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Comparative study on rearing performance, larval and post-cocoon characters of Tasar silkworm, *Antheraea mylitta* Drury ecoraces (Sukinda, Daba-TV and Andhra local)

Sreenivas M and Shamitha G

Abstract

Tropical tasar silkworm, *Antheraea mylitta* (Lepidoptera: Saturniidae) is a polyphagous sericigenous insect, silk producing forest silkworm of commercial importance in India. The wide range of distribution of the species has encountered diverse geographic and climatic variations of the distinct areas, leading to marked differences in not only phenotypic and physiological traits but also in the commercial and technological aspects. The present investigation is taken up to study the influence of environmental conditions during the rearing period and the genetic variability in relation to the environment among Sukinda, Daba -TV and Andhra local ecoraces. The life history of three ecoraces from hatching to egg laying stage, larval development stages and post cocoon characteristics were studied.

Keywords: *Antheraea mylitta*, climatic variations, rearing period, phenotypic, commercial and post-cocoon characteristics

Introduction

The tasar silkworm, *Antheraea mylitta* Drury is one of the important sericigenous insect of tropical India. It is polyphagous in nature having a number of primary and secondary host plants. Extensively, it thrives on the leaves of primary tasar food plants- *Terminalia tomentosa* (Asan), *Terminalia arjuna* (Arjun) and *Shorea rubusta* (Sal) which are widely available in the tropical belt in India. Tasar culture is practiced in six major states of India viz., Bihar, Orissa, Chhattisgarh, Telangana, West Bengal, and Uttar Pradesh.

Lepidopterans are accepted as ecological indicators of ecosystem [1]. They are used as models because of their amount of modifications in their community structure; they react quickly to environmental changes and they are considered to be the umbrella species and indicators of habitat quality. It has also been confirmed that a decrease in habitat leads to a decrease in species diversity and abundance and an alteration of Lepidoptera community composition [2]. They show variation in their phenotypic traits such as fecundity, Voltinism, cocoon weight, silk ratio and also in their host plant preference [3]. The influence of environment on silkworm rearing performance was studied [4, 5].

In order to preserve the natural biodiversity present among these populations, attempts are being made to understand the genetic structure of each population. However, no systematic studies were made to generate substantial information on the genetic diversity of these populations so as to develop appropriate strategy for its conservation at the natural habitat. The present study is focused on the genetic diversity of three commercial populations of *Antheraea mylitta* Drury in selected parts of India based on physical features, climatic conditions and quantitative cocoon, post-cocoon characteristics, biochemical aspects, molecular characterization, phylogeny and breeding.

Material and Methods

Rearing Method

The rearing of Tasar ecoraces was done by taking proper measures of disinfection to prevent outbreak of diseases and any attack by predators in fields. The quality of cocoons depends upon the selection of rearing site and food plants, brushing, supervision and maintenance of larvae and other operations. If any of these operations are ineffective, it seriously affects the yield. Attack by predators and taking proper measure of disinfection should prevent outbreak of diseases in fields

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Rearing of Tasar Silkworm, *Antheraea mylitta* Drury (Sukinda, Daba TV and Andhra Local)

Rearing of Tasar Silkworm, *Antheraea mylitta* was done on at *Terminalia arjuna* plantation developed in Department of Zoology, Kakatiya University, Warangal. Cleaning and disinfection was done in the rearing site by removing all weeds and shrubs in a radius of 2ft around each plant. The apical buds the primary growing regions that is located at the top of the plant were also removed the plants and the ground were disinfected with 9:1% Lime and bleaching powder.

The plantation was thus maintained for 1st and 2nd crops by giving NPK (Nitrogen, Potassium, and Phosphorus) inputs in two doses- one during onset of monsoon and second during August. Rearing was conducted at elevated places of Arjun (*Terminalia arjuna*) plantation with quality leaves. The tasar silkworm, *Antheraea mylitta* Andhra local, Daba TV and Sukinda ecoraces were reared in the present studies.

For the present study, the natural habitats of Tasar Silkworm, *Antheraea mylitta*, Sukinda ecorace, were explored in their natural habitats and the geographical parameters were recorded- Latitude -22.07°N, Longitude 84.01°E and altitude 256 meters. The eggs which were collected from those forest areas were growing under optimum temperature of 20.60-31.45°C and a relative humidity of 80-82% in the *in situ* conditions, fed on *Terminalia tomentosa* in Baripada district of Orissa State. Two DFLs of the Tasar Silkworm, *Antheraea mylitta*, Sukinda ecorace, were reared in *ex situ* conditions on the *Terminalia* plantation raised at Kakatiya University campus (Fig. 1).

Antheraea mylitta (Daba TV Ecorace), is a commercial and wild sericigenous insect, exists in nearly 17 states of our country. Daba belonging to Singhbhum is the only countrywide adapted ruling eco-race. It is explored in their natural habitats and the geographical parameters were recorded- Latitude -22°56'67" N, Longitude 85° 81' 67" E and altitude 244 meters.

