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Comparative Performance of Arjun for Tasar Silkworm Rearing in Vidarbha Region, India

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Abstract: Indian silk industry occupies a predominant position in the world with contribution of 15% of total world production. About 80% of silk production is contributed by China. In Maharashtra very few sections of the society are well acquainted with tasar and mulberry silk production. Sericulture in Maharashtra has a tremendous potential especially Western Maharashtra which has conducive environment and secondly it adjoins to Karnataka the premier Sericulture State of India. Sericulture in Maharashtra is not new, it is about three decades old, while in the tribal districts like Bhandara, Chandrapur, Gadchiroli and Gondia tasar cultivation is practiced for last 300 years. In the present study available host plants from Bhandara region of Eastern Vidarbha were used for study of *Antharaea mylitta* performance. Eastern Vidarbha is one of the hot spot of world biodiversity heritage, where very rich floral and faunal diversity is observed, many host plants of *A. mylitta* are available with good density, however, up to date it is observed that nobody has much focused on promotion of tasar silk and its host plant propagation, maintenance and utilization in Eastern Vidarbha. The present study showed that indoor early stage rearing of tasar and later stages in open environment would be a better option to get qualitative and quantitative cocoon production of *A. mylitta*. The present study also indicated that, among all the seasons rearing performance was good in autumn over rainy and winter season. Whereas among the food plants, performance for cocoon parameters like single cocoon weight, larval weight, shell weight, pupal weight etc., was observed better with *Terminalia arjuna* as a food plant and other plants are *Syzygium cumini* and *Ziziphus jujuba*.

Keywords: Tasar silkworm, *Terminalia arjuna*, *Syzygium cumini*, Vidarbha, *Antharaea mylitta*, *Ziziphus jujuba*

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Introduction

In India the silk are produced commercially through the cultivation of all four silk varieties viz., mulberry, tasar, muga and eri silkworms. Among non- mulberry, the tasar silk is produced by silkworm, *Antharaea mylitta* (D) and it is preferably used for commercially exploitation in

the tropical zone of India. In India, Maharashtra is one of the traditional tasar producing state and Chandrapur, Bhandara, Gondia and Gadchiroli districts in vidarbha are known for the traditional tasar silk production. The 44 eco-races of *A. mylitta* are confined to different ecological niches in India,

the eco-race Bhandara of *Antheraea mylitta* is native in the Vidarbha. The tribal families are involved in collecting the naturally available cocoons of *A. mylitta* from forest. *Antheraea mylitta* (Drury) eco-race Bhandara is a commercially important tasar silkworm with superior economic traits viz., tough cocoon shell, higher shell weight, higher silk ratio, low denier silk and disease resistance with the better luster. Due to its unchecked exploitation and collections by tribals, the natural population has decreased down and it has reached to the brink of extinction.

Tasar silkworm (*Antheraea mylitta*) is practiced in Eastern Vidarbha zone. There is great scope for rearing of Tasar silkworm rearing in Akola, Amravati, Buldhana and Nagpur district of Vidarbha. In forest area, host plants of Tasar silkworm are prevailing. On the basis of available resources this project was conducted to popularize the Tasar silkworm (Jadhav *et al.*, 2011)

Silk clothes have tremendous demand in Maharashtra and in other states. Silk farming has great capacity of self-employment with increase in demand every year by 16-20%. Mulberry cultivation can conserve environment as well as silk worm rearing, threading, clothing, and prevent migration of rural population to urban area. In Vidarbha region of Maharashtra State, particularly Gadchiroli, Bhandara, Gondia and Chandrapur District tasar sericulture is carried out on Yen and Arjun trees. Specially in Vidarbha (Silk and Milk) concept is held together. In this case from one acre of mulberry cultivation we can get money by selling of cocoon as well as by milk selling as branches and leaves of mulberry plant, remnants of mulberry food after eating and faeces of silkworms contain high amount of proteins and are provided as food to cattle. We can observe and study mulberry cultivation, silk worm rearing and threading combinely in State silk park on Amravati- Badnera road of Vidarbha. In Maharashtra State 18 districts motivate mulberry sericulture, while only 4 districts (Gadchiroli,

Bhandara, Gondia, Chandrapur) are involved in tasar sericulture. State directory of sericulture is at Nagpur and in all 22 districts are involved in sericulture. Weather in all districts of Maharashtra is suitable for mulberry cultivation. Silkworm rearing needs temperature about 25-28 C and moisture 65-85%. Opportunities to self-employment can be generated by selling leaves and branches of mulberry to sericulture center or silk worm rearing center, Sell of eggs/seeds for silk worm rearing, rearing of silkworm larvae and sell to other farmers, rearing of adult silkworm to produce cocoons, purchase of cocoon and separation of thread, making of silk clothes by handicrafts and by machine, Colouring and designing of silk clothes, making article such as bags and other handicraft material from silk clothes, Sell of silk clothes e.g. Paithani Sarees, and maintenance of these business, production of equipments essential for Sericulture and by managing sericulture maintenance center and its quality improvement and guidance center (Anonymous, 2008; Nimhare, 2017).

