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Studies on cost and returns of cocoon production among different farmer groups in Traditional districts of Tamil Nadu

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Abstract
The present study has was conducted to find out the cost and returns of cocoon production among various farmers' category in the Traditional districts of Tamil Nadu such as Dharmapuri, Salem, Namakkal and Perambalur in North Western Zone. In total, 45 farmers of marginal, small and medium level land holders were randomly selected for the study and thus, the total sample size was 45. The results showed that the cost for the cocoon production for marginal farmers was found to be Rs. 3,28,962.53 and the returns from the cocoon and the waste were Rs. 6,95,320.20. Whereas, the cost for the cocoon production for small farmers was found to be Rs.3,70,544.47 and the returns from the cocoon and the waste were Rs.796138.90. Similarly, in medium farmers' category, the cost for the Cocoon production for medium farmers was found to be Rs.3,96,102.52 with the returns from the cocoon and the waste was Rs.9,15,569.30. Therefore it is inferred that the benefit cost ratio is higher for the medium farmers which is about 1:2.31. So, both the cost and the returns of cocoon production were high in case of medium farmers followed by small and marginal farmers.

Keywords: Sericulture, traditional districts, mulberry, economics, cocoon, farmers, cost to benefit ratio

Introduction
commercial silks, *viz*., Mulberry, Tasar, Eri and Muga silks. The raw silk production of India was 35,261 MT with a mulberry cultivation area of 2,45,000 ha during 2018 - 19. The non-mulberry silk types such as Tasar and Eri silks contributed primarily for the growth in the silk production during the recent years in India. In India, mulberry sericulture is mainly followed in states like Tamil Nadu, Karnataka, Andhra Pradesh, West Bengal and Jammu & Kashmir which are considered as the traditional and non-traditional Sericulture areas.

Eventhough Karnata contributed for major share in silk production across India, Tamil Nadu stands first in in Bivoltine silk production (1914 MT). However, the silk demand is around 3,000 MT. The traditional districts can meet out this demand through mulberry area of 3,071 ha. Sericulture is an important venture plays an important role in rural employment generation and thus ensures minimum sustainable income round the year (Lakshmanan With *et al*. 1998) [7] the advent of production technologies for new bivoltine sericulture technologies, the sericulture productivity is in increasing trend. However, there are some significant changes are to be included in the nature, quantity and cost of input used in sericulture in order to maximize the yield and profit. In relation to this Hence it is very important to find out the ways to increase the profit from sericulture across India (Ravindran *et al.*, 1993, Lakshmanan *et al.*, 1996) [10, 8].

In India, Tamil Nadu is one of the pioneer state in mulberry sericulture and predominantly grown in western zone (Coimbatore, Tiruppur, Erode, Dindigul and Theni) and North Western zone (Dharmapuri, Krishnagiri, Salem, Namakkal and Permabalur). Hence it is very clear that there would be a vast potential to improve sericulture. In these contexts an attempt was made to compute and compare the economics of silk production while adopting various developed sericulture technologies exclusively in Traditional districts of Tamil Nadu. constitutes 42.66 per cent to the total mulberry area in Tamil Nadu.

Materials and Methods
The study was conducted in the major traditional districts of North Western Zone of Tamil Nadu such as Dharmapuri, Salem, Namakkal and Perambalur.

In total, 45 farmers of marginal, small and medium level land holders were randomly selected for the study and thus, the total sample size was 45. A random Sampling procedure was adopted for selection of farmers. In consultation with the officials of the Sericulture Department, a specially prepared questionnaire was prepared for data collection to have personnel interview with farmers. The primary data was collected through direct personal interview from farmers with the help of well structured and pre-tested schedule pertaining to socio-economic profile, area under mulberry, their cost and returns, cocoon production and marketing cost and return obtained including value of by-products. The statistical tools like mean and percentages are used to analyse the objective of the study. Simple cost accounting method was adopted to compute the cost and return from moriculture and silkworm rearing in unit area per year. Using the simple random sampling method, farmers who are holding the separate rearing house were selected for the study and these details have been collected from Department of Sericulture, Salem. The collected data were subjected to percentage analyses, to compare the economics of sericulture technologies. Generally, the silkworm rearing is end up with the cocoon production which is in combination with mulberry production together accounted as total cost of production. Also, the benefit cost ratio worked out for total silk production.