In the present study tasar silkworm *Antheraea mylitta* (Daba-TV) were reared during July, 2014 to August, 2014, were collected Daba-TV eggs from neighbouring forest (Venkatapuram, Khammam district of Telangana State) patches and reared for comparative analysis. Out of 256 eggs, about 144 newly hatched larvae (Table. 5) were raised in the *Terminalia* plantation at Kakatiya University Campus, Warangal.

Andhra local Ecorace of *Antheraea mylitta* was exclusively reared by the traditional tribal farmers in the agency area of Telangana. It is explored in their natural habitats and the geographical parameters were recorded- Latitude -18° 0' 0" N, Longitude 79.58°E and altitude 265.5 meters. The Andhra local ecoraces was neglected and left in the wilderness to fend for itself. In addition to the introduction of races, indiscriminate collection of natural cocoons, shrinkage of forest having tasar food plant, increase in large industries and mines have brought about a drastic decline in the population of this race. For the present studies Andhra local cocoons were collected from RTRS Warangal district of Telangana state. Out of 125 eggs, about 85 newly hatched larvae were raised (Table.5).

Supervision and maintenance of rearing larvae of Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhralocal Ecoraces)

Influence of Temperature

Larvae survive over wide range of temperature *i.e.*, from a of

maximum 34° - 35°C and a minimum of 9- 10°C in rearing site. Larvae react to temperature, *i.e.*, above 30°C they become restless while when the temperature is below 20°C they become inactive. The temperature also determines larval life span. In the present study, the temperature was recorded with the help of laboratory thermometer. The average of lowest and highest values were taken and recorded instar-wise.

The present investigation is taken up to study the influence of environmental conditions like optimum temperature during the rearing period were 28-33°C respectively (Table. 3). During rearing, environmental fluctuations were seen, which sometimes involved unfavorable conditions like rain, storm or hail.

Influence of Humidity

Larvae survive over wide range of humidity *i.e.*, a maximum of 90- 100% and a minimum of 30-40% in rearing site. Relative humidity also determines larval life span, *e.g.*, early instars need higher humidity of 75-85% while late instars require a lesser humidity of 60-70%. In the present study, the humidity was recorded with the help of lab hygrometer. The average of lowest and highest values 86.78-90.28% taken and noted instar-wise (Table.3)

Larval parameters: (length, weight, colour, size and shape of larvae)

At the beginning of each instar, 5-10 healthy worms were selected at random from the rearing lot of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local, Ecoraces) rearing on *Terminalia arjuna* plantation at Kakatiya University, Warangal, Telangana, India for measurement of length and weight. These parameters are taken just after hatching for the first instar and just before moulting for second instar and daily for fourth and fifth instar. Larval weights were measured in an electronic balance of Citizen (Model: CG 203).

The weights were measured for first instar to fifth instar, the length of the larvae were measured in cm by using a graph paper. The larval lifespan was also recorded. The larval mortality was calculated by counting the number of worms lost due to various reasons during each instar (Table. 4). The colour and shape of the cocoons whether they were yellow, gray or white or the oval / elliptical shape also recorded (Table. 5, Fig. 3).

Plantation uniformly after one day of completion of 2nd moult, by cutting off branches with young worms with a help of secateurs, putting gently on sheet of polythene spread in a basket. Transfer the worms in basket to another plantation in rearing garden, one by one with the branch of the plants during early morning or evening cooler hours. Larvae should not be disturbed during moult/ spinning.

Early age rearing (I to III instars) of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba TV and Andhra Local)

Hatched larvae should not be touched with bare hands. The hatching egg has to be spread in single layer in plastic tray and to be covered with branches with tender leaves; Larvae hatched on different days may be transferred to separate plants. The young age rearing should be conducted in rearing garden under cover of nylon net to provide protection to the young larvae from heavy rain, hail storm, pest and predators to minimize larval loss during early instars (Fig. 1).

