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Profitability Analysis of Sericulture Enterprise: A Comprehensive assessment for Diversifying Farm Income

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Abstract

Agriculture farm enterprises comprise of cultivation of multiple crops such as field crops (cereals and millets), horticultural crops (fruits, vegetables, flowers and plantation crops) and commercial crops (cotton and sugarcane) etc., along with sericulture (mulberry), livestock, poultry etc. Diversification in agriculture reduces income risk to farmers and increases the returns. This study was conducted in the selected 3 taluks/blocks of Kolar district in Eastern Dry Zone of Karnataka. Agriculture and allied enterprises comprising dairy and livestock, sericulture and crops such as tomato, cabbage, carrot, mango, beans, potato, marigold, cotton, ragi etc. was a common practice in the study area. Different sources of income of the sample farmers and the risk involved in them were analyzed and tabulated. The least risk was in sericulture at 64. 55 percent in Malur taluk followed by 57. 73 percent in Mulbagal and 7 percent from Srinivasapura taluk. It showed that income from sericulture was significant and a rise led to the decrease in income risk for farmers. The cost and returns of sericulture enterprise is divided into two parts namely mulberry cultivation and silkworm cocoon rearing. The average area under mulberry cultivation was 1. 88, 1. 42 and 2. 00 acres growing V-1 variety of mulberry in Malur, Mulbagal and Srinivaspura taluks, respectively. The total cost per crop of mulberry was lowest at Rs. 46875 in Mulbagal taluk followed by Rs. 58137 in Malur taluk and Rs. 58822 in Srinivaspura taluk (2016-17 prices). On an average, four crops were taken up in a year. The average shed size for rearing silk worms was 1400 sq. ft. in Malur taluk, 375 sq. ft. in Mulbagal talukand 600 sq. ft. in Srinivaspura taluk. The total cost of rearing one cycle of silkworm was Rs. 66354, Rs. 65621 and Rs. 60786 in Malur, Mulbagal and Srinivaspura taluks, respectively. Average cocoon yield was 280, 300 and 240 kgs with a total return of Rs. 61600, Rs. 54000 and Rs. 38400 in Malur, Mulbagal and Srinivaspura taluks, respectively. On an average, 2 rearing in Malur, 4 and 5 rearing in Mulbagal and Srinivaspura taluks were taken up. The total net return per year was Rs. 34044, Rs. 84418 and Rs. 57318 in the respective taluks. The return per rupee of expenditure was 1. 38, 1. 64 and 1. 43 in Malur, Mulbagal and Srinivaspura taluks, respectively. Therefore, sericulture income has lower Coefficient of Variation because of the stability in the flow of income. Thus it can be inferred that inclusion of sericulture enterprise along with crop cultivation leads to stability in farm income.

Keywords: Sericulture; Mulberry; Farm income; Enterprise; Profit.

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INTRODUCTION

Sericulture is an important labor intensive and agro-based enterprise,providing ample employment opportunities to rural and semi-urban areas in India. Apart from this, a sizeable number of workers engaged in this enterprise belong to the economically weaker sections of society. There is substantial involvement of women in this

enterprise. Although Sericulture is considered as a subsidiary occupation, technological innovations and advancements has made it possible to take it up on an intensive scale capable of generating adequate income to small and marginal farmers providing continuous income to farmers.

All the commercial varieties of silk, viz. Mulberry, Eri, Muga and Tasar are produced in India, Mulberry silk is the most popular variety among them and it alone contributes more than 80% of the Country's silk production. Silk and silk products have high foreign exchange. In India, due to prevalence of favorable climatic conditions, mulberry is cultivated mainly in five states, viz., Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu & Kashmir. These five states collectively account for about 97% of the total area under mulberry cultivation and 95% of raw silk production in the country.

Many studies have shown that inclusion of sericulture, dairy along with crop cultivation has benefitted farmers especially small and marginal farmers by diversifying their income source, thereby reducing the income risk (Gajanana and Sharma, 1994; Maharjan, 2002; Zen et al, 2003;Vassalos et al., 2013). With this background the present study was undertaken to analyze the profitability of sericulture as a subsidiary enterprise for income diversification and the extent of income risk reduction for small and marginal farmers of Kolar district in Eastern dry zone of Karnataka.

METHODOLOGY

In the present study, a stratified multistage random sampling frame work was adopted for the selection of study area and sample respondents for collection of data required for the study. Kolar district of Eastern dry zone of Karnataka was selected in the first stage, followed by the selection of Malur, Mulbagal and Srinivaspura taluks and total 30 respondents who had sericulture enterprise were selected for primary data collection.

