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RESEARCH PAPER

To analyse the cost of mulberry and cocoon production in Haveri district

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ABSTRACT

The study was conducted in Haveri district of Karnataka state. Where mulberry area of 947 hectares and cocoon production of 680.511 M tonnes, respectively during 2013-14 was observed. The study was conducted to analyze the cost of mulberry and cocoon production in Haveri district. In Haveri district two talukas were selected namely Haveri and Ranebennur. The cost of mulberry cultivation was found to be Rs. 23278.54 per acre in case of marginal farmers, Rs. 25116.18 per acre in case of small farmer and Rs. 26358.52 per acre in medium farmers. The cost of cocoon production was high for medium farmers Rs. 50046.54 per acre, followed by small farmers Rs.55036.06 per acre and marginal farmers Rs. 59187.20 per acre. Sericulture is a labour intensive enterprise providing employment to both men and women in mulberry cultivation and cocoon production. Where family labour was employed in this enterprise all around the year. Thus, encouraging this enterprise would help to generate additional income and absorb family labour which is under employed during off season.

KEY WORDS : Mulberry, Cocoon, Production, Cost

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India is an agriculture based country with 65 per cent of its population dependent on agriculture for their livelihood. Further, about 70 per cent of the people live in rural areas and more than 40 per cent of the rural population still lives below the poverty line. In developing countries like India, the small size holdings by a large proportion of farmers' in the absence of alternative sources of income are considered as one of the main factors causing rural poverty and hindering agricultural growth. Small farmers are able to realize only a part of the production potential due to physical, technological and institutional constraints. Government of India is committed to provide employment guarantee to one person from each family of below poverty line in the rural areas. Further, in order to control migration of rural poor to urban places, Government of India has been encouraging regular income and employment oriented farming approaches, one such potential farming enterprise is sericulture.

Sericulture is an agro based industries.Silk has been intermingled with the life and culture of the Indians. India has a rich and complex history in silk production and its silk trade dates back to 15th century. As per Ganga and Chetty (1991), the profitability of sericulture depends on the production of quality leaf and its conversion into quality cocoons at economic cost. Sericulture industry provides employment to approximately 7.65 million persons in rural and semi-urban areas in India. Of these, a sizeable number of workers belong to the economically weaker sections of society, including women. India's traditional and culture bound domestic market

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and an amazing diversity of silk garments that reflect geographic specificity has helped the country to achieve a leading position in silk industry. India has the unique distinction of being the only country producing all the five known commercial silks, namely, mulberry, tropical tasar, oak tasar, eri and muga, of which muga with its golden yellow glitter is unique and prerogative of India.As may be seen from the above world raw silk production was 1,52,868 MT in 2011-2012. China leads the world with silk production of 1,26,000 MT or 82.41 per cent of the produce. India is the second largest producer of silk in the world and has 15.49 per cent share in global raw silk production. All the countries except China and India have been witnessing a declining trend in raw silk production in the last two decades.Production of raw silk in India was 23,679 MT in 2012 of which, mulberry raw silk output aggregated to 18,715 MT (79.04 %). The remaining 4,964 MT (20.96 %) was *Vanya* silks. Mulberry sericulture is mainly practiced in five states namely, Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu and Jammu & Kashmir which jointly account for about 97 per cent of the total mulberry silk production in the country. As the consumption of raw silk (around 28,630 MT) exceeds the production, the additional requirement of around 5,000 MT of silk (particularly Bivoltine mulberry silk of international quality) is imported mainly from China.Mulberry silk is produced from silk worm (*Bombyx mori* L.) which feeds on mulberry leaves.