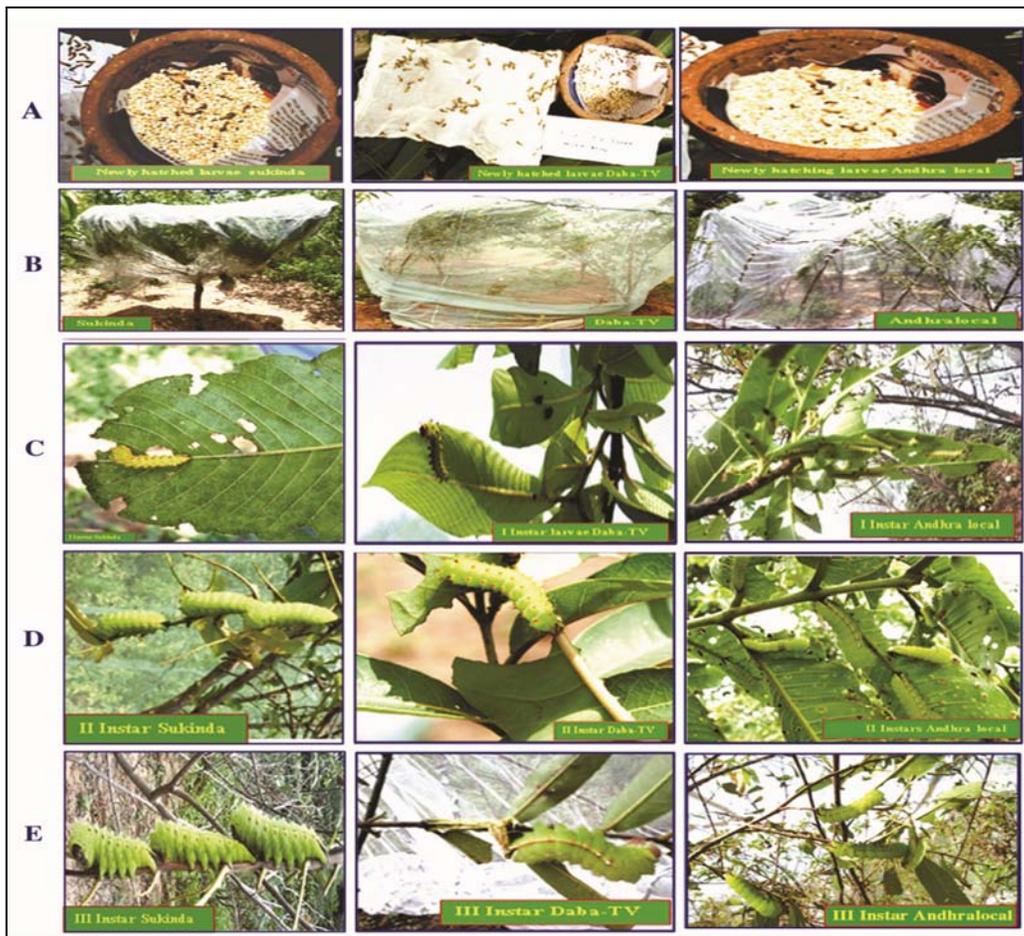


Fig 1: Early age rearing (I to III instars) of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba TV and Andhra Local) rearing on *Terminalia arjuna* plantation at Kakatiya University, Warangal, Telangana, India. (A. Newly hatched larvae B. Net rearing method.C. I instar larvae feeding on tender leaves. D. II instar larvae feeding on mature leaves. E. III instar larvae feeding on mature leaves).

Late age rearing (IV Instar to V Instar) of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Andhra Local and Daba TV).

For the healthy growth of the larvae, semi-mature and mature leaves were provided to the 4th and 5th instars respectively. The optimum temperature and relative humidity of 28-29°C and 48-52% respectively were maintained during late age development. The mature larvae 1-2 days stop feeding and either rest on the food plant or come down to the tree trunk

near the strips of plastic sheet tied around the tree trunk. The larvae remained there by raising their head upwards till evening and released their last excreta. Afterwards the larvae started searching suitable location for cocooning and pupation. At this stage, the mature larvae were picked up and kept in the bundle of dry twigs or in the bamboo made moutange for cocooning. The pupation was completed inside the cocoon within 9-10 days and cocoon formation was completed (Fig. 2).



Fig 2: Late age rearing (IV Instar to V Instar) of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba TV and Andhra local) rearing on *Terminalia arjuna* plantation at Kakatiya University, Warangal, Telangana, India.

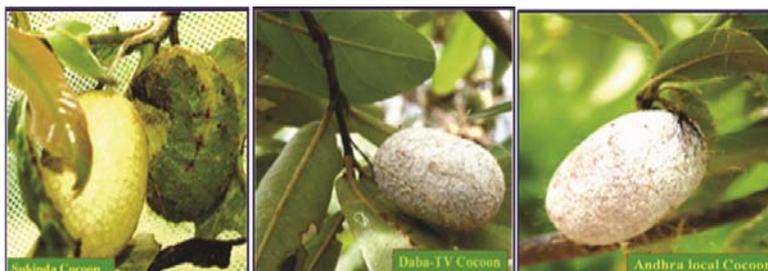


Fig 3: Cocoons of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba-TV and Andhra local Ecorace) rearing on *Terminalia arjuna* plantation at Kakatiya University, Warangal, Telangana, India.

Cocoon and Post-cocoon characteristics of Tasar silkworm, *Antheraea mylitta* (Sukinda, Daba-TV and Andhra local) Ecoraces

The weights of the cocoon, pupa and shell of Tasar silkworm, *Antheraea mylitta*, Sukinda, Daba-TV, Andhra local Ecoraces, were measured using standard Electronic Balance of Citizen-make in terms of grams.

The length of cocoon and peduncle; width of the cocoon were measured by using *Vernier Calipers* and the Shell Thickness was measured by using Screw Gauge.

The post cocoon parameters viz., Shell Ratio was measured according to standard procedures and recorded.

Shell Ratio

The Shell Ratio is calculated by the following formula:
Shell Ratio= Shell Weight / Cocoon Weight × 100

Length and Width of cocoon

The length and width of the cocoon shell and peduncle was measured with vernier calipers.

Total Length = Main Scale Reading + Vernier Coincidence × Least count.

Thickness of cocoon shell

Thickness of the cocoon shell and peduncle was done by

using the Screw Gauge.

