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Cost Structure of Silk Cocoon Production and Economic Impact on Tribal Families of Khammam District in A.P.

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ABSTRACT

Human labour was an important item in cocoon production starting from harvesting of leaves to nurse the worm throughout the day and night during the rearing period. It may be observed that total value of human labour was Rs.8419 (22.69% of total cost) for all farms. Total cost of silk cocoon production and gross returns per hectare were Rs.37103 and Rs.54298 for all farms. The cost of cocoon production has indicted an inverse relationship with that of farm sizes indicating that small farmers are better in containing the costs with their personal care. The MVP to opportunity cost ratio for all farms the cost of disinfectants was -1.82 which was highest and negative and suggests to reduce the expenditure on this input for realise more gross income.

Key words : Cost structure, Silk cocoon.

Sericultue is a labour intensive industry and at any rate in India, there has been very little of mechanization of its operations. The most ideal silk worm rearing will be one which is managed entirely by the familylabour of the sericulturist. Under ITDA several programmes such as agriculture, horticulture and sericulture were taken up and they have helped in increasing the income of the tribal farmers.

MATERIAL AND METHODS

Khammam district of Andhra Pradesh was purposively selected for the present study as it ranks first in the state in tribal population. Five mandals were selected randomly from the list of mandals implementing ITDA developmental programmes.

Villages were selected from each mandal based on highest number of beneficiaries through random sampling technique with probability proportion to different size of holdings. Thus one district, 5 mandals, 17 villages and 296 beneficiaries constitute the sample for the study. Data was collected in 1999-2000 by survey method. The Cobb-Douglas production function was used to estimate resource productivity, resource use efficiency and returns to scale. The form of the function is as follows

$$Y = ax_1^{b1}, x_2^{b2}, x_2^{b3} \ldots\ldots\ldots xk^{bk}$$

Where y = output, x_1, to x_k = inputs, a, b_1.b_k are the regression parameters.

For silk cocoon production,

X_1 = Human labour (Rs), X_2 = Cost of leaves (Rs.), X_3 = Cost of eggs (Rs.), X_4 = Cost of disinfectants (Rs.), X_5 = Marketing charges (Rs.), X_6 = Rent on mountages, Y = Gross income on dependent variable., a = constant.

Marginal value of products :

$$\text{MVP of } x_i = \frac{\overline{Y}}{\overline{x_i}} \times b_i$$

Where $\overline{y}$ = Geometric mean of output Y

$\overline{X_i}$ = Geometric mean of input xi

b_i = Regression coefficient of xi

RESULTS AND DISCUSSION

As indicated, the leaf produced from mulberry cultivation was used as an input in the cocoon production to feed the silk worms. The variable costs and fixed cost of silk cocoon production are shown in Table 1. Since the farmers purchase the silk worm eggs based on the quantity of leaf available, the costs and returns of silk cocoon production are presented on per hectare basis.

The cost of silk worm rearing were categorized into input costs and other costs. The input costs instituted a major component of the total costs being 89.01 per unit for all farms. The inputs involved in

Table 1: Structure of silk cocoon production (Rs ha^{-1})

S.No.	Particulars	Small		Medium		Large		All farms	
		Units	Value	Units	Value	Units	Value	Units	Value
A	**Inputs**								
1	Human labour								
	Family labour	-	7394.80	-	8102.26	-	6606.61	-	7480.70
	Hired labour	-	732.68	-	661.35	-	1702.93	-	938.82
	Total	-	8127.48 (21.49)	-	8763.61 (23.43)	-	8309.54 (23.39)	-	8419.52 (22.69)
2	Cost of Mulberry leaves	31807.69	22265.38 (55.88)	31209.09	21846.36 (58.40)	28691.17	20083.82 (56.84)	30822.69	21575.88 (58.15)
3	Cost of eggs (Rs.)	3045.67	3045.67 (8.05)	2250.00	2250.00 (6.01)	2654.41	2654.41 (7.48)	2640.95	2640.95 (7.12)
4	Cost of disingectant	18.80	373.07 (0.99)	-	385.90 (1.03)	-	426.47 (1.20)	-	390.95 (1.05)
	Sub-total A		33811.60 (89.41)	-	33245.87 (88.87)	-	31474.24 (88.61)	-	33027.30 (89.01)
B	**Other costs**								
5	Marketing (Rs.)	-	484.51 (1.28)	-	488.36 (1.31)	-	485.73 (1.37)	-	486.31 (1.31)
6	Rent on Mountages	-	730.57 (1.93)	-	740.09 (1.98)	-	725.88 (2.04)	-	733.15 (1.98)
7	Electricity	-	203.75 (0.54)	-	225.90 (0.60)	-	277.94 (0.78)	-	230.28 (0.62)
8	Miscella-neous	-	277.30 (0.73)	-	426.36 (1.14)	-	388.23 (1.09)	-	362.19 (0.98)
9	Interest on working capital	-	2308.00 (6.11)	-	2283.22 (6.10)	-	2167.88 (6.11)	-	2264.54 (6.10)
	Sub-total B-	-	4004.13 (10.59)	-	4163.93 (11.13)	-	4045.66 (11.39)	-	4076.47 (10.99)
	Total cost (A=B)	-	37815.73 (100)	-	37409.80 (100)	-	35519.90 (100)	-	371.03.77 (100)