PROFITABILITY ANALYSIS

The total cost incurred on the sericulture enterprise was divided into Variable Costs and Fixed Costs. The variable costs includes cost of variable inputs like seeds or seedlings, manure, fertilizers, wages of human and machine labour, plant protection chemicals, irrigation, intercultivation, weeding and interest on working capital. These costs vary with the level of output. Fixed costs include depreciation on farm implements and machinery, interest on fixed capital, land revenue and the rental value of land. The total cost of cultivation is the sum of variable costs and fixed costs and is expressed on per farm basis.

Amortized cost: The establishment cost incurred initially in the sericulture enterprise for Mulberry planting, construction of shed and others were considered over the total life of the crop using the formula as given below,

$$\text{Amortized cost} = I * [(1+i)^n]/[(1+i)^n-1]$$

Where, I is initial establishment cost

i is the interest rate/discount rate

n is the number of years of duration of the crop

The returns are calculated based on the yield and prevailing market price of the produce (2016-17 prices). The cost and returns of sericulture enterprise is divided into two parts namely mulberry cultivation and silkworm or cocoon rearing. Returns per rupee of expenditure was worked out by taking the ratio of gross return to total cost

$$\text{Return per rupee of expenditure} = \frac{\text{Gross returns}}{\text{Total cost}}$$

Co-efficient of variation (CV %)

To infer about the magnitude of risk associated with the income of the farmers, the coefficient of variation (CV) was estimated. The coefficient of variation was used as a measure to study the variability in income from various sources of enterprises. The coefficient of variation (CV) was computed using the following formula

$$CV = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

Economic analysis of sericulture enterprise

Sericulture was an important subsidiary occupation in the study area. Small and marginal farmers of Malur taluk, Mulbagal taluk and Srinivaspura taluk practiced sericulture along with cultivation of crops. The average area under mulberry cultivation was 1. 88, 1. 42 and 2. 00 acres growing V-1 variety of mulberry in Malur, Mulbagal and Srinivaspura taluks, respectively

Table 1: Cost and returns analysis of mulberry cultivation

(Rs. per farm)

Particulars	Malur taluk	Percent (%)	Mulbagal taluk	Percent (%)	Srinivaspura taluk	Percent (%)
Mulberry cultivation						
Average area (acres)	1. 88	-	1. 42	-	2	-
Establishment cost						
Manure	22250	-	4550	-	8500	-
Cuttings	8914	-	5300	-	8200	-
Fertilizers	8500	-	9500	-	10000	-
Human Labour	18450	-	14675	-	16790	-
Machine Labour	7500	-	5000	-	5300	-
Irrigation	3760	-	2840	-	4000	-
Total establishment cost	69374	-	41865	-	52790	-
Variable cost						
Irrigation	3760	6. 47	2840	6. 06	4000	6. 8
Labour	3700	6. 36	2300	4. 91	3600	6. 12
Fertilizers	3400	5. 85	2900	6. 19	3500	5. 95
Weeding	800	1. 38	983	2. 1	1000	1. 7
Intercultivation	4200	7. 22	3000	6. 4	4000	6. 8
Plant protection chemicals	2800	4. 82	2500	5. 33	3000	5. 1
Interest on working capital (8 % p. a.)	2223	3. 82	1602	3. 42	2083	3. 54
Total Variable Cost	20883	35. 92	16125	34. 4	21183	36. 01
Fixed cost						
Amortized cost	9122	15. 69	5504	11. 74	6941	11. 8
Interest on fixed capital (8 % p. a.)	8298	14. 27	9946	21. 22	9625	16. 36
Rental value of land	18800	32. 34	14200	30. 29	20000	34
Land revenue	47	0. 08	35. 5	0. 08	50	0. 09
Depreciation	988	1. 7	1064	2. 27	1023	1. 74
Total fixed cost	37255	64. 08	30750	65. 6	37639	63. 99
Total cost per crop	58137	100	46875	100	58822	100
Total cost per crop per acre	30924	-	33011	-	29411	-
Total cost per year	120785	-	95250	-	122373	-
Total cost per acre per year	64247	-	67078	-	61186	-
Returns						
Leaf (Value)	42500	-	44600	-	45000	-
No. of crops	4	-	4	-	4	-
Gross returns	170000	-	178400	-	180000	-
Net returns	49215	-	83150	-	57627	-
Gross returns per acre	90426	-	125634	-	90000	-
Net Returns per acre	26178	-	58556	-	28814	-
Returns per Rupee Expenditure (RRE)	1. 41	-	1. 87	-	1. 47	-