Least count = Pitch of the screw/ No. of divisions on the head scale

Reelability

The reelability of cocoons for economic reeling is the ease with which the cocoons yield the bave in reeling, which is called the reelability of cocoons. This is calculated by the following formula:

Reelability = Weight of the silk reeled / Weight of the cocoon × 100

Denier

The difference in thickness of the size of the bave from beginning to the end is so gradual and minute in tasar cocoon that it does not interfere with the quality of the size of ultimate raw silk reeled. Denier is obtained by the following formula:

Denier = Weight of the silk reeled/ Length of the silk reeled× 9000

Results

Rearing of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba TV and Andhra local ecoraces)

Table 1: Origin and characteristics of Tasar Silkworm, *Antheraea mylitta*

S.No	Ecorace	Collection site	Food plant	Soil	Forest type
1	Sukinda	Baripada (Orissa)	<i>Terminalia arjuna, T. tomentosa</i>	Red Loamy	Tropical moist deciduous
2	Daba-TV	Khammam (Telangana)	<i>Terminalia arjuna</i>	Black Loamy	Tropical moist deciduous
3	Andhra local	RTRS Warangal (Telangana)	<i>Terminalia arjuna</i>	Red Loamy	Tropical moist deciduous

Table 2: Geographical aspects of ecoraces of *Antheraea mylitta*

Sl.No.	State	Latitude	Longitude	Altitude (m)
1.	Baripada, Orissa	22°12' 40"N	84.03"E	256
2.	Khammam, Telangana	19°40' 12" N,	78° 31' 48" E	264
3.	Warangal, Telangana	18° 0' 0" N	79. 58° 0 E	265.5

Observations indicated that range of distribution of *Antheraea mylitta* is almost between 18° 0' 0" N –22°56'67" N latitude; 78° 31' 48" E – 86°72' 00"E longitude and 244-554 meters of altitude (Table 2).

Rearing of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces) in *Terminalia arjuna* plantation at Kakatiya University, Warangal, Telangana, India

Table 3: Instar-wise Average Temperature (°C), and Average Relative Humidity (%) during rearing of Tasar silkworm, *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local ecoraces)

Instar	Temperature (°C)			Humidity (%)		
	Sukinda	Daba-TV	Andhra local	Sukinda	Daba-TV	Andhra local
I	31.4±3.15	29.8±1.89	29.8±2.27	89.68±7.16	90.5±3.20	89.2±4.02
II	33.3±1.58	29.5±2.59	28.9±1.62	86.78±6.61	82.2±3.10	82.8±3.70
III	30.54±0.97	29.1±2.47	29.4±2.28	87.98±7.92	87.9±4.70	84.9±3.57
IV	28.16±0.86	36.3±3.90	27.5±1.41	88.43±7.28	90.0±4.89	89.1±4.85
V	29.02±1.86	30.3±1.98	28.7±2.28	90.28±3.58	87.1±5.50	86.7±4.94

* The values are expressed in terms of Standard Error of the Mean.

The instar wise average temperature and its standard deviation of Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local) were 31.4±3.15, 33.3±1.58, 30.54±0.97, 28.16±0.86 and 29.02±1.86, 29.8±1.89, 29.5±2.59, 29.1±2.47, 36.3±3.90 and 30.3±1.98, 29.8±2.27, 28.9±1.62, 29.4±2.28, 27.5±1.41 and 28.7±2.28 in I, II, III, IV and V instar respectively (Table.3).

The instar wise average Relative Humidity and its standard deviation were 89.68±7.16 (S.D), 86.78±6.61, 87.98±7.92, 88.43±7.28 and 90.28±3.58, 90.5±3.20, 82.2±3.10, 87.9±4.70, 90.0±4.89 and 87.1±5.50, 89.2±4.02, 82.8±3.70, 84.9±3.57, 89.1±4.85 and 86.7±4.94 in I, II, III, IV and V instars respectively (Table. 3).

