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A comprehensive analysis of silk production: Economic viability and market potential of Kanker District of Chhattisgarh

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Abstract
The study was conducted on "A Comprehensive Analysis of Silk Production: Economic Viability and Market Potential of Kanker district of Chhattisgarh". Kanker and Charama blocks were selected for study purpose. Five self-help groups (SHG's) engaged in mulberry silk production were selected from two blocks of Kanker district and total 60 mulberry silk growers were selected by using random sampling techniques. The study of socio-economic characteristics of selected mulberry growers was based on primary data and it was found to be 63.37% mulberry growers comes under the ST category was highest out of all social group, 61.66% mulberry growers comes under 30 to 60 year age which was highest in all age category and 45% mulberry growers were experienced in this field 6 to 10 year. The cost is divided into two parts, in the first part it was mentioned about the total establishment and maintenance cost of overall farms which is governed by the government agency (sericulture department). These initial investment cost/ establishment cost and maintenance during gestation period was observed as Rs. 99,349.5 and 24,244.75 per hectare for mulberry orchard (*Morus alba*) respectively. Second, variables cost governs by SHG's for mulberry silk production. It was estimated that the overall level per hectare cost of mulberry silkworm rearing was found to be Rs. 3,669.34. The per hectare net profit for SHG's at input cost of mulberry silk, was found to be Rs. 2,02,455.49, overall benefit-cost ratio for SHG's was found to be 1:56.14 however overall input-output ratio for SHG's was found to be 1:56.14. The marketing channel for mulberry silk was identified i.e. channel –I (cocoon growers – cocoon bank – private traders) but sometimes channel-II was rarely identified in the study area. Marketing efficiency was found to be higher in the channel-I for 'ºC grade mulberry cocoon' 5.5. The major constraints of production and marketing of mulberry silk was observed as fluctuation in weather leads to effect of silkworm, problem of pest and disease of silkworm, monopsony (*Single buyer*), and poor quality of silk. In view of finding of the study it was suggested that the sericulture department should develop weather tolerant mulberry silkworm races. So, that mulberry silkworm can be reared even in adverse climate condition and insect, pest and disease regarding there is a need to organize various extension activities through training, demonstration facilities should be provided, and the government should arrange for development of require infrastructural facilities in the local markets. So that the SHG's or mulberry growers will get competitive price for their produce.

Keywords: SHG's, B:C ratio, input-output, mulberry, cost and return

Introduction
Mulberry silk, known for its lustrous texture and exquisite quality, has been an integral part of Indian's rich cultural heritage for centuries. As one of the largest producers of silk globally, India has witnessed remarkable growth in mulberry silk production, contributing significantly to the country's economic and social fabric. "Sericulture" means cultivation of silkworms, which finally produces silk. Traditionally, Indian economy is largely dependent on the success of agriculture and allied farm activities as more than 70 percent of the people's livelihood security is depending on this sector. It being an agro-based enterprise plays a predominant role in shaping the economic destiny of the rural people and fits very well in India's rural structure. It is structure comprising of mulberry cultivation, silkworm rearing, silk reeling and fabric weaving spreads across the agriculture sector, industrial sector as well as cottage industries and export units. Thus, sericulture plays a pivotal role in economic development of the country by generating employment, income, as well as foreign exchange. It is spread all over India, while it has a long-standing tradition in states such as Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu & Kashmir. It has significant presence also in several non – traditional states such as Uttar Pradesh, Madhya Pradesh, Orissa, Bihar and the North – Eastern states.

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Chhattisgarh State, which holds a prominent position in the production of Kosa in the country, has given a special identity to the State by its traditional charming silk clothes. Koriya district of Sarguja division is one of the leading districts in terms of cocoon production in the state of Chhattisgarh. 2021-22 Last year, 14 lakh 89 thousand 581 pieces of Kosa were produced here. As compared to last time, this time there has been an increase in the production of 4 lakh 27 thousand 763 pieces of Kosa.

