

Original Research

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Comparative economics of vanya with mulberry cocoon production in India

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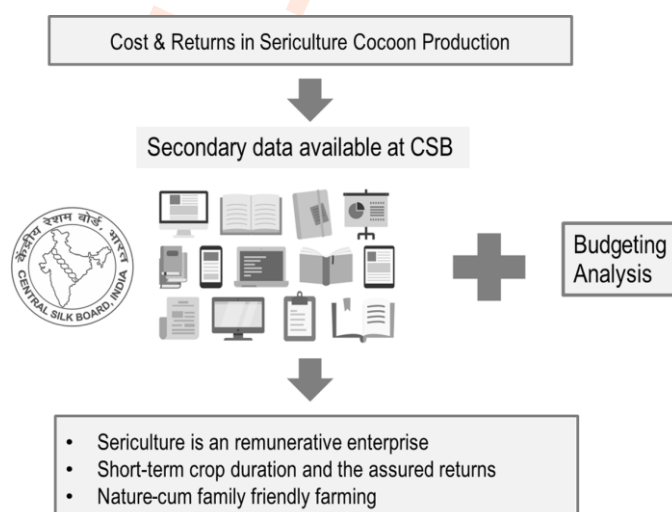
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Abstract

Aim: To compare the remunerativeness of Mulberry, Tasar, Eri and Muga based sericulture enterprises.**Methodology:** An empirical analysis was undertaken to compare the economics of mulberry and non-mulberry cocoon production in India, utilizing the available data from Central Silk Board using descriptive statistics and suitable ratios.**Results:** The study indicated that returns per rupee of investment in Mulberry (1.66), Tasar (1.60), Eri (1.88) and Muga (2.07) were higher compared to agriculture crop enterprises (National Silk Policy-2020), besides being of short duration with frequent assured income at least for three to six times in a year.**Interpretation:** The Mulberry and Eri silkworm cocoon production is highly remunerative enterprise and attracts the youths, because of its domesticated nature, short duration and women friendly enterprise.**Key words:** Cocoon production, Economics, Eco-friendly, Mulberry, Sericulture enterprises, Vanya

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Introduction

India is the second largest silk producer (40%) after China (54%) with CAGR of 4% and notable export earnings over the years (International Sericulture Commission, 2022). Sericulture in the nation is a subsidiary women-friendly activity and yields monthly/periodical income throughout the year. Sericulture is an eco-sustainable agroenterprise (Gregory and Brian, 2022). Currently, 34903 metric tons (2021-22) of raw silk is being produced in India (71% mulberry and 29% non-mulberry silk) with a 4% CAGR (Central Silk Board, 2015-2022a) reflecting the country's economy gains in terms of employment generation (~87.3 lakh persons) and foreign export (~Rs.1500 crores) earnings. Sericulture in India is a culturally practiced tradition by the farming communities, now it has turned into remunerative enterprise/venture across silk value chain since China's silk production has declined drastically in the last six years, i.e., from 170000 metric tons (2015) to 467000 metric tons (2021).

An analysis of the trends in international silk production (Central Silk Board, 2003) suggests that sericulture has better prospects for growth in developing countries like India than in the advanced countries. Accordingly, India has a bright scope (pleasure cum pressure) to lead the sericulture industry globally with diversified silk varieties (Mulberry in Southern India, North and North West India; Tasar in Central and Northern India and Eri and Muga in North-eastern India). Domesticated mulberry silkworm (*Bombyx mori*) is reared on *Morus* spp. across varied agro-climatic regions (tropical, sub-tropical and temperate) of India for cocoon production. Whereas tasar silkworm (*Antheraea mylitta*) rearing is restricted to Central and Northern regions on different host plants (*Terminalia arjuna*, *T. tomentosa* and *Shorea robusta*); Muga (*A. assamensis*) silkworm rearing is confined to North-eastern region on different host plants (*Persea bombycina*, *Litsea monopetala* and *L. salicifolia*) in out-doors; the semi-domesticated Eri silkworm (*Samia ricini*) is reared in North-east region and few areas of South India utilizing various host plants (*Ricinus communis*, *Manihot esculanta* and *Heteropanax fragrans*). Besides, it is known that India is the largest silk consumer and importer from other countries as domestic production of raw silk is not able to meet the industry requirements (Kumaresan, 2022).