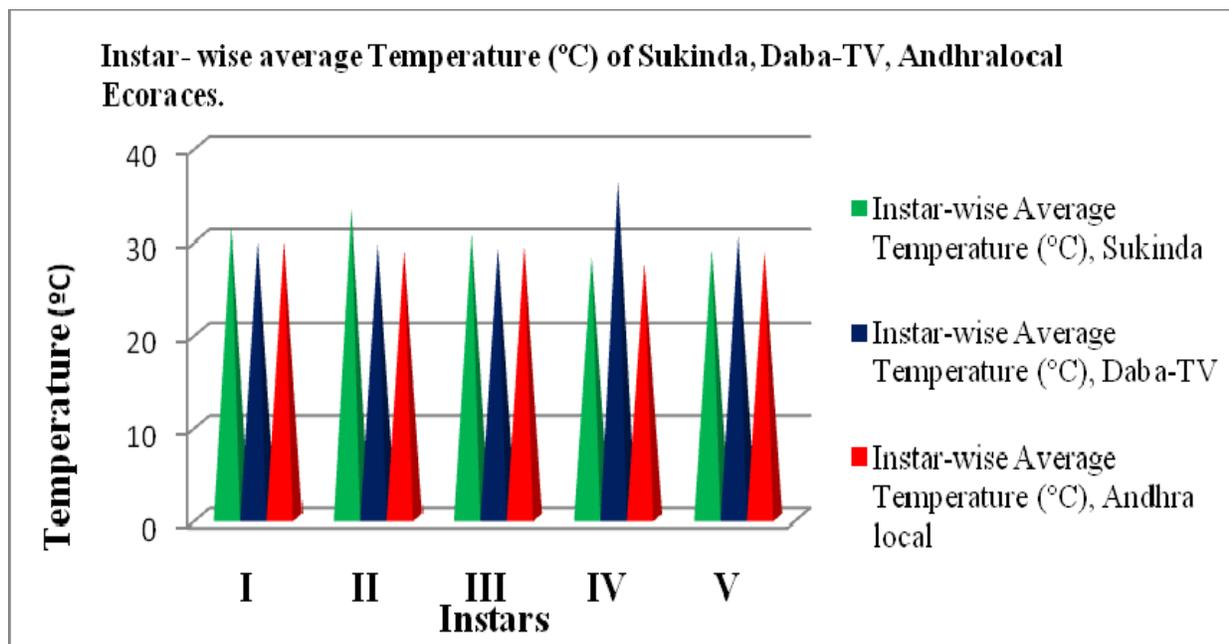


Fig 4: Instar-wise average temperature (°C) during rearing of tasar silkworm, *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

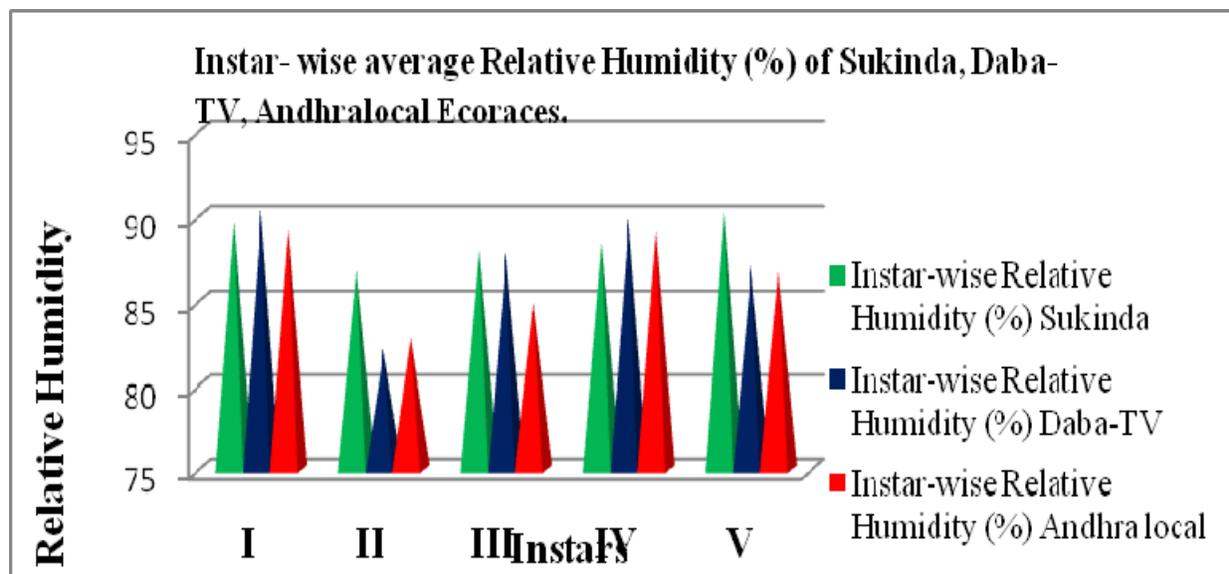


Fig 5: Instar-wise average relative humidity (%) during rearing of tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

Table 4: Instar-wise average larval Life span and Mortality during rearing of tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

Instar	Larval life span			Larval Mortality		
	Sukinda	Daba-TV	Andhra local	Sukinda	Daba-TV	Andhra local
I	6	6	6	30	31	18
II	5	8	7	26	38	12
III	7	9	8	21	17	13
IV	8	6	8	48	3	18
V	20	10	12	22	23	4
Total	46	39	41	109	112	65

The instar wise larval life span of Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces) were 6, 5, 7, 8, 20, and 6, 8, 9, 6, 10 and 6,7, 8, 8,12, in I, II, III, IV and V instars respectively. The instar wise larval mortality of

Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces) were 30, 26, 21, 48, 22 and 31, 38, 17, 3, 23 and 18, 12, 13, 18, 4 in I, II, III, IV and V instars respectively (Table. 4).