Figures in parentheses indicate percentage to the total

cocoon production are mulberry leaf, eggs (layings), human labour and disinfectants. The other costs included were rent on mountages, electricity, marketing and miscellaneous. In the total cost of cocoons production, the value of mulberry leaf accounted for a major share and it was Rs.21575 representing 58.15 per cent for all farms. This was in conformity with the findings of Kerutagi and Shankar Murthy (1996).

The human labour was also an important item in cocoon production starting from harvesting and transportation of leaf to the rearing rooms, cleaning the trays and later to nurse the worm throughout the day and night during the rearing period. It may be observed from the table that the total value was Rs.8419 (22.69% of total cost) for all farms. The cost of number of layings (disease free layings) required per hectare was 3045 for small, 2250 for medium, 2654 for large and 2640 for all farms.

In other costs, interest on working capital the major item amounting to Rs.2308, Rs.2283, Rs.2167 and Rs.2264 with a percentage of 6.11, 6.10, 6.11 and 6.10 to the total cost of cocoon production. Next to that is the rent on mountages worked out to be Rs.730, Rs.740, Rs.725 and Rs.733 respectively for small, medium, large and all farms. Thus the total cost of silk cocoon production per hectare was Rs.37815, for small, Rs.37409 for medium, Rs.35519 for large and Rs.37103 for all farms. The cost of cocoon production has indicated an inverse relationship with the farm size. These findings are in conformity with that of Radhika Rani (1998).

Table 2. Unit cost of production, yield and returns of silk cocoon production.

S.No.	Particulars	Small	Medium	Large	All farms
1	Cost of production of cocoons (Rs.)	37815.73	37409.80	35519.90	37103.77
2	No. of Layings	3045	2250	2654	2640
3	Yield of cocoons (kg)	679.71	579.81	669.26	638.22
4	Cost of production kg of cocoons (Rs)	55.63	64.52	53.07	58.13
5	Income from cocoons (Rs.)	55288.17	50018.27	58245.14	53945.56
6	Income from by-product	408.17	334.54	297.05	352.65
7	Gross income (Rs.)	55696.34	50352.81	58542.19	54298.21
8	Net income (Rs.)	17880.61	12943.01	23022.29	17194.44
9	B-C ratio	0.47	0.35	0.64	0.46

Table 3. Production elasticities of different input factors cocoon production

Particulars	Small	Medium	Large	All farms
Constant(a)	0.7444	0.5155	0.4398	1.4026
X_1 Human labour	0.6888*	0.2320**	0.2905**	-0.0344
	(0.3025)	(0.0091)	(0.0190)	(0.0596)
X_2 Cost of leaves	0.0318	0.6230**	0.6349**	1.1608**
	(0.0236)	(0.0161)	(0.0303)	(0.0884)
X_3 Cost of eggs	0.1662	0.0590**	0.0135	-0.2806
	(0.1283)	(0.0163)	(0.0295)	(0.2200)
X_4 Cost of disingectants	-0.0354	0.0210**	0.0415**	-1.1356**
	(0.0948)	(0.0046)	(0.0067)	(0.2824)
X_5 Marketing charges	0.2652	0.0283	-0.0217	0.5396**
	(0.5143)	(0.0190)	(0.0332)	(0.0732)
X_6 rent on mountages	-0.0802	0.0283	0.0405	0.1864
	(0.5565)	(0.0208)	(0.0412)	(0.1179)
Ebi	1.0365	0.9919	0.9995	0.4362
R^2	0.9976	0.9997	0.9994	0.9036

Figures in parenthesis show standard error.
* at 5 per cent level of significance
** at 1 per cent level of significance

The details of unit cost, yield and returns of silk cocoon production are presented in Table 2.

