

Cost And Returns Of Silkworm Rearing: A Fresh Look In Different Productivity Regions Of Tamil Nadu, India

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INTRODUCTION

Sericulture is a major income generating sector in Tamil Nadu, India. It is a sector in which a large number of people earn their livelihood in rural areas. Expanding the area under mulberry and increasing cocoon production and productivity have been the main thrust of the National Sericulture Project Programme in Tamil Nadu.

In absolute terms, the area under mulberry increased from 8967 acres in 1975/76 to 75, 952 acres in 1986/87. Between 1975/76 and 1986/87 the area under mulberry increased by 66, 985 acres. The area under mulberry cultivation increased substantially in the 1984 and to some extent in the 1986/87. The availability of high price, particularly in the initial period led to a movement of land in favour of mulberry cultivation. But a sudden fall was noticed in 1987/88 and 1988/89 which accounted for 43 percent and 38 percent respectively of the total mulberry area. As on March 1996, the area under mulberry was 37, 968 acres in Tamil Nadu (Pugazhendi 1996)

The production of reelable cocoons was only 100 lakh Kgs. in 1985/86 and it went up to 188 lakh Kgs. in 1990/91. Further it reached the peak high of 130.70 lakh kgs. in 1991-92. By 1992/93 the state reached 74, 852 acres under mulberry and produced about 141 lakh Kgs. of cocoons. During 1985/86 the cocoon yield was 137.62 Kgs. per acre per year, reached the peak of 205 Kgs. per acre in 1990/91. As on March 1996 total cocoon production in Tamil Nadu state was 71.61 lakh kgs. and cocoon production reached 210 Kgs. per acre per year (Pugazhendi 1996)

The cocoon production is influenced by not only the increasing the area under mulberry but also the cocoon productivity per acre. But the

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cocoon productivity is not uniform in all parts of Tamil Nadu. It varies from place to place and region to region. And costs like labour, fertilizer, farm yard manure (FYM), layings, chemicals, disinfectants, marketing involved in garden maintenance and silkworm rearing also differ from region to region. In this direction, this paper tries to give clear picture about cost and returns of different categories of farmers under different productivity regions, and the factors responsible for low productivity and steps to be taken to overcome the low productivity in the field level.

This paper also aims to analyse the costs involved in rearing silkworms. Most of the selected farmers in the study region do not buy all the factors of production from the market, e.g. those such as family labour, their own capital, land, etc. But, for calculating the cost, we have imputed the value of all the owned factors, on the basis of market prices. Since the relative proportions of family and hired resources vary considerably at different categories of farm size, this procedure would yield different picture of labour cost as between different farm categories.

METHODOLOGY

The sericulture districts have been classified into three productivity regions viz. low, medium and high, based on their respective achievements in terms of mulberry area, and cocoon production. The districts are classified as follows:

Low Productivity Region

Ramnad, Madurai, Tirunelveli, Kamarajar, Thanjavur, PuduMwttai, Changai MGR, The Nilgiris, Thiruvannamalai, Thevar Thirumaganar, V.O. Chidambaranar, S.A. Cuddalore and Kanyakumari where farmers get below 150 Kgs. of cocoon yield per acre of mulberry per year.

Medium Productivity Region

Trichy, Madurai and Dindigal Anna where farmers get above 150 Kgs. and below 250 Kgs. of cocoon yield per acre of mulberry per year.

High Productivity Region

Coimbatore, Dharmapuri, Vaniyambadi, Periyar and Salem Where farmers get more than 250 Kgs. of cocoon yield per acre of mulberry per year.

The districts under the low productivity region have taken up sericulture in recent years, where irrigation potential is very low. Districts like Dharmapuri, Salem, Coimbatore etc., fall under high productivity region, where sericulture has been practiced for more than two decades. The medium productivity region falls in between.