The results of cost and returns analysis of mulberry cultivation are presented in Table 1. The highest average area per farm under mulberry cultivation was 2. 00 acres in Srinivaspura followed by 1. 88 acres in Malur and 1. 42 acres in Mulbagal taluks. The highest percentage of cost incurred was at 22 percent of the total cost on manure and 20 percent on labour in mulberry cultivation in case of Malur taluk. Whereas, highest percentage of cost incurred was on intercultivation, labour, irrigation and fertilizers among the variable costs in all the three taluks. The amortized cost of initial establishment over 40 years, interest on fixed capital at 8 percent per annum and rental value of land were the major fixed cost components in mulberry cultivation. The mulberry leaf was harvested at four intervals in a year which were used for cocoon rearing by the farmers.

The total cost of mulberry cultivation included the establishment cost which was amortized and added to total fixed cost. The total cost per crop of mulberry was lowest at Rs. 46875 in Mulbagal taluk followed by Rs. 58137 in Malur taluk and Rs. 58822 in Srinivaspura taluk. The total variable cost was around 36, 35 and 36 percent of the total cost per crop in Malur, Mulbagal and Srinivaspura taluks, respectively. The total fixed cost accounted for 64. 08, 65. 60 and 63. 99 percent of the total cost of mulberry cultivation in Malur, Mulbagal and Srinivaspura taluks, respectively. On an average, four crops were taken up in a year. The total value of mulberry leaves was Rs. 170000, Rs. 178400 and Rs. 180000 in the three taluks, respectively (Table 1).

The investment pattern in sericulture showed that, highest investment was made on construction of shed which was largest in the case of Malurta lukat 1400 sq. ft. followed by Srinivaspura taluk (600 sq. ft.) and Mulbagal taluk (375 sq. ft.) whose depreciation cost incurred was also higher accordingly (Table 2). The cost of cultivation of mulberry was also accounted in the variable cost. The next highest cost incurred was on imputed family labour as sericulture is a labour intensive enterprise which requires a type of skilled labour.

Table 2: Cost and returns analysis of cocoon rearing

Rs. per 200 dfls

Particulars	Malur taluk	Percent (%)	Mulbagal taluk	Percent (%)	Srinivaspura taluk	Percent (%)
Cocoon rearing						
Shed size	40×35ft	-	15×25ft	-	20×30ft	-
Shed value (Rs.)	300000	-	200000	-	250000	-
No. of rearing per year	2	-	4	-	5	-
Nearest Market	Siddlaghatta	-	Chintamani	-	Chintamani	-
Variable cost						
Eggs or dfls (disease free layings)	1000	1. 51	1000	1. 52	1250	2. 06
Disinfectants	750	1. 13	1000	1. 52	1000	1. 65
Family labour	14945	22. 52	13490	20. 56	11250	18. 51
Hired labour	2400	3. 62	1500	2. 29	1200	1. 97
Chandrike/rearing stand	1640	2. 47	2450	3. 73	1680	2. 76
Miscellaneous	350	0. 53	400	0. 61	450	0. 74
Transportation	150	0. 23	700	1. 07	400	0. 66
Interest on working capital (8 % p. a.)	1567	2. 36	1447	2. 21	1244	2. 05
Total Variable Cost	22803	34. 37	21987	33. 51	18474	30. 39
Cost of mulberry cultivation	30924	46. 6	33011	50. 31	29411	48. 38
Total variable cost per year	45605	-	87949		92370	
Fixed cost						

Table Cont...

Depreciation of shed & equipments	4699	7. 08	3663	5. 58	4565	7. 51
Interest on fixed capital (8% p. a.)	7928	11. 95	6960	10. 61	8336	13. 71
Total fixed cost	12627	19. 03	10623	16. 19	12901	21. 22
Total cost per rearing	66354	100	65621	100	60786	100
Total cost per year	89156	-	131582	-	134682	-
Returns						
Average cocoon yield (kg)	280	-	300	-	240	-
Average cocoon price (Rs. /kg)	220	-	180	-	160	-
Total returns	61600	-	54000	-	38400	-
Total returns per year	123200	-	216000	-	192000	-
Net returns per year	34044	-	84418	-	57318	-
Returns per Rupee Expenditure (RRE)	1. 38	-	1. 64	-	1. 43	-