Silk worm rearing is location specific, a temperature ranging from 70ºF to 85ºF, humidity in the range of 60 to 80 per cent and the annual rainfall of about 600 mm found suitable for cultivation. Silkworms produce the cocoon in about 25-30 days, after which worms spin cocoons. These cocoons are sold to the reelers at the regulated cocoon markets. The reelers convert them into silk yarn. In the major silk producing states, there are well established cocoon markets for the sale of cocoons (Dandin *et al*., 2003). The reeled silk is bought by weavers and this transaction takes place through the silk exchanges. However, sericulture sector is denied of the benefit by announcement of reduction in customs duty in the union budget. Once the prices of cocoons and raw silk reduced, there was a large scale uprooting of mulberry in the sericulture belts of Karnataka which resulted in drastic decline in raw silk production in turn will increase the gap of demand and supply of Chines silk. Mulberry cultivation during the year 2012-13 was 1.86 lakh per hectare and raw silk production was 19.84 metric tonnes during the year 2012-13 in India. Karnataka accounts for 56.85 per cent of the country's cocoon production and in the vertex of the silk map. In the state, about three lakh families are engaged in mulberry cultivation and 22 lakh people in the silk yarn reeling industry. The Karnataka Silk Marketing Board has been designated as the intervening agency to purchase raw silk from the open market. Sericulture is rapidly progressing in Haveri district, they had a mulberry area of 947 hectares and a cocoon production of 680.511 M tonnes, respectively during 2013-14.

METHODOLOGY

The study was conducted to analyse the cost of mulberry and cocoon production in Haveri district because of this district is having highest mulberry cultivation and cocoon production. A random sampling procedure was adopted for selection of talukas, villages and sample farmers. In Haveri district two talukas were selected namely Haveri and Ranebennur maximum farmers were adopting mulberry cultivation and cocoon production. From each taluka 60 farmers were selected. In each talukas 20 marginal farmers, 20 small farmers and 20 medium farmers and also collected 5 traders, 5 wholesaler and 5 retailers were randomly selected. Thus, total sample size is 150. The data required for accomplishing the objectives of the study were collected from primary sources in the year 2013-14. The primary data was collected through personal interview from the 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. The stastical tools like averages and percentages are used to analyse the objective of the study.

Tabular analysis :

Tabular presentation technique was adopted for analyzing the general characteristics of the sample farmers, land utilization pattern, cropping pattern, costs, returns, profits, marketing costs and price spread. The data were compared and contrasted with the aid of averages, percentage etc., to obtain meaningful results.

ANALYSIS AND DISCUSSION

Mulberry requires higher dosage of fertilizers applied in splits and better irrigation facility from time to time for good quality of mulberry leaves with higher quantity bio-mass. The competition of weeds necessitated more human labour for undertaking weeding at different stages to control weeds. Besides, mulberry cultivation being more of labour intensive nature required more human labour.

Proper establishment of mulberry cultivation for optimum production is most critical for the profitability of sericulture enterprise. Sericulture is a most labour intensive production and the efficiency with the labour is used. The labour requirements along with use of bullock pair and machine powers are in accordance with the major operations to establish per acre of mulberry cultivation by the sample respondents is presented in Table 1.

An average of marginal farmers the total human labour required per acre the establishment of mulberry cultivation

was 49.79 man days and that of bullock labour and machine power were 2.74 pair days and 3.02 machine hours, respectively. Out of the total labour requirement is 26.80 per cent (13.34 man days) of labour were used for undertaking weeding at different stages, followed by 24.80 per cent (12.35 man days) of total human labour used for planting of mulberry cuttings. The remaining 19.00 per cent (9.46 man days) and 15.30 per cent (7.62 man days) of human labour were used for irrigation and for transportation and application of organic manure. Whereas, 7.00 per cent (3.50 man days) of human labour was used for harvesting of mulberry leaves. The fertilizer application and spraying of plant protection chemicals required about 3.90 and 3.20 per cent of human labour, respectively. On the other hand out of the total bullock pair used in the establishment of mulberry cultivation, 56.20 per cent (1.54 pair days) of it was used for opening up of ridges and furrows. Whereas, 27.40 and 16.40 per cent (0.75 and 0.45 pair days) of the bullock pair was used for harrowing and ploughing operations. Whereas, entire 3.02 machine hours were used for ploughing operation.