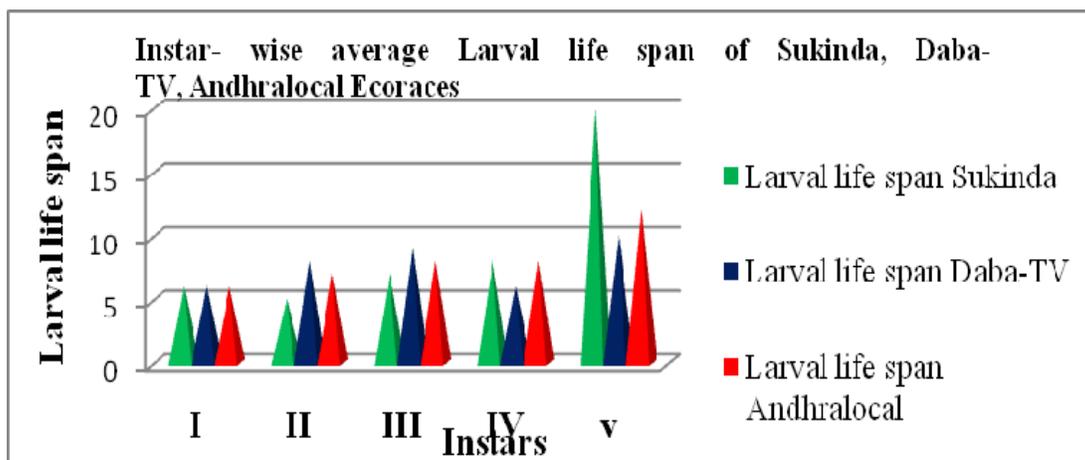


Fig 6: Instar –wise Average larval Life span during rearing of tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

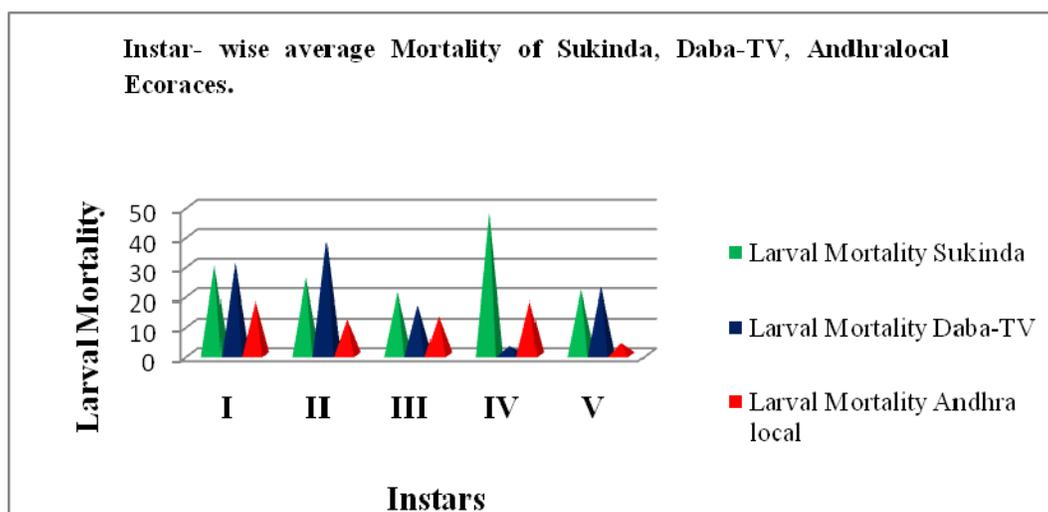


Fig 7: Instar –wise Average larval Mortality during rearing of tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

Table 5: Rearing Performance in Sukinda, Daba-TV, and Andhra local Ecoraces of Tasar silkworm, *Antheraea mylitta*

Ecorace Name	No. of Eggs	No. of worms brushed	Mortality	Percent Mortality	Cocoon yield	Predominant colour	Cocoon Shape
Sukinda	300	200	109	36.3%	48	Yellow	Oval
Daba-TV	256	144	112	43.7%	32	Light grey	Oval
Andhra local	125	85	65	52%	20	Whitish grey	Oval

Table 6: Instar-wise Average Larval length and weight during rearing of Tasar Silkworm, *Antheraeamylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

Instar	Avg. larval length (cm)			Avg. larval weight (g)		
	Sukinda	Daba-TV	Andhra local	Sukinda	Daba-TV	Andhra local
I	1.70±0.20	1.06±0.38	0.56±0.06	0.09±0.02	0.21±0.22	1.31±0.02
II	2.24±0.11	2.56±0.48	2.61±0.11	2.3±0.27	2.66±0.65	2.16±0.05
III	4.00±0.21	5.96±0.39	5.22±0.66	5.66±0.46	2.48±0.65	3.42±1.38
IV	7.26±0.42	10.78±0.97	9.96±0.46	8.6±0.5	18.46±1.25	19.44±4.39
V	11.31±0.73	12.92±1.41	13.32±1.55	11.3±0.73	27.85±0.92	24.17±0.66

* The values are expressed in terms of Standard Error of the Mean.

The instar wise average larval length (cm) and its standard deviation of Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV and Andhra local ecoraces) were 1.70±0.20 (S.D),

2.24±0.11, 4.00±0.21, 7.26±0.42 and 11.31±0.73, 1.06±0.38, 2.56±0.48, 5.96±0.39, 10.78±0.97 and 12.92±1.41, 0.56±0.06, 2.61±0.11, 5.22±0.66, 9.96±0.46 and 13.32±1.55, in I, II, III,

IV and V instars respectively. The instar wise average larval weight (g) and its standard deviation of was 0.09±0.02 (S.D), 2.30±0.27, 5.66±0.46, 8.60±0.5 and 11.30±0.73, 0.21±0.22,

2.66±0.65, 2.48±0.65, 18.46±1.25 and 27.85±0.92, 1.31±0.02, 2.16±0.05, 3.42±1.38, 19.44±4.39 and 24.17±0.66, in I, II, III, IV and V instars respectively (Table. 6).