Results and Discussions

The present study clearly showed that Tamil Nadu contributes a mulberry area of 20,128 ha in which Traditional districts has 3,071 ha. The total cost of establishment of mulberry garden for the marginal farmers was Rs. 1,23,170/ha. (Table 1). Whereas, the total cost of mulberry leaf production was Rs. 1,52,547.60/ha/year. Among various costs, money incurred on chemical fertilization (Rs. 22,500/- and 27,500/-) and human labourers (Rs. 22,433.75 and 75,565/-) contributed major shares of 18.27 and 18.03 and 18.22 and 49.54 per cent during establishment of mulberry garden and leaf production respectively than all other expenses. It was recorded the gross return value of Rs. 6,95,320.20/ha/year through sales of cocoon. The total costs include the total fixed cost of Rs. 1,62,353.87/ha/year and the variable cost of Rs. 2,89,778.66/ha/year which gives Rs. 3,28,962.53/ha/year as total cost of cocoon production (Table 2). Hence the net income generated was Rs. 366357.67 /ha/year with the benefit cost ratio of 1:2.11 (Table 3).

The total cost of establishment of mulberry garden for the small farmers was Rs. 1,30,056.95/ha (Table 4). The total cost of mulberry leaf production was Rs. 1,64,191.56 /ha/year (Table 5). The return value of cocoon was Rs. 7,96,138.90/ha /year. As it was recorded during previous case, similar trend of maximum contribution by chemical fertilization and human labour was registered in mulberry cultivated by small farmers. The total cost of cocoon production was Rs. 3,70,544.47 with the total fixed cost and variable costs of Rs. 44,867.20 and Rs. 325677.27 have been recorded respectively and these were cumulatively accounted as Rs 3,70,544.47 /ha /year as total cost of cocoon production. At last, the net income generated was Rs. 4,25,594.43 /ha/year with the benefit cost ratio of 1:2.148 (Table 6).

The total cost of establishment of mulberry garden for the medium farmers was Rs. 1,37,653.00 /ha (Table 7). The total cost of mulberry leaf production recorded as Rs 1,79,480.56 /ha/year (Table 8). As it was mentioned in previous cases, the cost incurred on human labour and chemical fertilizers accounted for major expenditure than other factors involved in mulberry production. The return value of cocoon was 9,15,569.30 /ha /year. The total fixed cost of Rs. 46,788/ha/year and the variable cost of Rs. 3,49,314.52/ha/year have been recorded and these were cumulatively accounted for Rs. 3,96,102.52/ha/year as total cost of cocoon production. The net income generated was Rs 5,19,466.78 /ha/year with the benefit cost ratio of 1:2.31 (Table 9).

Roopa Hosali and Murthy (2015) [11] analysed the economics of sericulture in Haveri district of Karnataka and concluded that the cost of mulberry cultivation was found to be Rs. 23,278.54/ acre in case of marginal farmers and whereas, it was Rs. 25,116.18 and 26,358.52 per acre in small and medium land holding farmers respectively. Similarly, cost of cocoon production was also found higher for medium farmers Rs. 50,046.54/acre, followed by small (Rs. 55,036.06/ acre) and marginal farmers (Rs. 59,187.20/acre). In Udumalpet area of Coimbatore district, Kumaresan *et al*. (2008) [6] observed that large farmers incurred more cost for production of cocoon/ kg than small farmers and these mainly due to engagement of more labours by large farmers. Similar reports have also been given by Dandin *et al.* (2005) [3], Balasarswathi *et al*. (2010) [1] and Beula Priyadarshini and Vijaya Kumari (2017) [2]. In Udaipur district of Rajasthan, Shukla (2018) reported that in garden establishment, highest share of cost was associated with human labour followed by FYM application and he recorded a net return of Rs. 5,20,39.32 and benefit cost ratio of 1.49 in sericulture. Manjunatha *et al*. (2017) [9] assessed the silkworm cocoon production and its profitability in five taluks of Kolar district of Karnataka and found that the total cost incurred for rearing of 8,000 dfls/ year was Rs. 7,30,224 and among various costs, maximum was incurred towards the mulberry leaf production. According to Jayram *et al*. (1996) [5], ever price fluctuating nature of many agro inputs,

poor awareness about those inputs and less appreciation of farmers in accepting the improved practices are some of the important points could be taken in to consideration during the improvisation of sericulture. It was also observed the higher transport cost for the mobilization of inputs at various levels of production also increased the cost of cultivation. It was also found that cost spent on availing human labour for carrying out many operations in silk worm rearing considerably increase the cost of production. Hence, there would be much scope for mechanization of many practices in sericulture. This will help to reduce the cost and also for easiness of working. Additionally it may reduce the problem of labour shortage. Contribution by family women labour should also be effectively utilised in several sericulture operations in order to achieve considerable reduction in the cost of cocoon production and to increase the net benefit.