Materials and Methods

Tasar Silkworm, *Antharea mylata* eggs (20 dfls) were procured from Regional Tasar Breeding and Rearing Center, Armori District Gadchiroli. 20 dfls were kept in equal quantity in three rearing tray for hatching. Succulent branches of Arjun, Ber and Jamun tree were kept over hatched dfls of three different trays. Neonate larvae of Tasar Silkworm were climbed over succulent branches of three different hosts i.e. Ber, Arjun and Jamun in tray and these branches were tied to the selected trees of Arjun, Ber and Jamun for natural rearing. Host were covered with mosquito nets for the protection of released larvae from predators. Observations were recorded on first instar larval weight and fifth instar larval weight, cocoon weight, pupal weight, shell weight, total larval period and cocoon yield obtained from three different hosts for studies on economic parameters.

Results and Discussion

The experiment was conducted for three years (2009-10, 2010-11 and 2011-12) and results are presented in Tables 1-7. It is revealed that, the significantly maximum first instar and fifth instar larval weight i.e. 0.361 g and 12.666 g was recorded in rearing of Tasar silkworm larvae on Arjun host.

Similarly, highest cocoon weight (11.890 g), shell weight (1.293 g) and Pupal weight (10.601 g) were also noticed in rearing of Tasar on Arjun host. The minimum larval duration 48.76 days was also observed on Tasar silkworm rearing on Arjun tree. However, the other host viz., Jamun and Ber recorded lowest performance on above economic parameters. First instar larval weight and total larval duration of Tassar silk worm on Ber and Jamun host were at par with each other. The highest cocoon yield 347.666 g was obtained from rearing of Tasar silk worm on Arjun host. However, the minimum cocoon yield i.e. 232.190 g and 272.666 g was recorded on Jamun and Ber, respectively. Ghosh *et al.* (1996) also reported a positive and highly significant correlation existed between female moth weight and fecundity (by number and weight) which in confirmation with the present findings.

Pooled data presented in Table 1 revealed that significantly maximum first instar larval weight (0.361 g) was recorded on rearing of Tasar silkworm larvae on Arjun (*Terminalia arjuna*). The minimum larval weight of 0.305 g was observed in rearing of Tasar on Jamun host and found at par with Ber in which 0.311 g first instar larval weight was observed.

Maximum weight of fifth instar larva of Tasar Silkworm (12.666 g) was recorded on rearing of Tasar silk worm on Arjun host and found significantly superior to Ber and Jamun in which 9.999 g and 8.619 g larval weight were observed (Table 2).

Reddy *et al.* (2010) concluded in the studies the better availability of nutrients required for silk

production and egg fertility in *L. parviflora* food plant than *T. tomentosa* and hence, the leaf of *L. parviflora* can be fed during final larval stages to attain optimal silk and seed productivity in *A. mylitta* which supports the current studies.

Pooled data presented in Table 3 exhibited that Arjun was significantly superior over all the treatments and recorded the highest cocoon weight (11.890 g). The Ber host was second in order of merit recording 9.307 g cocoon weight and was followed by Jamun (8.153 g).

Pooled data presented in Table 4 regarding shell weight represent that highest shell weight (1.293 g) was recorded in Tasar silkworm larvae reared on Arjun host and found significantly superior over Ber and Jamun in which 1.158 g and 0.908 g shell weight was recorded, respectively.

Maximum Pupal weight (10.601 g) was recorded in rearing of Tasar silkworm larvae on Arjun host and found significantly superior over Ber and Jamun hosts in which minimum pupal weight i.e. 8.148 g and 7.247 g were recorded (Table 5).

From the pooled data presented in Table 6 it was observed that all the host significantly differ with each other. Minimum larval duration (48.76 days) was observed in rearing of Tasar silkworm on Arjun host and found significantly superior over others. Maximum larval duration was recorded on Jamun and Ber hosts in which 53.61 and 53.42 days, respectively required to complete total larval duration. However, both these hosts were at par with each other.

All the hosts were significantly differ with each other in respect of harvested cocoon yield from rearing of Tasar silkworm on three different hosts. Maximum cocoon yield (347.666 g) was procured from Arjun (*Terminalia arjuna*) and found significantly superior to Ber (*Zyzipus jujuba*) and Jamun (*Syzygium cumuni*) in which 272.666 g and 232.190 g cocoon yield was recorded, respectively.

Tasar silkworm rearing on Arjun tree was

found to be better in terms of reduction in larval duration and getting maximum larval weight, cocoon weight, shell weight, pupal weight and cocoon yield than ber and jamun tree in Vidarbha.