This study has been undertaken in three districts of Tamil Nadu. One Tamilnadu Silworm Rearing Centre (TSC) from each of the selected district and one cluster from each of the selected TSCs, have been selected following the same criterion as adopted in the case of district selection. The study, therefore, covered three clusters. About 115 sericulturists have been covered from these three selected clusters. The data have been collected through the questionnaire along with conversational interviews by the author.

COST AND RETURNS

Production of mulberry leaf, on which production of cocoon depends, necessitates the cultivation of mulberry and rearing of silkworms simultaneously. The cultivation of mulberry comprises two stages: establishment of mulberry garden, and maintenance of mulberry garden and the cost have to be estimated accordingly. The establishment of garden includes the cost of cuttings, manures and fertilisers, cost on land preparation, irrigation, value of human labour and other expenditure incurred up to rearing stages. The annual maintenance cost incurred on the garden has been estimated which includes labour cost, farm yard manure and fertiliser, irrigation charges etc. The cost of silkworm rearing incurred the cost of layings reared, rearing labour cost, chemicals, disinfectants, paraffin paper, moutage hiring charges, marketing cost, etc.

The cost of production of silkworm rearing estimated, include: maintenance of mulberry garden, and cost incurred on silkworm rearing-layings, labour, disinfectant, marketing. While estimating the cost, rent or rental value of land, interest on working capital, depreciation cost on equipment etc. have not been included. All items of inputs, both owned and purchased items, have been valued at the prevailing market price. For egg, total purchased disease free layings (DELS) per acre per year are charged at the rates actually paid to the department of sericulture officials or to the private grainages where they get DFLs. Fertiliser includes urea, complex which are used in mulberry field, and this cost is charged at the

rate actually paid in the fertilizer shop. The cost of fertilisers also includes the amount spent on transport to bring the fertilisers from market to their mulberry garden likewise chemicals, disinfectants and paraffin paper cost is also calculated. Home purchased farm yard manure is valued at the relevant rate in the village i.e. total number of cartload of farm yard manure used per acre per year is multiplied by per cartload price prevalent in the village.

Regarding labour cost, the prevailing wage rates, for men and women engaged in agricultural/sericultural activities have been considered for evaluating the labour cost. The value of own labour, family labour component has been valued at the prevailing wage rates in the field, for men and women separately. The value of main production, cocoon, is valued at the price of one kgs. of cocoons and value of other by products has not been included for calculating the gross returns.

The cultivation of mulberry garden, accompanied by silkworm rearing practices incurred more labour cost, family and hired labour, in sericulture activities, and family labour cost constitutes the major portion of the total labour cost in sericulture operations.

Thus the estimated cost incurred in silkworm rearing have been presented across the size of holding in terms of per acre. While computing the net returns two types of net returns have been shown: income resulting after allowing the cost which includes imputed value of family labour from gross income, and the gross income minus the cost which excludes value of family labour.

ANALYSIS

High Productivity Region

Table 1
Cost of Silkworm Rearing

(IRs./ Acre/ Annum)

S.No.	Cost Items	Small	Medium	Large	Overall
I	Maintenance of Garden				
	Labour	2780.00 (13.82)	3065.00 (14.18)	3115.00 (13.58)	3085.67 (13.66)
	Fertilizer	2125.56 (10.57)	2326.82 (10.77)	2535.00 (11.06)	2483.95 (10.99)
	FYM	1875.00 (9.32)	2250.00 (10.41)	2550.00 (11.12)	2470.36 (10.94)
	Total A	6780.00 (33.71)	7641.82 (35.36)	8200.00 (35.76)	8039.98 (35.59)
II	Cost of Silkworm Rearing				
	Laying	1857.50 (9.24)	2000.00 (9.25)	2065.00 (9.01)	2043.32 (9.04)
	Labour (rearing)	9475.00 (47.11)	9725.00 (44.99)	10175.0 (44.37)	10078.09 (44.61)
	Chemicals, Disinfectant and Paraffin Paper.	0950.00 (4.72)	1010.75 (4.68)	1126.36 (4.91)	1101.71 (4.88)
	Mountage Hiring Charges	0630.00 (3.13)	0756.00 (3.50)	0840.00 (3.66)	0816.19 (3.61)
	Marketing Cost	0420.00 (2.09)	0480.00 (2.22)	0525.00 (2.29)	0512.78 (64.41)
	Total B	13332.50 (66.29)	13971.75 (64.64)	14731.36 (64.24)	14552.09 (64.41)
III	Total Cost (A+B)	20113.06 (100)	21613.57 (100)	22931.36 (100)	22592.07 (100)

Source: Computed from the Primary Data collected by The Author in the Field Survey, 1996.