Table 1: Cost of establishment of mulberry garden by marginal farmers

No.		Quantity		
1	Human Labour	Man days89.735	22,433.75	18.22
2	Animal Power	Hours 21.73	9,343.90	7.59
3	Machine Power	Hours 17.20	12,040.00	9.77

4	Farm yard Manure	Tonnes 14.93	14,930.00	12.12
5	Chemical Fertilizers	Kg 900.00	22,500.00	18.27
6	Cuttings and Saplings	- -	20,134.70	16.34
7	Irrigation	- -	10,000.00	8.12
8	Miscellaneous cost	- -	3,360.00	2.72
9	Land Tax	- -	370.70	0.30
10	Interest on working capital @ 7% p.a	- -	8,057.85	6.55
	Total		1,23,170.00	100.00

Table 2: Cost of mulberry leaf production by marginal farmers

S. No	Variables	Units		Physical Quantity	Cost (Rs.)	Share (%)
I	Operational Cost					
1	Human Labour	Man days		30.26	75,565.00	49.54
2	Animal Power	Hours		0.73	365.00	0.23
3	Farmyard Manure	Tonnes		17.733	17,733.00	11.62
4	Chemical Fertilizer	Kg		1100	27,500.00	18.03
5	Irrigation	Rs		-	10,000.00	6.56
6	Miscellaneous Cost	Rs		-	3,360.00	2.2
7	Land Tax	Rs		-	370.70	0.24
8	Interest on working	Rs		-	9,442.56	6.18
	Capital @ 7% p.a					
				Total	1,44,336.26	94.6
II.	Fixed Cost (Share of Garden per ha/annum)	establishment	of	Mulberry	8,211.34*	53.83
III.	Grand Total (I+II)				1,52,547.60	100

Note: * indices that total cost of establishment was divided and accounted for 15 years.

Table 3: Cost and return studies of cocoon production by marginal farmers

S. No.	Variables	Cost (Rs)	Share (%)
I	Fixed Cost		
1	Depreciation on Rearing House	18,425.60	5.6
2	Depreciation on equipment	16,560.00	5.03
3	Interest on Working Capital @12% p.a	4,198.27	1.28
	Total Fixed Cost (I)	39,183.87	11.91
II	Variable Cost		
1	Human Labour	46,600.00	14.17
2	Dfls.	58,733.33	17.85
3	Disinfectants	14,240.00	4.33
4	Transport Charge	6,066.67	1.84
5	Miscellaneous Cost	2,613.33	0.79
6	Interest on Working Capital @7% p.a	8,977.73	2.73
7	Mulberry Leaf Cost	1,52,547.60	46.37
	Total variable Cost (II)	2,89,778.66	88.08
	Total Cost (I+II)	3,28,962.53	100
III	Return		
1	Gross Return (Rs)	695320.20	
2	Total Cost (Rs)	328962.53	
3	Net Return (Rs)	366357.67	
	B:C Ratio	1:2.11	

Table 4: Cost of establishment of mulberry garden by small farmers

S. No.	Variables	Units	Physical Quantity	Cost (Rs.)	Share (%)
1	Human Labour	Man days	85.77	24015.60	18.46
2	Animal Power	Hours	19.93	9665.00	7.43
3	Machine Power	Hours	17.86	12502.00	9.61
4	Farm yard Manure	Tonnes	14.20	14200.00	10.91
5	Chemical Fertilizers	Kg	950.75	23768.75	18.28
6	Cuttings and Saplings	-	-	21667.20	16.66
7	Irrigation	-	-	12000.00	9.23
8	Miscellaneous cost	-	-	3363.30	2.59
9	Land Tax	-	-	366.70	0.28
10	Interest on working capital @ 7% p.a	-	-	8508.40	6.54
	Total			130056.95	100

Table 5: Cost of mulberry leaf production by small farmers

S. No.	Variables	Units	Physical Quantity	Cost (Rs.)	Share (%)
I.	Operational Cost				
1	Human Labour	Man days	302.06	84,576.80	51.51
2	Animal Power	Hours	0.86	430.00	0.26
3	Farmyard Manure	Tonnes	15.86	15,860.00	9.66
4	Chemical Fertilizer	Kg	1150	28,750.00	17.51
5	Irrigation	-	-	12,000.00	7.31
6	Miscellaneous Cost	-	-	3,363.33	2.05
7	Land Tax	-	-	366.70	0.22
8	Interest on working Capital @ 7% p.a	-	-	10,174.27	6.2
Operational Cost				1,55,521.10	94.72
II.	Fixed Cost (Share of establishment of Mulberry Garden per ha/annum)			8,670.46*	5.3
III.	Total (I+II)			1,64,191.56	100

Note: * indices that total cost of establishment was divided and accounted for 15 years.