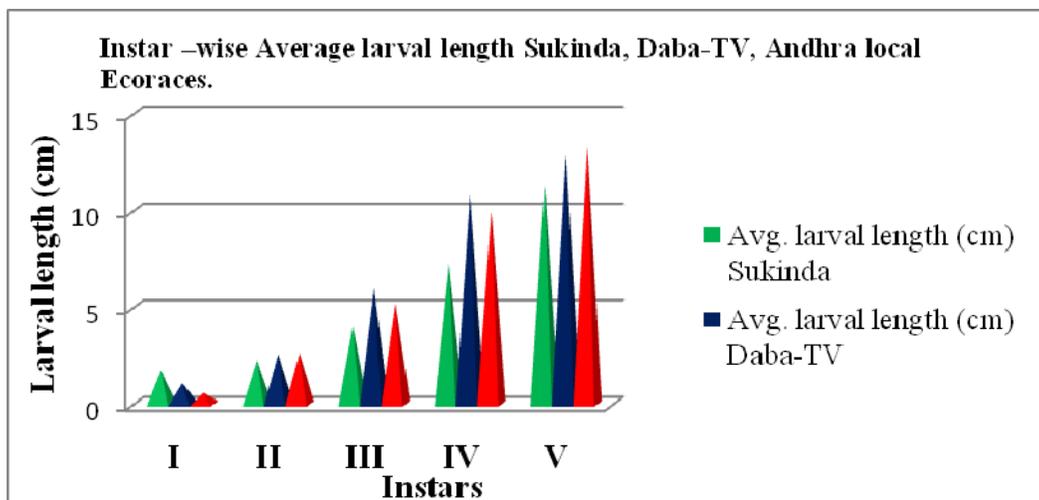


Fig 8: Instar-wise Average Larval length during rearing of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

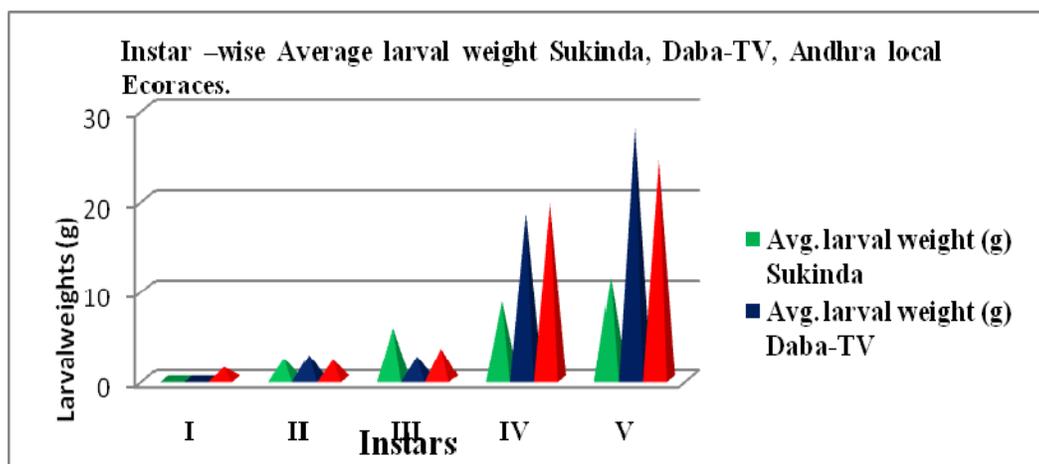


Fig 9: Instar-wise Average Larval weights during rearing of Tasar Silkworm, *Antheraea mylitta* (Sukinda, Daba-TV, Andhra local Ecoraces).

Table 7: Post cocoon characters of Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhralocal), Ecoraces

Ecorace	Cocoon Weight (g)	Pupal Weight (g)	Cocoon length(cm)	Cocoon width(cm)
Sukinda	6.40±1.43	6.53±1.24	4.29	2.47
Daba-TV	8.92±1.60	7.69±1.69	4.22	2.61
Andhra local	6.42±0.62	4.77±1.02	4.00	2.28

The values are expressed in terms of Standard Error of the Mean

The average cocoon weight, Pupal weight, Cocoon length (cm), Cocoon width of rearing Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhralocal) ecoraces, were Sukinda 6.40±1.43 (S.D) 6.53±1.24 (S.D), 4.29, 2.47, Daba-

TV 8.92±1.60 (S.D), 7.69±1.69 (S.D), 4.22, 2.61 while Andhra local 6.42±0.62 (S.D), 4.77±1.02 (S.D), 4.00, 2.28 respectively (Table. 7).