Similar labour distribution pattern was observed even among the small farmers. The total human labour required per acre for the establishment of mulberry cultivation was 50.34 man days and that of bullock labour and machine power were 2.97 pair days and 3.02 machine hours, respectively. Out of the total labour requirement, 26.90 per cent (13.52 man days) of labour were used for undertaking weeding at different stages, followed by 24.80 per cent (12.49 man days) of total human labour used for planting of mulberry cuttings. The remaining 18.90 per cent (9.53 man days) and 15.20 per cent (7.66 man days) of human labour were used for irrigation and for transportation and application of organic manure, respectively. Whereas, 7.00 per cent (3.54 man days) of human labour was used for harvesting of mulberry leaves. The fertilizer application and spraying of plant protection chemicals required about 3.90 and 3.30 per cent and of human labour, respectively. On the other hand out of the total bullock pair was used for opening up of ridges and furrows in the establishment of mulberry cultivation was 56.20 per cent (1.67 pair days).

The labour use pattern by medium farmers the human labour required for the establishment of mulberry cultivation was 51.00 man days and that of bullock labour and machine hours were 3.06 pair days and 3.02, respectively. Out of the total labour requirement, a large proportion of 27.00 and 24.80 per cent were used for undertaking weeding and planting of mulberry cuttings. The results on labour utilization by farmers for mulberry cultivation thus clearly indicated that there was almost similar pattern of labour, bullock and machine power use were observed across the size of fields for different operations.

Returns in mulberry cultivation through mulberry leaves, stalks etc were either assumed or imputed ones in nature. This was because leaf was not sold but used by the producer himself in cocoon production and the by-products were wholly

Table 1 : Labour utilization pattern in establishment of mulberry garden **(Rs. per acre)**

Sr. No.	Particulars	Marginal farmers			Small farmers			Medium farmers		
		HL	BL	ML	HL	BL	ML	HL	BL	ML
1.	Ploughing	-	0.45 (16.4)	3.02 (100.00)	-	0.45 (15.2)	3.02 (100.00)	-	0.45 (14.8)	3.02 (100.00)
2.	Harrowing	-	0.75 (27.4)	-	-	0.85 (28.6)	-	-	0.91 (29.7)	-
3.	Transportation and application of FYM	7.62 (15.3)	-	-	7.66 (15.2)	-	-	7.70 (15.1)	-	-
4.	Opening ridges and furrows	-	1.54 (56.2)	-	-	1.67 (56.2)	-	-	1.70 (55.6)	-
5.	Planting	12.35 (24.8)	-	-	12.49 (24.8)	-	-	12.64 (24.8)	-	-
6.	Fertilizer applications	1.92 (3.9)	-	-	1.94 (3.9)	-	-	1.96 (3.8)	-	-
7.	Irrigation	9.46 (19.0)	-	-	9.53 (18.9)	-	-	9.60 (18.8)	-	-
8.	Weeding	13.34 (26.8)	-	-	13.52 (26.9)	-	-	13.76 (27.0)	-	-
9.	Spraying of plant protection chemicals	1.60 (3.2)	-	-	1.66 (3.3)	-	-	1.72 (3.4)	-	-
10.	Harvesting of mulberry leaves	3.50 (7.0)	-	-	3.54 (7.0)	-	-	3.62 (7.1)	-	-
11.	Total	49.79 100.00)	2.74 (100.00)	3.02 (100.00)	50.34 100.00)	2.97 (100.00)	3.15 (100.00)	51.00 (100.00)	3.06 (100.00)	3.29 (100.00)

Note: Figures in parentheses indicate to the percentages to the total ,
HL: Human labour (man days), BL: Bullock labour (bullock pair days), ML: Machine labour (Machine hours)

used by the farm families themselves.

Considerable cost is involved for acquiring various resources and also for the maintenance of the mulberry crop. Table 2 presents information on the costs incurred in mulberry under two broad heads namely, variable costs and fixed costs on per acre basis. The different items of costs as percentage of their respective totals provided the relative importance of each cost and are also presented in the Table 2.