Barsagade *et al.* (2012) confirmed in their studies that *Antheraea mylitta* (Drury) eco-race Bhandara which is in habitat to the forest of Vidarbha region is commercially important tasar silk eco-race endowed with superior economic

Table1: Weight of 1st instar larvae of Tasar silkworm (g)

Treatment	Avg. wt. of first instar larvae of Tasar Silkworm			Total	Avg.
	2009-10	2010-11	2011-12		
Ber	0.325	0.31	0.297	0.932	0.311
Arjun	0.396	0.354	0.332	1.082	0.361
Jamun	0.311	0.312	0.291	0.914	0.305
F test	Sig.	Sig.	Sig.		Sig.
SEM ±	0.014	0.0006	0.007		0.006
CD at 5%	0.044	0.002	0.022		0.019
CV %	11.06	1.907	5.93		4.72

Table 2: Weight of 5th instar larvae of Tasar Silkworm (g)

Treatment	Avg. weight of 5 th instar larvae of Tasar Silkworm			Total	Avg.
	2009-10	2010-11	2011-12		
Ber	11.285	9.571	9.142	29.998	9.999
Arjun	12.714	13.142	12.142	37.998	12.666
Jamun	7.571	10.428	7.857	25.856	8.619
F test	Sig.	Sig.	Sig.		Sig.
SEM ±	0.29	0.388	0.477		0.178
CD at 5%	0.91	1.197	1.467		0.540
CV %	6.00	9.30	12.93		4.517

Table 3: Weight of Cocoon of Tasar silkworm (g)

Treatment	Avg. weight of cocoon of Tasar Silkworm			Total	Avg.
	2009-10	2010-11	2011-12		
Ber	10.154	8.614	9.153	27.921	9.307
Arjun	11.808	11.967	11.896	35.671	11.890
Jamun	6.765	10.268	7.427	24.46	8.153
F test	Sig.	Sig.	Sig.		Sig.
SEM ±	0.189	0.286	0.283		0.152
CD at 5%	0.597	0.883	0.878		0.462
CV %	5.307	7.386	7.916		4.119

Table 4: Shell weight of of Tasar silkworm (g)

Treatment	Avg. shell Wt. of of Tasar Silkworm			Total	Avg.
	2009-10	2010-11	2011-12		
Ber	1.174	1.222	1.079	3.475	1.158
Arjun	1.21	1.418	1.251	3.879	1.293
Jamun	0.645	1.275	0.803	2.723	0.908
F test	Sig.	Sig.	Sig.		Sig.
SEM ±	0.078	0.021	0.075		0.035
CD at 5%	0.241	0.066	0.245		0.110
CV %	12.087	4.352	13.855		8.897

Table 5: Weight of Pupa of Tasar silkworm (g)

Treatment	Avg. wt. of Pupa of Tasar Silkworm			Total	Avg.
	2009-10	2010-11	2011-12		
Ber	8.98	7.391	8.074	24.445	8.148
Arjun	10.597	10.562	10.644	31.803	10.601
Jamun	6.125	8.992	6.624	21.741	7.247
F test	Sig.	Sig.	Sig.		Sig.
SEM ±	0.18	0.288	0.264		0.146
CD at 5%	0.58	0.888	0.818		0.453
CV %	2.4	8.49	8.316		4.5

Table 6: Total larval duration of Tasar silkworm (days)

Treatment	Avg. total larval duration of Tasar silkworm (days)			Total	Avg.
	2009-10	2010-11	2011-12		
Ber	53.42	52.28	54.57	160.28	53.42
Arjun	49.71	46.57	50.00	146.28	48.76
Jamun	55.28	51.28	54.28	160.85	53.61
F test	Sig.	Sig.	Sig.		Sig.
SEM ±	0.23	0.59	1.15		0.41
CD at 5%	0.72	1.83	3.55		1.28
CV %	6.00	3.13	5.75		2.12

Table 7: Cocoon yield of Tasar silkworm (g)

Treatment	Avg. Cocoon yield of Tasar silkworm (g)			Total	Avg.
	2009-10	2010-11	2011-12		
Ber	327.142	292.714	198.142	817.998	272.666
Arjun	416.000	351.285	275.714	1042.999	347.666
Jamun	214.142	314.571	167.857	696.570	232.190
F test	Sig.	Sig.	Sig.		Sig.
SEM ±	13.14	2.94	8.72		5.735
CD at 5%	40.50	9.07	26.87		17.670
CV %	6.40	2.43	10.78		5.335

traits, viz., tough cocoon shell, higher shell weight, higher silk ratio (15.42%), low denier silk (8.0) and disease resistance with the better luster in comparison to other semi-domesticated eco-races. This is in accordance with the current study.

Ganvir and Khune (2020) reported that *Buchanania lanzan* (Spreng) as secondary host can be utilized for rearing of *Antheraea mylitta* after *Terminalia tomentosa* and *Terminalia arjuna* which supports the present study.

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