Table 8: Post cocoon characters of Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhralocal), Ecoraces

Ecorace	Shell Weight (g)	Shell Width (cm)	Shell Thickness(mm)	Shell ratio (%)	Reelability(%)	Denier
Sukinda	1.38±1.62	2.56	0.13	25.5	12.93	9.07
Daba-TV	1.23±1.58	2.49	0.192	13.7	7.76	9.07
Andhra local	1.64±0.54	2.36	0.42	25.5	13.37	7.75

The values are expressed in terms of Standard Error of the Mean

The average Shell weight (g), Shell width (cm), Shell thickness(mm), Shell Ratio, Reelability (%), and Denier of rearing Tasar silkworm *Antheraea mylitta* (Sukinda, Daba-TV, Andhralocal) ecoraces, were 1.38±1.62 (S.D), 2.56, 0.13,

25.5, 12.93, and 9.07, 1.23±1.58 (S.D), 2.49, 0.192, 13.7, 7.76 and 9.07, 1.64±0.54 (S.D), 2.36, 0.42, 25.5, 13.37 and 7.75 respectively (Table. 8).

Discussion

Rearing of Tasar silkworm, *Antheraea mylitta* (Sukinda, Daba TV and Andhra Local ecoraces)

In the present study, the natural habitats of Tasar Silkworm, *Antheraea mylitta* Drury, Sukinda ecorace, were explored and the geographical parameters were recorded as Latitude – 22.07°N, Longitude 84.01°E and 256 meters of altitude. Daba-TV is explored in their natural habitats and the geographical parameters were recorded as Latitude – 22°56'67" N, Longitude 85° 81' 67" E and 244 meters of altitude and Andhra local Ecorace of *Antheraea mylitta* is explored in their natural habitats and the geographical parameters were recorded as Latitude –18° 0' 0" N, Longitude 79.58°E and altitude 265.5 meters (Table. 2).

The *larval length* and *weight* were fluctuating instar-wise, the highest larval length was observed in Andhra local ecorace, while Daba TV has shown the highest larval weight (Table. 6). Though, Sukinda ecorace has shown longest larval life span (Table. 4), there was no corresponding increase in its larval weight. It was also observed that the *pupal weight*, *cocoon weight* and *cocoon width* were also comparatively higher in Daba TV, than Sukinda and Andhra local ecorace. The *shell weight* and *thickness* was also greater in Andhra local ecorace, intum indicating in its high *Reelability* and *low denier*, of this indigenous ecorace (Tables. 7 and 8).

Thus, Andhra Local ecorace of Tasar silkworm, *Antheraea mylitta*, which is an exclusive race of Warangal region, is well known for its superior commercial qualities. Owing to certain weaknesses like poor egg-laying behavior, voltinism, erratic emergence, non-uniform silk deposition in cocoons and pupal mortality, it is on the verge of extinction. It has hard and compact cocoons with high reelability but low yield, which has given way for the introduction of exotic races like Daba and Sukinda ecorace (Fig. 3). The ecoraces- Daba and Sukinda are available in many parts of tasar producing states as robust cocoons, Andhra Local ecorace is found in limited numbers in exclusive areas with their respective unique features. Hence the study suggests an urgent need to conserve the Andhra local ecorace by standardising the rearing methodology or explore on alternative food plants to enhance the rearing performance and cocoon yield, as the cocoon weight and subsequent post-characters directly depend on the nutrients supplied by host plants, methods to improve not only cocoon parameters, but also overcome the physiological weaknesses of Andhra local ecorace can be evolved. Earlier several attempts on indoor rearing^[7] and exploring potential host plants^[8, 9] to boost tasar culture were aimed at in this direction.

The low *cocoon yield* in Sukinda, Daba TV and Andhra Local viz., 48 for the 200 worms hatched (*i.e.*, 24%), 32 for 144 worms hatched (*i.e.*, 22.2%) and 20 for 85 worms hatched (*i.e.*, 23.5%) respectively, suggests poor adaptability in *ex-situ* conditions (Table. 5). In the present studies it was observed that the cocoon length and shell width of Sukinda were comparatively higher than those of Daba TV and Andhra local ecorace. Based on the significant observation that the shell weight of the cocoons obtained as considerably higher than those studied under natural conditions and the fecundity was also higher in these moths, the studies indicates that Sukinda ecorace can be considered for rearing in *ex-situ* conditions.

Earlier, several studies were conducted on Sukinda based on utilization of economic wild life, conservation of the associated environment for sustainable rural and tribal development^[10]. It was also revealed that semi domestication

for commercial exploitation can enhance potential of Sukinda under *in situ* because of better performance levels than the stocks maintained *ex situ*^[11, 12].

In the present studies, during *ex-situ* rearing of Tasar silkworm, *Antheraea mylitta* (Sukinda ecorace), though larval life period was increased and larval weight and cocoon parameters like cocoon weight, and shell width were observed lesser than the worms grown under natural habitats. The low cocoon yield of 48 for the 200 worms hatched (*i.e.*, 24%), also suggests poor adaptability in *ex-situ* conditions.

Significant difference in cocoon characteristics was observed for the Tasar Silkworms reared on different food plant species. Comparatively, higher larval weights resulted higher cocoon weights in *T. tomentosa*, *T. arjuna* and *T. belerica*, which might be due to better rate of quantity of food in-taken, digested and assimilated^[13]. The low cocoon yield in the present studies suggests poor adaptability in *ex-situ* conditions. However, a recent study conducted on multi locational trials, rejuvenation and preservation of Sukinda TV revealed that a pure line of Sukinda ecorace could be developed which started behaving equally at all the supplied places, which could result in the rejuvenation of dying natural treasure of Odessa^[14].

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