The variable costs per acre included the costs on human labour, bullock labour, organic manure, fertilizers, irrigation, growth regulators and bio-fertilizers along with interest on working capital computed at nine per cent per annum. While, the fixed costs included land revenue, apportioned establishment cost, cost on depreciation of rearing house and equipments and rental value of land along with interest on fixed capital assessed at the rate of 12 per cent per annum.

The operation wise and input wise break up of cost of mulberry cultivation in small farmers indicated that the total cost incurred in the mulberry cultivation was worked out to be Rs.25116.18/acre. A large proportion of the total cost was constituted by variable cost component at Rs.21697.1/acre accounting 100 per cent to the total. The remaining Rs. 2541.68 was the fixed cost (100 %). Among the variable costs, the cost on human labour shared a large proportion is 58.30.

The operation wise and input wise break up of cost of mulberry cultivation in small farmers indicated that the total cost incurred in the mulberry cultivation was worked out to be Rs. 25116.18/acre. Similarly, as observed in case of marginal farmers a large proportion of the total cost was constituted by variable cost component at Rs. 22574.50/acre accounting 100 per cent. The remaining Rs. 2541.68 was fixed cost with a share of 100 per cent. Among the variable costs, the cost on human labour shared a large proportion (66.90 %) of the total cost at Rs. 15102.00/acre.

In the medium farmers the operation wise and input wise break up of cost of mulberry cultivation indicated that the total cost incurred in the mulberry cultivation was worked out to be Rs. 26358.52/acre. A large proportion of the total cost was constituted by variable cost component at Rs.23427.80/acre accounting 100 per cent. The remaining fixed cost of Rs.2930.72 were the fixed cost is (100 %). Among the variable costs, the cost on human labour shared a large proportion 65.31 per cent of the total cost at Rs.15300/acre during each rearing. This finding was in conformity with Naphade and Tingre (2008).

For the purpose of analysis, it is assumed that the unit producing the mulberry leaves is a service unit which produced basic raw material to the cocoon production unit. There is an integration of these activities. The results pertaining to analysis of different costs of cocoon production under two broad heads, namely, variable costs and fixed costs are presented in Table 3.

The operation wise and input wise break up of cost of

Table 2 : Cost of mulberry cultivation **(Rs. per acre)**

Sr. No.	Name of the operations	Marginal farmers	Percentage	Small farmers	Percentage	Medium farmers	Percentage
Variable costs							
1.	Human labour	14937	68.84	15102	66.9	15300	65.31
2.	Bullock labour	822	3.79	921	4.08	975	4.16
3.	Machine labour	1510	6.96	1575	6.98	1645	7.02
4.	Fym(tonnes)	1645.49	7.58	1767.21	7.83	1806.35	7.71
5.	Fertilizers						
	Urea	183.71	0.85	260.09	1.15	356.9	1.52
	Dap	890.8	4.11	974.76	4.32	1032.78	4.41
	Mop	279.17	1.29	309	1.37	354.09	1.51
	Ssp	82.17	0.38	103.92	0.46	155.04	0.66
	Complex	158.28	0.73	195.44	0.87	220.86	0.94
6.	Irrigation	208.45	0.96	301.81	1.34	405.13	1.73
7.	Growth regulators	227.14	1.05	328.05	1.45	427.59	1.83
8.	Bio fertilizers	9.05	1.04	13.33	0.06	15.67	0.07
9.	Interest on working capital	743.86	3.43	722.87	3.2	733.37	3.13
	Total variable costs	21697.1	100	22574.5	100	23427.8	100
Fixed cost							
1.	Land revenue	20	1.26	20	0.79	20	0.68
2.	Depreciation	1392	88.02	2294	90.26	2581	88.07
3.	Interest on fixed working capital@12%	169.44	10.71	227.68	8.96	329.72	11.25
	Total fixed cost	1581.44	100	2541.68	100	2930.72	100
	Total cost (A+B)	23278.54	100	25116.18	100	26358.52	100