Almost entire mulberry leaves produced was used as feed for the silk worm rearing on the farm. The average shed size for rearing silk worms was 1400 sq. ft. in Malur taluk, 375 sq. ft. in Mulbagal talukand 600 sq. ft. in Srinivaspura taluk. The total cost of rearing one cycle of silkworm was Rs. 66354, Rs. 65621 and Rs. 60786 in Malur, Mulbagal and Srinivaspura taluks, respectively. In which 46. 60, 50. 31 and 48. 38 percent of the total cost was cost of mulberry production; about 22. 52, 20. 56 and 18. 51 percent of total cost was family labour. Disinfectants formed 1. 13, 1. 52 and 1. 65 percent of the total cost. Cost of disease free layings (*dfl or eggs*) was 1. 51, 1. 52 and 2. 06 percent of the total costinMalur, Mulbagal and Srinivaspura taluks, respectively. Average cocoon yield was 280, 300 and 240 kg with a total return of Rs. 61600, Rs. 54000 and Rs. 38400 in Malur, Mulbagal and Srinivaspura taluks, respectively. On an average, 2 rearingin Malur, 4 and 5 rearing in Mulbagal and Srinivaspura taluks were taken up. The total net return per year was Rs. 34044, Rs. 84418 and Rs. 57318 in the respective taluks. The return per rupee expenditure was 1. 38, 1. 64 and 1. 43 in Malur, Mulbagal and Srinivaspura taluks, respectively (Table 2).

The transportation cost incurred in marketing of cocoons was lowest in the case of Malur taluk followed by Srinivaspura taluk and Mulbagal taluk farmers, respectively. Average cocoon price per kg of cocoon was highest in Siddlaghatta market as compared to Chintamani cocoon market. The net returns and RRE were highest in Mulbagal followed by Malur and Srinivaspura taluks because the average cocoon yield was highest in the case of Mulbagal taluk (300 kg per 200 dfl) vis-a-vis Malur taluk (280 kg) and Srinivaspura taluk (240 kg) and cost per year incurred in cocoon production was highest in Srinivaspura compared to Mulbagal and Malur taluks.

Table 3: Variability in different sources of income of the sample farmers

Income source	Malur taluk		Mulbagal taluk		Srinivaspura taluk	
	Average Income (Rs.)	CV (%)	Average Income (Rs.)	CV (%)	Average Income (Rs.)	CV (%)
Crop	1120242	77. 47	502070	113. 46	1005878	138
Livestock	108600	119. 13	71847	44. 87	58210	78. 36
Sericulture	76900	64. 55	130333	57. 73	100000	-
Total farm income	1305742	74. 85	704250	109. 63	1164088	134. 23
Non-farm income	244118	73. 88	240200	72. 31	230775	76. 95
Total	1549860	3. 98	944450	93. 22	1394863	130. 58

Farming is susceptible or prone to myriad of production and marketing risks. To overcome production and marketing risks, farmers in the study area adopted a number of measures. One of them is diversification. This is practiced by taking up different types of enterprises such as crops, dairy, sericulture, non-farm activities and others. The variability in income of farmers was highest among livestock enterprise in Malur and contrasting results were seen in the case of Mulbagal where the variability in livestock income was lowest and lower in the case of Srinivaspura taluk (Table 3). This may be because of only a small number of people were depending on livestock in Malur and farmers grew tomato hybrids which are of more demand and of lower risk. Apart from this, sericulture income had lower CV because of the stability in the flow of income. Thus it can be inferred that inclusion of livestock and sericulture in crop pattern leads to stability of farm income. This result is in line with findings of Gajanana and Sharma (1994) who showed that in Tumkur district of Karnataka, sericulture and dairy adds stability to farm returns. Non-farm income also had a comparatively lower risk in all the three taluks of the study area compared to total farm income because non-farm income includes regular salaried wage people and shop keepers who earn stable incomes as compared to total farm income.

CONCLUSION

Diversification in agriculture reduces income risk to the farmers and increases the returns. Diversification of farm enterprises involves cultivation of multiple crops such as field crops (cereals and millets), horticultural crops (fruits, vegetables, flowers and plantation crops) and commercial crops (cotton and sugarcane) etc., along with sericulture (mulberry), livestock and poultry enterprises. Diversification of enterprises helped in reducing the income risks in farming. It was the most popular on farm strategy used by the farmers. The return per rupee expenditure made on sericulture enterprise varied from 1. 38 to 1. 64 among the selected sample farmers. Apart from this, sericulture income had lower Coefficient of Variation because of the stability in the flow of income. Thus it can be inferred that inclusion of sericulture enterprise along with crop cultivation leads to stability of farm income in the study area.

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