To give further fillip for sericulture industry and self-sufficient, Government of India has implemented Centrally Sponsored Scheme (CSS) called Silk Samagra-2 (2021-22 to 2025-26) for transferring beneficiary oriented technologies through private and public players (State Sericulture Department, Line Departments, NGOs, Universities, etc.) across the states. Silk Samagra-2 has set a target of producing 46,500 metric tons raw silk with an Import substitute BV silk production metric tons of 12250 by the end of year 2025-26. For successful sericulture, supply of quality leaves (feed), races (breed), seeds (disease free) and favorable rearing seasons/climate is indispensable. Sericulture farmers expect more economic returns on incurring minimal expenditure in short duration without giving due

consideration for above mentioned factors. Hence, the present study aimed at testing the hypothesis of how remunerative is the sericulture enterprise (cocoon production) among the sericultural crops (Mulberry, Eri, Muga and Tasar).

Materials and Methods

The secondary data pertinent to costs and returns of Mulberry, Eri, Muga and Tasar cocoon production was collected from various reports/records of sericulture (Central Silk Board Annual Reports from 2015 to 2022 and CSB Seri-info Survey Report 2022b). The data was analyzed using complete budgeting technique with cost concepts (Subbareddy *et al.*, 2022; Manjunatha *et al.*, 2020a) and descriptive statistics (measure of central tendency and dispersions) for meaningful interpretations (Sahu, 2007). To compare the cocoon production enterprises in sericulture, Benefit: Cost (B:C) ratio indicator was also employed, as it reveals the returns per rupee investment on enterprise.

Results and Discussion

Table 1 to 3 provides information on sector-wise sericulture outline, costs incurred and returns realized from cocoon production across sericulture crops, share of expenditure incurred on major inputs in the total cost of respective cocoon production. The sector-wise sericulture profile across India depicted in Table 1 revealed that the maximum proportion of area was covered by V-1 mulberry variety for rearing silkworm hybrid FC1xFC2. In case of Eri, castor had more acreage in road-side followed by systematic/forest places, and local race of Eri silkworm was preferred for rearing either in bunch or tray method (Utpal and Das, 2010 a, b). Kessaru and Cassava are preferred as an alternative host plants for ericulture (Sakthivel, 2016) whereas som, Muga host plant was observed as maximum proportion utilized for Muga rearing with domesticated Muga silkworms. Similarly, Tropical Tasar area dominated with host plants of Arjun and Asan was observed in forest regions. Tasar silkworm rearing was conducted with daba eco races and CTR-14 on an average of two crops in a year (Vishak *et al.*, 2020).

Besides, intensity of silkworm crops (number of crops per year) was highest in mulberry followed by Eri, Tasar and Muga sectors, which is well reflected in the quantum of silkworm intake by the farmers. Further, the rearing profile of each sector indirectly reveals the rate of technology adopted at field level (Khan *et al.*, 2022). Accordingly, the concerned state departments/players should chalk-out the right action plans for strengthening the areas in adopting technologies at higher rate (like replacing local silkworm races/hybrids, host plant varieties, mountages, traditional system, etc., with latest technologies/ practices), as developed by Central Silk Board R&D institutes. The results revealed that the returns per rupee of investment (B:C ratio) in cocoon production was higher in Muga (2.07), followed by Eri (1.88), Mulberry (1.66) and Tasar (1.60). Though the Muga cocoon production is more profitable, its area coverage is miniscule (Table 1). Besides, Muga (polyphagous) has emerged