Note: Figures in the Brackets are Percentages.

The Table 1 shows that total labour cost per acre silkworm rearing for small farmer is 47.11 percent, 45 percent for medium and 44.37 percent for large farmers. The total costs of silkworm rearing per acre are IRs. 20,133.00 for small, IRs. 21,613. 57 for medium and IRs. 22,931.36 for large farmers, of which laying costs are 9.24 percent, 9.25 percent, 9.01 percent for small, medium and large farmers respectively.

Table 2
Returns Per Acre

S.NO.	Particulars	Small	Medium	Large	Overall
I.	DFLs Brushed Per Acre Per Year (Nos.)	823	880	906	870
II.	Yield Per Acre Per Year (kgs.)	372.57	401.23	440.79	417.30
III.	Value of Production Per Acre (IRs.)	31668.45	34104.55	37467.15	35470.50
IV.	Net Returns A	11555.39	12490.98	14535.79	12878.43
V.	Net Returns B	20400.39	21365.98	18375.79	17594.43

Source: As of The Table 1 .

Note: Ratio of Gross Return to Gross Cost = 1.57.

A = Inclusive of Imputed Value of Family labour, B = Exclusive of Imputed Value of Family labour.

This imputed value of family labour to total cost, both family labour cost of garden maintenance and silkworm rearing, is IRs 8845 for small farmers, IRs 8875 for medium farmers, IRs. 3840 for large farmers and the overall family labour cost IRs 4716 respectively. When the imputed value of family labour is excluded from the total cost then the total cost will go down and the net returns realised among the different size group of farmers are still more higher. On the basis, the net returns excluding family labour cost are IRs. 20,400.39 for small farmers, IRs. 21,365.98 for medium and IRs. 18,375.79 for large farmers and overall net returns IRs. 17,594.43 respectively.

In high productivity region farmers take about more than six crops per acre per year and brush about 870 DFLs per acre per year. On an average farmers get 48 Kgs. per 100 DFLs, and earn profit of about IRs. 12,878 annually inclusive of imputed value of family labourers.

Reasons For High Returns

Variety And Spacing

Most of the sericulturists have sericulture experience for more than 10 years. Farmers have enthusiastically taken up sericulture, using modern methods. 90 percent of the cultivated mulberry area of this region is under MR2 variety and 10 percent of the mulberry area is under M5 variety with 3x3 spacing. Mulberry cultivation methods are carried on according to the advice of the extension staff department of sericulture. The cultivation practices like plantation, spacing between the plants, mulberry variety, application of fertiliser, FYM and irrigation are as per the advice of the department.

Farm Yard Manure

Farmers use farm yard manure most frequently like other organic manures. Only a few farmers use oil cakes, poultry dropping and compost. Almost all the farmers produce their own farm yard manure or else they purchase from within the village. All the sericulturists applied adequate quantity of fertilizer.

Infrastructure

In the high productivity region all the sericulturists have separate rearing sheds. They follow leaf feeding methods. Ninety five percent of the sericulturist take up rearing more than six times in a year. Rearing equipment, such as wooden trays, iron stands, nets, thermometer etc. are used by the sericulturist. Most of the sericulturist in this village possess separate space for keeping the trays and chandrikas. All the farmers go for fumigation of formalin in the rearing shed before taking up rearing and washing with bleaching powder.