Objectives
1. To study the socio-economic characteristics of selected mulberry growers.
2. To estimate cost and return from mulberry silk production in study area.
3. To examine the marketing pattern of mulberry silk in study area.
4. To identify the production and marketing constraints and suggest suitable measures to overcome them.

Materials and Methods
Kanker district is comprises of seven blocks i.e., Antagarh, Bhanupratappur, Charama, Durgkondal, Kanker, Koyalibeda, and Narharpur, in which 2 block (Kanker and Charama) were selected purposively for the study based on maximum mulberry silk production. Five-mulberry seed centre selected from Kanker and Charama blocks, on the basis of maximum coverage area under the Mulberry cocoon production. In which each center has a Self-Help Group (SHG's) involved. Each SHG's has 10 to 12 members who are producing mulberry cocoon at the centre. Sample of five villages were randomly selected for the present study *viz*: Makdi, Kodejunga, Nathiya Navagoan, Bardevari, and Parsoda.

Analytical tools
Estimation of cost and return
The total cost of cultivation was divided into
1. Establishment costs
2. Maintenance costs

To work out the cost and return of Mulberry silk production in study area Total cost = Total fixed cost +

Total variable cost

Gross income (Rs.) = Total Yield (kg) * Market Price of the Mulberry cocoon (Rs./kg)

Net income (Rs.) = Gross income – Total cost
Input Output Ratio = Gross income/Total cost
Benefit Cost Ratio = Net come/Total cost

Constraints in production and marketing of Mulberry silk Garrett's ranking technique
The garret's ranking method were used to rank the constraints faced by SHG's in rearing, collection and marketing of Mulberry cocoon

$$\text{Percentage position} = \frac{R_{ij} - 0.5}{N_j} \times 100$$

Where,
R_{ij} = Rank given for ith constraint by jth individual.
N_j = Number of constraints ranked by jth individual

Results and Discussion
Cost and return of mulberry silk production
Per hectare cost of cultivation of mulberry sericulture under rainfed condition is presented in table 1, 4. This expenditure is paid by the sericulture department for plantation and establishment of mulberry garden In the study area establishment cost calculated for one-hectare mulberry garden (*Morus alba*) in the Kanker district of Chhattisgarh. The average total establishment cost of mulberry garden in Kanker district was estimated ₹ 99349.5 per hectare. The highest cost item of expenditure was incurred on labour costs per hectare which was worked out to be ₹ 53200 per hectare, constituting 53.54 percent to total establishment cost, followed by material cost per hectare which was ₹ 32659.5 per hectare, contributing 32.87 percent of total establishment cost. After that machinery cost per hectare was worked out ₹ 11180 and constituting 11.25 percent to total establishment cost, and miscellaneous cost per hectare ₹ 2310 (2.32 percent) were considered the other major component of the overall average establishment cost of the orchard.

Table 1: Establishment cost Ist year governs by the government agency (Sericulture department) (Rs./ha)

S. No.	Particular	Unit of measurement	Requirement per 1 ha	Rate per unit of measurement (Rs.)	Cost (Rs.) per 1 ha.
	A. Material Costs				
I	**During Nursery Preparation time**				
1	Mulberry cuttings	pieces	12000	1	12000
2	Polythene tube or bag	kg	18	140	2520
3	CDM	cft	100	15	1500
4	Sand	cft	32	10	320
5	Soil	cft	90	3	270
6	Neem cake	kg	20	20	400
7	Urea	kg	2	8	16
8	SSP	kg	55	15	825
9	Carbendazim 12% wp (fungicide)	gm	30	310	310
10	Gunny bag	piece	8	30	240
II	**During Plantation time**				
1	CDM	cft	235	7.5	1762.5
2	Cow dung 2 kg / Plants	qtl	45	110	4950
3	Urea	kg	68	8	544
4	Imidacloprid ai70% w/w insecticide	ml	100	439	439
5	chlorpyrifos 50% EC	ml	500	551	551
7	Growth hormone Micronutrients etc.	ml	500	624	624