Table 1: Sector-wise sericulture outline in India

Particulars	Mulberry	Eri	Muga	Tasar
Raw Silk Proportion (34903 metric tons, 2021-22)	74.03%	21.07%	0.73%	4.17%
Major Location	Southern and N & NW India	North East India	North East India	Central & East India
Avg. Plantation Area (Acre)	1.7 (0.4-2.5)	0.8 (0.5-1.24)	1.2 (0.6-2.1)	5.16 (0.8–6.95)
Plantation Type	Bush & Tree	Road-side (53%), Systematic & Forest	Block (69%) & Forest	Forest (71%) followed by Block plantation
Plant Varieties	V1 (60%), S-1635 & S-1	Castor (39%) & Kesseru	Som (85%) & Soalu	Arjun & Asan (50-68%)
Avg. No. of Crops	Five (1-10)	Two (1-5)	Two (1-3)	Two (1-3)
Silkworm	FC1xFC2,	Eco race	Domesticated race	Daba, Eco race
Hybrid/Breed	SK6xSK7 & ICBs	& C-2	& CMR series	& CTR-14
Avg. Dfls Reared/Crop	616 (200-1200)	60 (50-100)	150 (120-300)	338 (90-500)
Dfls Source	CSB, DoS & Private grainages including chawki supply	DoS & CSB	DoS & CSB	CSB & DoS
Rearing Type	Shoot (70%) & Tray	Bunch & Tray	Tree	Tree
Mountage Type	Plastic, Bamboo & Rotary	Jali	Jali	–
Avg. Cocoon Yield	70 kg/100 dfls	8.92 kg cut cocoons/ 100dfls (44kg Pupae)	47 cocoons/dfl	39 cocoons/dfl
Cocoon Price Range	350-800/kg	600-1200/kg (Pupa: 300-400/kg)	3-4/cocoon	4-5/cocoon
Silk Yarn Price Range (Rs.)	4000-5000/kg	2500-3500/kg	25000-32000/kg	4000-5000/kg

Table 2: Cost & returns of Mulberry, Muga, Eri and Tasar silkworm cocoon production per ha per year

Crop	Total cost (Rs)	Gross return (Rs)	Yield (‘00 kg)	Net return (Rs)	Production cost (Rs/unit)	B:C
Mulberry	311930	516750	13	204820	235.42/kg	1.66:1
Muga	115930	240000	960**	124070	1.20/cocoon	2.07:1
Eri	190745	344000	0.8 (2.4*)	153255	867.02/kg	1.88:1
Tasar	30000	90000	900**	50000	2.80/cocoon	1.60:1

Note: ** Cocoon in ‘00 numbers & *Pupa

Table 3: Sector-wise production costs comparisons on input resources

Crops	Leaf	Labour	Dfls	Disinfection	Infrastructure/ Fixed cost apportion
Mulberry	41%	32% + Family	12%	4%	5-6%
Muga	10% + Forest	Family	2%	1-2%	<1% (Rearing @ Forest/Block)
Eri	30% + Road Side	Family	3%	1-2%	5-8%
Tasar	10% + Forest	Family	2%	1-2%	<1% (Rearing @ Forest/Block)

as profitable since its cocoon production requires relatively lesser inputs such as robust ecoraces, more reliance on family labour, meager application of disinfectants and rearing on forest plantation (Pandey *et al.*, 2010). Whereas, mulberry silkworm cocoon production is intense (wrt area coverage and frequency)

in South India and solely depends on *Morus* spp. with systematic and advanced rearing practices (Choudari *et al.*, 2020; Manjunatha *et al.*, 2020b). In terms of total or net returns, the Mulberry sector occupies first position followed Eri, Muga and Tasar (Table 2). Further, the risk element is crucial in success of

sericulture enterprise. It is lower in case of Mulberry and Eri crops because of indoor rearing practices and organized marketing system. The study is undertaken in relevance to test the hypothesis of how remunerative is the sericulture enterprise (cocoon production) among the sericultural crops (Mulberry, Eri, Muga and Tasar). In toto, sericulture has emerged as a remunerative enterprise, especially in Mulberry and Eri cocoon production (Soundarya *et al.*, 2022; Jayaprakash *et al.*, 2008; Sakthivel *et al.*, 2010) as compared to the remaining and even other crop enterprises (CSB-National Silk Policy, 2020b), as, sericulture assure returns at least three to six times in a year, even ten times per year in the southern states of India mulberry sericulture (Dewangan, 2013).

Tasar and Muga are reared in outdoors/natural conditions (tree based rearings without any controlled condition like Mulberry and Eri) and had chances to crop losses by sudden climate and pest outbreaks (Gadad *et al.*, 2022), otherwise investment for enterprise is always low as compared to Mulberry and Eri silkworm rearing. Besides, it is a nature-cum family friendly farming under the concept of eco-economical life cycle assessment (LCA). Quality leaves (feed), races (breed) and seeds (disease free) are the crucial inputs deciding success of cocoon production, besides rearing skills and marketing (Afroz *et al.*, 2018). The cocoon production activity across the sectors has emerged as remunerative (return per rupee investment in Mulberry: 1.66, Tasar: 1.60, Eri: 1.88 and Muga: 2.07) attracting the youths to become entrepreneurs in sericulture industry (Manjunatha *et al.*, 2021).

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