Medium Productivity Region

Table 3
Cost of Silk Worm Rearing

(IRs. / Acre / Annum)

S.No.	Cost Items	Small	Medim	Large	Overall
I	Maintenance of Garden				
	Labour	1875.00 (15.85)	2085.00 (16.51)	2955.00 (20.86)	2118.64 (17.00)
	Fertilizer	0670.00 (5.66)	0760.00 (6.02)	0885.00 (6.25)	0732.25 (5.88)
	FYM	0960.00 (8.12)	1105.00 (8.75)	1250.00 (8.83)	1050.71 (8.43)
	Total A	3505.00 (29.63)	3950.00 (31.28)	5090.00 (35.94)	3901.60 (31.31)
II	Cost of Silkworm Rearing				
	Laying	1650.00 (13.95)	1670.00 (13.23)	1722.00 (12.16)	1667.95 (13.38)
	Labour (rearing)	5370.00 (45.39)	5550.00 (43.96)	5670.00 (40.03)	5480.91 (43.98)
	Chemicals, Disinfectant & Paraffin Paper.	0345.00 (2.92)	0375.00 (2.97)	0425.00 (3.00)	0367.17 (2.95)
	Mountage Hiring Charges	0360.00 (3.04)	0432.00 (3.42)	0540.00 (3.81)	0411.16 (3.30)
	Marketing Cost	0600.00 (5.07)	0649.38 (5.14)	0716.74 (5.06)	0633.84 (5.08)
	Total B	8325.00 (70.37)	8676.38 (68.72)	9073.74 (64.06)	8561.03 (68.69)
III	Total Cost (A+B)	11830.00 (100)	12626.38 (100)	14163.4 (100)	12462.63 (100)

Source: As of The Table 1.

Note: Figures in the Brackets are Percentages.

A = I, B = II

It can be seen from The Tabel 3 that overall the labour cost incurred in mulberry cultivation is 17 percent, and in silkworm rearing 43.98 percent,

which is significantly dominant. The total cost of cultivation of mulberry garden and silkworm rearing per acre are IRs. 11,830 for small, IRs. 12,626.38 for medium and IRs. 14,163.74 for large farmers and the overall cost of cultivation of mulberry garden and silkworm rearing per acre in medium productivity region is IRs. 12,463.63 and average gross return is Rs. 18,518.40 respectively. The ratio of gross return to gross cost is 1.49. The imputed value of family labour to total cost is 46.79 percent, IRs. 5535, for small farmers, 37.78 percent, IRs. 4770, for medium farmers, 20.80 percent, IRs. 2946.74, in the case of large farmers and the overall imputed value of family labour cost is 39.10, IRs. 4872.67, respectively. This imputed value of family labour cost consists of both family labour cost of garden maintenance and silkworm rearing. The net return realised by excluding family labour cost is IRs. 11,160.20 for small, IRs. 10,994.82 for medium, IRs. 9,978.20 for large farmers and the overall net return IRs. 10,928.44 respectively.

Table 4
Returns Per Acre

S.No.	Particulars	Small	Medium	large	Overall
I	DFLs Brushed Per Acre Per Year (Nos.)	752.48	760	810.74	764.47
II	Yield Per Acre Per Year (kgs.)	218.19	235.64	264.94	231.48
III	Value of Production Per Acre (IRs.)	17455.20	18851.20	21195.20	18518.40
IV	Net Returns A	5625.20	6224.82	7031.46	6055.77
V	Net Returns B (In IRs.)	11160.20	10994.82	9978.20	10928.44

Source: As of the Table 1.

Note: Ratio of Gross Returns to Gross Cost = 1.49.

A = Inclusive of Imputed Value of Family Labour.

B = Exclusive of Imputed Value of Family Labour.

