall mortality was less as compared to DBV. The BDR 10 larvae was more resistant to viral infections as compared to DBV. However, both the races were equally susceptible to bacterial and fungal infections. Both the races suffer from Calcium excretion symptoms caused due to bacterial infections (Chandrashekharaiyah *et al.*, 2019). Also, cocoon yield is higher for BDR 10 as compared to DBV.

### Conclusion

Tasar sericulture is the means of livelihood for many tribal families across the tasar belt. Sericulture is an agro-based profitable venture that engages rural youth and alleviates poverty. Seed, feed, breed, and management are the four pillars of successful sericulture programmes. Thus, use of improved and high yielding, disease resistant breeds is crucial to ensure high profitability in sericulture. The higher average cocoon yield of BDR 10 over DBV makes it a highly suitable alternative for tasar culture.

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