cocoon production in marginal farmers indicated that the total cost incurred in the cocoon production was worked out of Rs. 50046.54. A considerable size of the total cost was constituted by variable cost of Rs. 46675.18 accounting 100 per cent. The remaining fixed cost of Rs. 3351.36 was of Rs. 23278.54 and 49.85 per cent. Among the variable costs, the cost on mulberry leaves cultivation shared a large proportion (30.51 %) followed by human labour of Rs. 14245.11 and chawki worms Rs. 1800.00.

The operation wise and input wise break up of cost of cocoon production in small farmers indicated that the total cost incurred in the cocoon production was worked out to be Rs. 55036.06. A large proportion of the total cost was constituted by variable cost component at Rs. 51387.10 accounting 100 per cent. The remaining (100 %) was the fixed cost Rs. 3648.96. Among the variable costs, the cost on mulberry cultivation shared a large proportion (48.88 %) of the total cost at Rs. 25116.18 followed by Rs. 15840.39 (30.83 %) on human labour, Rs. 1800.00 on DFLs/ Chawki worms (2.80 %).

But in case of medium farmers, the total cost incurred in cocoon production was Rs. 59187.20. A sizable proportion of the

Table 3 : Costs of cocoon production **(Rs. 100 DFLs cost)**

Sr. No.	Name of the operations	Marginal farmers	Percentage	Small farmers	Percentage	Medium farmers	Percentage
Variable costs							
1.	DFLs/Chawki worms	1800	3.85	1800	3.5	1800	3.33
2.	Human labour	14245.11	30.51	15840.39	30.83	16277.77	30.12
3.	Disinfectants						
	Bed disinfectants	332.71	0.71	453.45	0.88	518.08	0.96
	Lime dust	546.08	1.17	625.44	1.22	735.76	1.36
	Bleaching powder	144.03	0.31	158.91	0.31	173.76	0.32
4.	Paraffin paper	259.63	0.56	332.88	0.65	421.24	0.78
5.	News paper	155.21	0.33	250.14	0.49	322.69	0.6
6.	Total cost mulberry cultivation per acre	23278.54	49.85	25116.18	48.88	26358.52	48.77
7.	Marketing cost	580.5	1.24	815	1.59	1080	2
8.	Miscellaneous	318.74	0.68	445.17	0.87	531.97	0.98
9.	Interest on working capital @ 9%	5034.63	10.78	5549.544	10.8	5832.211	10.79
	Total variable cost	46695.18	100	51387.1	100	54052	100
Fixed costs							
1.	Depreciation of rearing room and equipments	2992.29	89.29	3258	89.29	4585	89.29
2.	Interest on fixed capital @ 12	359.07	10.71	390.96	10.71	550.2	10.71
	Total fixed cost	3351.36	100	3648.96	100	5135	100
	Total cost (A+B)	50046.54	100	55036.06	100	59187.2	100

Table 4 : Returns from cocoon production (Rs. 100 DFLs cost)

Sr. No.	Item	Marginal farmers		Small farmers		Medium farmers	
		Quantity	Value (Rs.)	Quantity	Value (Rs.)	Quantity	Value (Rs.)
Outputs							
1.	Main product						
	Cocoon yield (kg) per kg. (Rs. 399)	66.00	26334.00	210.00	83790.00	230.00	91770.00
	Low quality cocoon yield (kg.) per kg. (Rs. 60)	7.86	471.60	10.84	650.40	12.51	750.60
2.	By product						
	Mulberry Crop waste/fodder Rs. 100 per (quintal)	6.00	600.00	5.85	585.00	6.30	630.00
	Total	79.86	27405.60	226.69	85025.40	248.81	93150.60
Returns							
	Gross returns	-	27405.60	-	85025.40	-	93150.60
	Total costs	-	50046.54	-	55036.06	-	59187.20
	Net returns	-	22640.94	-	29989.34	-	3396.34
	B:C Ratio	-	2.2		1.8		1.7