In medium productivity region, on an average sericulturists rear 4-5 crops a year. The average number of DFLs brushed by a farmer is 764 per

acre per year and cocoon yield is 231.48 Kgs. per acre per year (Table 4) with an average cocoon productivity of 30.28 Kgs. per 100 DFLs. In this region, productivity is 185.82 Kgs. less than the high productivity region and 87.76 Kgs. higher than the low productivity region. Weather abnormalities, lack of technological and institutional advancement, in the form of garden maintenance, mulberry variety, spacing, and disinfection, lead to moderate productivity in this region. They follow sericulture technology, even though the level of adoption and application is only at the moderate level.

Low Productivity Region

Table 5
Cost Of Silkworm Rearing

S.No.	Cost Items	IRs. / Acre / Annum			
		Small	Medim	Large	Overall
I	Maintenance of Garden				
	Labour	1422.00 (17.46)	1804.00 (19.88)	1904.00 (19.44)	1584.65 (18.43)
	Fertilizer	0415.00 (5.10)	0486.00 (5.36)	0510.00 (5.21)	0445.23 (5.18)
	FYM	0465.00 (5.71)	0515.00 (5.67)	0590.00 (6.03)	0494.74 (5.75)
	Total A	2302.00 (28.27)	2805.00 (30.91)	3004.00 (30.68)	2525.62 (29.36)
II	Cost of Silkworm Rearing				
	Laying	1246.00 (15.30)	1390.00 (15.32)	1410.00 (14.40)	1303.14 (15.15)
	Labour (rearing)	3774.00 (46.35)	3884.00 (42.79)	4254.00 (43.44)	3869.25 (44.97)
	Chemicals, Disinfectant & Paraffin Paper.	0156.00 (1.91)	0212.00 (2.34)	0249.00 (2.54)	0182.47 (2.12)
	Mountage Hiring Charges	0240.00 (2.95)	0300.00 (3.31)	0360.00 (3.68)	0271.32 (3.15)
	Marketing Cost	0425.00 (5.22)	0485.00 (5.34)	0515.00 (5.26)	0451.96 (5.25)
	Total B	5841.00 (71.73)	6271.00 (69.09)	6788.00 (69.32)	6078.14 (70.64)
III	Total Cost (A+B)	8143.00 (100)	9076.00 (100)	9792.00 (100)	8603.76 (100)

Source: Computed From the Primary Data Collected by The Author, 1996

Note: Figures in the Brackets are Percentages.

A = I, B = II

The overall total cost of cultivation per acre of silkworm rearing and maintenance of mulberry garden in low productivity region is IRs. 8603.76, of which the value of layings is IRs. 1303.14, constituting 15.15 percent of the total cost. Another major item of cost is labour involved in rearing. The value of chemicals, disinfectants and paraffin papers constitutes 2.12 percent of the total cost. The total cost of silkworm rearing per acre are IRs. 8143 for small, IRs. 9076 for medium, IRs. 9792 for large and the overall cost is IRs. 8603.76 of which family labour cost contribution are IRs. 4096, 50.30 percent for small farmer, IRs. 4118, 45.37 percent, for medium farmer, IRs. 2283, 23.31 percent for large farmer and IRs. 3776, 43.89 percent, for overall family labour cost. When family labour cost is deducted from the total cost, then the total cost has to go down to IRs. 4047 for small, IRs. 4958 for medium, IRs. 7509 for large farmers, and IRs. 4827.76 for overall family labour cost respectively.

Table 6
Returns Per Acre

S.No.	Particulars	Small	Medium	large	Overall
I	DFLs Brushed Per Acre Per Year (Nos.)	573	645	655	601
II	Yield Per Acre Per Year (kgs.)	135.67	152.95	163.57	143.72
III	Value of Production Per Acre (IRs.)	10853.60	12236.00	13085.60	11497.60
IV	Net Returns A (I Rs.)	2710.60	3160.00	3293.60	2893.84
V	Net Returns B (I Rs.)	6806.60	7278.00	5576.60	6669.84

Source: As of of The Table 1.

Note: Ratio of Gross Returns to Gross Cost = 1.34.

A = Inclusive of Imputed Value of Family Labour.

B = Exclusive of Imputed Value of Family Labour.