Table 6: Cost and return studies of cocoon production by small farmers

S. No.	Variables	Cost (Rs)	Share (%)
I	Fixed Cost		
1	Depreciation on Rearing House	22,500.00	6.07
2	Depreciation on equipment	17,560.00	4.74
3	Interest on Working Capital @12% p.a	4,807.20	1.3
	Total Fixed Cost (I)	44,867.20	12.1
II	Variable Cost		
1	Human Labour	69,381.20	18.7
2	Dfls.	58,933.33	15.9
3	Disinfectants	13,800.00	3.72
4	Transport Charge	6,446.70	1.74
5	Miscellaneous Cost	2,360.00	0.64
6	Interest on Working Capital @7% p.a	10,564.48	2.85
7	Mulberry Leaf Cost	1,64,191.56	44.31
	Total variable Cost (II)	3,25,677.27	87.9
	Total Cost (I+II)	3,70,544.47	100
III	Return		
1	Gross Return (Rs)		7,96,138.90
2	Total Cost (Rs)		3,70,544.47
3	Net Return (Rs)		4,25,594.43
	B:C Ratio		1:2.148

Table 7: Cost of establishment of mulberry garden by medium farmers

S. No.	Variables	Units	Physical Quantity	Cost (Rs.)	Share (%)
1	Human Labour	Man days	89.10	26,730.00	19.41
2	Animal Power	Hours	24.06	12,030.00	8.73
3	Machine Power	Hours	18.06	12,642.00	9.2
4	Farm yard Manure	Tonnes	15.20	15,200.00	11.04
5	Chemical Fertilizers	Kg	1000.0	25,000.00	18.2
6	Cuttings and Saplings	-	-	19,506.33	14.2
7	Irrigation	-	-	13,500.00	9.8
8	Miscellaneous cost	-	-	3,662.00	2.7
9	Land Tax	-	-	377.33	0.27
10	Interest on working capital @ 7% p.a	-	-	9,005.34	6.5
Total				1,37,653.00	100

Table 8: Cost of mulberry leaf production by medium farmers

S. No.	Variables	Units	Physical Quantity	Cost (Rs.)	Share (%)
I.	**Operational Cost**				
1	Human Labour	Man days	304.86	91,458.00	51.0
2	Animal Power	Hours	0.86	430.00	0.24
3	Farmyard Manure	Tonnes	17.86	17,860.00	10.0
4	Chemical Fertilizer	Kg	1275.00	31,875.00	17.8
5	Irrigation	-	-	13,500.00	7.5
6	Miscellaneous Cost	-	-	3,662.00	2.0
7	Land Tax	-	-	377.33	0.21
8	Interest on working Capital	-	-	11,141.37	6.2

	Operational Cost			1,70,303.70	94.9
II.	Fixed Cost (Share of establishment of Mulberry Garden per ha/annum)			9,176.86*	5.1
III.	Total (I+II)				

Note: * indices that total cost of establishment was divided and accounted for 15 years.

Table 9: Cost and return studies of cocoon production by medium farmers

S. No.	Variables	Cost (Rs)	Share (%)
I	Fixed Cost		
1	Depreciation on Rearing House	23,500.00	5.9
2	Depreciation on equipment	18,275.00	4.6
3	Interest on Working Capital @12% p.a	5,013.00	1.3
	Total Fixed Cost (I)	46,788.00	11.81
II	Variable Cost		
1	Human Labour	75,300.00	19.01
2	Dfls.	59,706.67	15.1
3	Disinfectants	14,980.00	3.8
4	Transport Charge	6,333.33	1.6
5	Miscellaneous Cost	2,403.33	0.6
6	Interest on Working Capital @7% p.a	11,110.63	2.8
7	Mulberry Leaf Cost	1,79,480.56	45.3
	Total variable Cost (II)	3,49,314.52	88.2
	Total Cost (I+II)	3,96,102.52	100
III	Return		
1	Gross Return (Rs)	9,15,569.30	
2	Total Cost (Rs)	3,96,102.52	
3	Net Return (Rs)	5,19,466.78	
	B:C Ratio	1:2.31	

Conclusion

The present study clearly showed that both the cost and the returns of cocoon production were high in case of medium farmers with maximum benefit cost ratio followed by small and marginal farmers

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