Note: Figures in parentheses percentage to the total

total cost was constituted by variable cost at Rs. 54052.00 which accounted 100 per cent. The apportioned fixed costs amount of Rs. 5735.00 accounting for 100 per cent. Among the variable costs, the cost on mulberry leave cultivation shared a large proportion (49.4 %) of the total cost of Rs. 26358.52 during each rearing followed by 25.50 per cent (Rs. 16277.77) on human labour, 3.33 per cent (Rs. 1800.00) on DFLs/ Chawki worms.

Human labour was mainly employed in the indoor activities for preparation of rearing house and handling of rearing equipments during rearing, disinfection, feeding of silkworms, bed-cleaning, sorting of ripe and diseased worms, dispersing of ripe worms in mountages, harvesting and sorting of cocoons. The outdoor activities utilizing labour were leaf harvest, leaf transport, chawki rearing and cocoon marketing. The major item of expenditure was on mulberry leaf cultivation as it includes many numbers of expenses (Table 4). The next major item of expenditure was on human labour (Rs. 16277.77) to the total cost, since it is labour intensive. This finding was in conformity with Singh *et al.* (2009).

Returns in cocoon production were partly in the form of cash returns which had accrued from the sale of main product and partly in the form of imputed returns on by-products which were entirely used by the farm households themselves. The main product namely cocoons were sorted after harvest into good quality cocoons and substandard cocoons, the later consisting of flimsy, stained and double cocoons together known as "waste" or "jalligoodu". The proportion of substandard cocoons generally increased with the extent of disease in a crop and was minimal in a healthy crop. These cocoons being unsuitable for reeling or seed purpose were often sold off-hand for a single negotiated price for the entire quantity mostly to lone buyers.

The quantities of litre-manure and bed-fodder produced were dictated by the quantity of layings reared and leaf fed to the worms. The results on per acre gross and net returns from cocoon production for each rearing are presented in Table 4. The main returns consisted of cocoon yield (both of good and low quality) and by product composed of crop waste which is used as fodder for animals and the manure/litre.

It could be seen from the results that an average of marginal farmer realized relatively more cocoon yield (66 kg) as main product per rearing small farmers (210 kg), whereas (230 kg) from medium farmers. However, the gross returns realized by farmers main and by-products *i.e.*, from the sale of cocoon and by-products valued at Rs. 27405.60/acre in case of marginal farmers, Rs. 85025.40/acre in case of small farmers and in case of medium farmers it is Rs. 93150.60. The share of gross returns contributed by main product *i.e.*, cocoon yield account for 90 per cent to the total gross returns in marginal, small and medium farmers. While, the remaining 10 per cent of the gross returns was contributed by by-products like manure.

The gross returns were Rs. 27405.60, Rs. 85025.40 and Rs. 93150.60 in case of marginal, small and medium farms, respectively. The net returns were Rs. 22640.94, Rs. 29989.34 and Rs. 3396.34 in case of marginal, small and medium farms. The B:C Ratio in case of marginal farmers is 2.2, in case of small farmers 1.8 but and in case of medium farms 1.7. This finding is in conformity with Hatai and Baig (2007). Similar work related to the present investigation was also carried out by Jayakumar *et al*. (2005) and Ravikmumar (2003).

Conclusion :

The cost of mulberry cultivation was found to be Rs. 23278.54 in case of marginal farmers, Rs. 25116.18 in case of small farmer and Rs. 26358.52 in medium farmers. The cost of cocoon production was high for medium farmers (Rs. 50046.54), followed by small farmers (Rs. 55036.06) and marginal farmers (Rs. 59187.20). Sericulture is a labour intensive enterprise providing employment to both men and women in mulberry cultivation and cocoon production. In the study area, family labour was employed in this enterprise all around the year. Thus encouraging this enterprise would help to generate additional income and absorb family labour which is under employed during off season.

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