8	Permanent Fencing					5388
	Total					32659.5
B. Labour Costs						
I	**During Nursery Preparation Time**					
1	Cutting collection	Man Days	2	190		380
2	Cutting sorting	Man Days	4	190		760
3	Cutting soaking	Man Days	2	190		380
4	Shade preparation	Man Days	2	190		380
5	Growing media	Man Days	5	190		950
6	Bag filling	Man Days	8	190		1520
7	Germinated cutting Selection	Man Days	4	190		760
II	**During Plantation time**					
1	Land cleaning	Man Days	18	190		3420
2	Lining and staking	Man Days	15	190		2850
3	Pit Digging (50 pits / MD)	Man Days	82	190		15580
4	Mixing biomass and filling in the pit	Man Days	30	190		5700
5	Plantation (115 pit/MD)	Man Days	40	190		7600
6	irrigation	Man Days	20	190		3800
7	weeding	Man Days	20	190		3800
8	Watch and ward	Man Days	46	190		8740
	Total					53200
C. Machinery Costs						
1	Transport of manure	hour/tractor	6	650		3900
2	Transport of	hour/tractor	3	260		780
	Neem cake, fertilizers, Micronutrients, Growth hormone					
3	Transport of water for watering	hour/tractor	10	650		6500
	Total					11180
D. Miscellaneous Costs						
1	During Nursery Preparation Time					620
2	During Plantation time					1690
	Total					2310
	Cost A+B+C+D	A. Material Costs				32659.5 (32.87)
		B. Labour Costs				53200 (53.54)
		C. Machinery Costs				11180 (11.25)
		D. Miscellaneous Costs				2310 (2.32)
		Over all total cost				99349.5 (100)

(Figures in parentheses are the percentage to the total cost)

Table 2: Maintenance cost of mulberry orchard in Kanker district of Chhattisgarh (Rs. ₹/ha)

S. No.	Particulars	IInd	IIIrd	Year IVth	Current Year 22- 23	Total Cost (Rs)	Average Cost / Annum (Rs)
1	Manure and Fertilizers	4560	6258	8015	9773	28606	7551.5 (31.14)
2	Plant Protection	1460	1530	1540	1550	6080	1520 (6.26)
3	Pruning and cutting (15 days)	4050	4050	4342	4635	17077	4269.25 (17.60)
4	Interculture and hoeing(10days)	2700	2750	2920	3090	11460	2865 (11.81)
5	Gap filling	1854	1854	2472	3090	9270	2317.5 (9.55)
6	Watch and ward	4392	4740	4830	4921	18883	4720.75 (19.47)
7	Miscellaneous	1213	1427	1463	1500	5603	1400.75 (5.77)
	Total operational Cost	20229	22609	25584	28559	96979	24244.75 (100)

It can be seen from the table 3 the per hectare operational cost of mulberry plant (*Morus alba*) maintenance between ₹ 20229 to 25584 from second year to fourth year. The operational cost goes on increasing up to fourth year of the establishment of an orchard and thereafter it becomes more or less stabilized. Current year cost was found to be ₹ 28559. The average operational cost from first to current years were found to be ₹ 7551.5 on manure and fertilizers (31.14%), ₹ 1520 on plant protection (6.26%), ₹ 4269.25 on pruning and cutting (17.60%), ₹ 2865 on interculture operation (11.81%), ₹ 2317.5 on gap filling (9.55%) and ₹ 4720.75 on watch and ward (19.75%) and ₹1400.75 on miscellaneous (5.77%) in mulberry cultivation per hectare annually respectively.