The unit cost of production in case of all farms was Rs.58.13, whereas it was Rs.55.63, Rs.64.52 and 53.07 for small, medium and large farms respectively.

Small farmers realized 679.71 kg of silk cocoons from3045 layings while it was 579 kg and 669 kg for medium and large farmers from 2250 and 2654 layings.

The gross returns from silk cocoon worked out to be Rs.55696 for small, Rs.50352 for medium, R.58542 for large and Rs.54298 for all farms.

The net return per hectare of silk cocoon production and benefit cost ratio worked out to Rs.17194 and 0.46 respectively for all farms. It draws support of the report of Bhatikar (1985).

The size-wise estimated production functions for cocoon rearing are presented in Table 3.

The coefficient of multiple determination (R^2) for cocoon production in case of all farms was 0.90 and it was found statistically significant. This indicated that 90 per cent of variation in the gross income was explained by the variables included in the function. The production elasticities of cost of leaves and marketing charges were in the order of

Table 4. Resource use efficiency of cocoon production

MVP	Small	Medium	Large	All farms
X_1 Human Labour	0.8304	0.2714	0.3398	-0.0346
X_2 Cost of leaves	0.0341	0.6560	0.6711	1.2008
X_3 Cost of eggs	0.2243	0.0829	0.0184	-0.3529
X_4 Cost of disinfectants	-0.0650	0.0398	0.0770	-1.8246
X_5 Marketing charges	0.4726	0.0512	-0.0391	0.8666
X_6 Rent on mountages	0.1330	0.0474	0.0676	0.2575
OC				
X_1 Human Labour	1.000	1.000	1.000	1.000
X_2 Cost of leaves	1.000	1.000	1.000	1.000
X_3 Cost of eggs	1.000	1.000	1.000	1.000
X_4 Cost of disinfectants	1.000	1.000	1.000	1.000
X_5 Marketing charges	1.000	1.000	1.000	1.000
X_6 Rent on mountages	1.000	1.000	1.000	1.000
MVP/OC Ratio				
X_1 Human Labour	0.8034	0.2714	0.3398	-0.0346
X_2 Cost of leaves	0.0341	0.6560	0.6711	1.2008
X_3 Cost of eggs	0.2243	0.0829	0.0184	-0.3529
X_4 Cost of disinfectants	-0.0650	0.0398	0.0770	-1.8246
X_5 Marketing charges	0.4726	0.0512	-0.0391	0.8666
X_6 Rent on mountages	-0.1330	0.0474	0.0676	0.2575

MVP = Marginal value of products OC = Opportunity cost

1.16 and 0.53 respectively. This indicated that the production elasticities of these variables were positive and significant in nature.

The production elasticities of rent on the mountages charges was 0.18, which was positive and statistically non-significant in all farms. The production elasticity of cost of disinfectants was -1.13 which is negative and statistically significant in nature. The production elasticity of human labour charges was -0.03 which is negative and statistically non-significant in all farms.

An overall picture shows that human labour must be properly exploited by all the size groups of farmers except all farms. All farm farmers were already is an excess use of this resource, hence it must be curtailed by the all farms farmers. There is need to curtail the expenditure on the cost of disinfectants and marketing charges in small farms. There is a need to curtail the expenditure on the cost of marketing charges in the large farms and finally there is a need to curtail the expenditure on the cost of eggs and the cost of disinfectants in all farms.

The particulars of MVPS opportunity cost and their ratios of cocoon production are presented in Table 4.

The ratio of MVP to opportunity cost for cost of leaves marketing charges and rent on the mountages for all farms are in the order of 1.20, 0.86 and 0.25 respectively. The MVP to opportunity cost ratio for these inputs is less than one and except cost of leaves indicating the need to increase the expenditure on these inputs. The MVP to opportunity cost ratio for cost of human labour, cost of eggs was -0.03 and -0.35 which was lowest and negative. The MVP to opportunity cost ratio for the cost of disinfectants was -1.82 which is highest and negative and suggests to reduce the expenditure on these inputs to realise more gross in course.

Conclusion:

The above analysis has clearly indicated that all these resources are not being efficiently used except that of cost of leaves which indicated more than the opportunity cost and suggests to increase

the use of this input and curtail other inputs. There seems to be high order of resource use inefficiency in almost all the inputs use, thus, there is a need to reorganize the use of these resources to achieve better results by the tribal farmers.

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