In low productivity region, 4 to 5 crops are taken in a year. The average number of DFLs brushed per acre per year is 601 and yield is 143.72 Kgs. The number of DFLs brushed per acre per year is the lowest in this region and it increased with the land holding size and is the highest for large farmers. Cocoon yield is increased accordingly.

Reasons For Low Returns

The mulberry leaf is the exclusively food of the silkworm. It is essential that the mulberry leaves are not only in abundant supply but are also of good and suitable quality for the success of silkworm rearing and the quality of cocoon produced. Manure and fertiliser applications are important factors for increasing the quality of mulberry leaf and improving the mulberry leaf yield.

Mulberry Variety

There are a number of mulberry varieties grown in Tamil Nadu. But spreading of new mulberry variety is very slow in low productivity region. Most of the farmers still continue with traditional local mulberry variety with less spacing. It gives low leaf yield and also it requires more labour to pluck the mulberry leaf and the labour cost is increased.

Rearing Space And Equipment

In the low productivity region, rearing space is very congested and without sufficient windows for ventilation. About 90 percent of rearers carry out rearing in the living room of their dwelling house rather than in separate place. In some cases, silkworms are reared in a cattle shed or unused portion of the dwelling house. Inadequacy of rearing equipments like trays and chandrikas is noticed among poor and low productivity farmers. Inadequacy of rearing trays leading to overcrowding of worms. This type of congested and badly ventilated rearing space and lack of equipment leads to crop failure.

Disinfection

Most of the low and medium productivity farmers do not disinfect their rearing house regularly. The disinfection is done only when there is a continuous crop failure. Cost of disinfectants is also major factor for low productivity and to go for disinfection.

Scale Of Operation

almost, 80 percent of the sericulturists take up rearing only for 4 times in a year. 95 percent of the sericulturists do not own separate rearing shed in low productivity region and 65 percent of the farmers have the same problem of rearing shed in medium productivity region.

Irrigation

Irrigation is one of the main factor responsible for sericulture production. It helps the maximum use of technology, proper use of fertiliser, increasing the number of crops per year, improved varieties of mulberry varieties etc. In the low productivity region irrigation facilities are very poor. Well is the only source of irrigation and all the wells are shallow wells and do not yield enough water during summer months.

Technology And Infrastructure

Low productivity region has been less affected by the sericulture technology. Infrastructure and technological factors are neither adequate nor timely. Farmers are less innovative.

Credit

More importantly, productivity in sericulture is depended on the easy access of credit to the sericulturist. In this region, large number of sericulturist have less than one acre and this class of farmers lake the resources for investment for increasing the production. Credit facilities are not readily available to them according to their production needs. Whatever little credit is available them at present is diverted to their pressing demands leading to indebtedness.

CONCLUSION

The above analysis indicate the costs incurred and returns and productivity levels achieved in different productivity regions of Tamil Nadu. It can be seen that the number of DFLs brushed per acre is 870 and 601 in high and low productivity region respectively. Across the productivity region, it is seen that the number of DFLs reared per acre increasing in high productivity region. The average cocoon yield per acre is 417.30 Kgs. per annum in high productivity region and it varies directly with productivity region. Lack of assured irrigation facilities, adoption of low level of technology and poor maintenance of garden deter sericulture production and restrict the possibility of multiple cropping, number of crops, which in turn result in low productivity per unit of land in the low productivity region.

Farmers are inefficient in soil, water conservation methods and land management practices. The low productivity region is also characterised

by lack of capital which leads to poor investment in infrastructure facilities like hygienic and ventilated rearing shed, rearing equipment like trays and chemicals which affect adversely the cocoon production in low and medium productivity region. In order to increase the cocoon production, farmers need to be educated in rearing practices hygienically and should be trained with new sericulture technology, disinfection methods, water management practices in low and medium productivity regions, and to produce more cocoon yield per unit area by minimum cost i.e. involvement of hired female labour, application of FYM instead of inorganic fertiliser, planting appropriate mulberry varieties.

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