Table 3: cost and return from mulberry silk production in Kanker district (Rs/ha/annum)

S. No.	Particulars	SHG's I	SHG's II	SHG's III	SHG's IV	SHG's V	Overall
1	Cost for Government	49082 (91.63)	52358 (92.63)	42346.72 (91.69)	50357.23 (94.02)	38512.79 (93.52)	46531.34 (92.69)
2	Cost for SHG's	4479.62 (8.27)	4164.42 (7.27)	3835.81 (8.21)	3202.69 (5.98)	2664.98 (6.48)	3669.34 (7.31)
	Total Cost	53561.62	56522.42	46182.53	53559.92	41177.77	50200.68

			(100)	(100)	(100)	(100)	(100)	(100)
3		Return						
(a)	Silk Yield (in numbers)	Qty. (Kg)	526	478	492	472	367	467
		Value (Rs.)	233350	211500	215375	209875	160525	206125
(b)	Gross income for SHG's		233350	211500	215375	209875	160525	206125
(c)	Net income for SHG's		228870.38	207335.58	211539.19	206672.31	157860.02	202455.49
(d)	B:C Ratio for SHG's		51.09	49.78	55.14	65.53	59.23	56.14
(e)	Input- Output Ratio for SHG's		1:51.09	1:49.78	1:55.14	1:65.53	1:59.23	1:56.14
(f)	B:C Ratio from total cost		4.27	3.66	4.58	3.85	3.83	4.03
(g)	Input- Output Ratio from total cost		1:4.27	1:3.66	1:4.58	1:3.85	1:3.83	1:4.03

(Figures in parentheses represents percentage to the average cost per annum)

Marketing pattern of mulberry silk

Marketing channel is the path or route for any product as it moves from the producers to the consumer. In the context of marketing different intermediaries who hold responsibilities to move the outputs or the products from the producer to the consumer. The chain of these intermediaries is known as marketing channels." in other words a marketing channel is the people, organizations and activities necessary to transfer the ownership of goods from the point of production to the point of consumption. It is the way products get to the end-user the consumer, and is known as a distribution channel. In the study area, two marketing channels found in the study area was channel – I. and Channel- II but Channel - I the most commonly used for the Mulberry silk grower of in the Kanker district.

Constraints in the production and marketing of silk

Table 4: Constraints faced by mulberry silk producer (No. of Respondent = 60)

S. No.	Particulars	Mean score	Rank
Problems faced during mulberry silk production			
1	Fluctuation in weather leads to effect of silkworm	68.31	I
2	Problem of Pest and diseases of silkworm	61.75	II
3	Training about improved method of rearing is no level t satisfactory	57.98	III
4	Unavailability of good quality plantations	47.61	IV
5	Improper knowledge in the use of disinfectants	45.46	V
6	Unavailability of inputs in time	44.83	VI
7	Difficulty in obtaining DFL's	39.18	VII
Problems faced in marketing of silks			
1	Monopsony (*Single buyer*)	68.86	I
2	Poor quality of silk	59.46	II
3	Lack of reasonable price	55.01	III
4	Fail to make timely payment	43.21	IV
5	High Transportation Cost	40.61	V

Conclusion

The yield and returns from mulberry cocoon production in Kanker district. Gross returns and yields per hectare were computed for SHGs of different sized. The overall gross returns realized by the mulberry cocoon producers amounted Rs. 2, 06,125. SHG's Group I generated the highest gross returns (Rs. 2,33,350), followed by SHG's Group III (Rs. 2,15,375), SHG's Group II (Rs. 2,11,500), SHG's Group IV (Rs. 2,09,875), and SHG's Group V (Rs. 1,60,525), respectively. Overall, SHG's net returns from mulberry cocoon production were estimated to be Rs.2,02,455.49. On an overall basis, the benefit-cost ratio for SHGs was 56.14 per hectare. SHG's Group IV had the highest B:C Ratio (65.53), followed by SHG's Group V (59.23), SHG's Group III (55.14), SHG's Group I (51.09), SHG's Group II (49.78), in that order. SHGs had a greater than one benefit-cost ratio. The input-output ratio for SHG's at an overall level per hectare per annum was 1:56.14. The input-output ratio for SHG's were highest 1:65.53 in SHG's Group IV followed by SHG's Group V 1:59.23, SHG's Group III 55.14, SHG's Group I 1:51.09, and SHG's Group II 1:49.78, Respectively. It is also reveled that dummy silk production constraints fluctuation of weather lead to effect of silkworm was the major problem represented by 68.31% respondent followed by the problem of pest and disease of silkworm which was represent by 61.75% respectively.

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