

## ANALYSIS OF COSTS AND RETURNS IN MULBERRY AND COCOON PRODUCTION AMONG THE SERICULTURISTS

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### ABSTRACT

*Sericulture is an important agro-based rural industry that helps India's economy and generates higher income and employment. Sericulture has been practised in a wide range of agro-climatic regions like forests, hilly areas and plains. Most of the farmers are illiterate which constitute 7.14% and only 9 farmers (64.28%) are secondary level, about the family size, majority of the respondents (10) are having medium family size (in numbers) between 4-6 representing 71.4% and 4 farmers (28.57%) holding big family (>6). Socio-economic characters of sericulturists varied markedly and thus these have a great bearing on the economics of mulberry. Majority of the respondents (6) obtain less net returns ₹<3000, which constitutes 42.85%, followed by 5 farmers who obtain medium net returns between ₹ 3000-5000 representing 35.7% and rest of 3 farmers receive higher net revenue ₹>5000 (21.4%). About cost of cocoon production, majority of the respondents (8) invest between ₹100-140 for productions of 1 kg of cocoons (57.14%), followed by 3 farmers invests less than ₹ 100 which constitutes 21.4% and only 3 farmers (21.4%) invest more than ₹ 140. The study revealed that, mulberry cultivation and silkworm rearing practices have great bearing on the costs and returns in mulberry and cocoon production. Hence, efforts must be directed towards minimization costs and maximization of returns by providing adequate knowledge about the recent technologies to improve the economic status of sericulturists.*

**Keywords:** costs, returns, cocoon, mulberry, cocoon, sericulturists

### INTRODUCTION

India is mainly an agriculture based country, with 65 per cent of its population dependent on agriculture for their livelihood (Rathod and Ganga, 2019). 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 the developing countries like India, small size of land holdings for large proportion of farmers is considered as one of the main factors causing rural poverty and hindering agricultural growth (Vinaya *at al.* 2017). Among cottage and village industries, sericulture is the largest employer after hand loom. Sericulture Industry creates two types of employment *viz.*, direct and indirect employment. Direct employment relates to employment in mulberry cultivation and silk cocoon production (Venkatanarasaiah, 1992). It was estimated that one hectare of mulberry garden generate employment for about 13 persons throughout the year (3250 mandays) against 206 mandays in paddy, 335 mandays in sugarcane, 64 mandays in groundnut and 75 mandays in ragi cultivation (Anon., 2001). Besides low productivity, Indian silk industry has failed to produce silk confirming to the international standards to compete in international

market. Further, increasing cost of labour and resources coupled with frequent crop losses make silk cocoon production less profitable. Generation of appropriate cost effective and cocoon production technologies are the pre-requisites for sustainable sericulture. Mulberry leaf is the exclusive food for the silkworm, *Bombyx mori*, L. and its production practices play a vital role in determining the cost of production of cocoons, quality and quantity of raw silk. It was estimated that 60% of the cost of production of cocoons goes to mulberry leaf production. The National Council of Applied Economics Research indicated that "The weakness of sericulture industry is reflected in the cost of production of cocoons". The performance of silk industry is reflected by the cost of production of mulberry leaves, cocoon and silk yield and returns there from.

### OBJECTIVES

- (1) To know the socio Socio-economic status of sericulturists in Surankote Tehsil, Poonch District
- (2) To know the Costs and returns in mulberry production among the sericulturists of Surankote Tehsil, Poonch District

- (3) To know the costs and returns in cocoon production among the sericulturists of Tehsil Surankote, Poonch District

**METHODOLOGY**

The present study was conducted in seven villages in Surankote tehsil of Poonch District, namely Kalar kattal, Marhote, Dundhak, Sanai, Potha, Surankote and Mohra Bachhai

The information about the farmers was collected through formal discussions, telephone calls and with interview schedules.

The data was analyzed by simple tabular methods. The concepts and methods used in working out economics of sericulture are:

**(2) General information Education, family size and total land holding**

The respondents were asked to indicate their formal education, which was recorded and quantified. This variable refers to the total number of men, women and children in the respondent’s family. The respondents were classified as per family size into three groups namely small, big and medium. This variable refers to the extent of land possessed by the respondents both under irrigated and rainfed conditions. The classification of respondents was done into three groups such as big, medium and small land holding.

**(2) Evaluation of different inputs and outputs & costs and returns**

Information on the actual expenditure incurred by the farmer per hectare per crop was obtained. Calculating interest on working capital for raising mulberry garden, the actual expenditure incurred by the farmer for human labor, bullock power, FYM and chemical fertilizers, etc., were considered. For estimation of cost of garden maintenance per crop was also done in the same way. In case of cocoon production, cost of layings, leaves purchased if any, hired charges on mountages, cost of owned and hired labour for rearing, disinfection and maintenance besides cost of marketing and miscellaneous expenses were also taken into consideration. The interest was calculated @ 13 per cent on the working capital. The cost of mulberry leaves for cocoon production was calculated at the actual cost of cultivation of

mulberry /acre/crop. Depreciation on each capital equipments used in sericulture and on rearing house was calculated for each individual farmer separately by the fixed installment method.

Initial cost of the asset (₹)

$$\text{Annual depreciation} = \frac{\text{Initial cost of the asset (₹)}}{\text{Estimated life span of the asset (years)}}$$

The by-products from cocoon production including stumps, left over leaf and litter were all valued at the prevailing prices. The output of the mulberry leaves and cocoons were valued at the actual price received by the farmer. Costs-return analysis was made separately for mulberry cultivation and cocoon production for rearing /acre /crop. The gross income was valued at a total value of cocoons sold in the market and value of byproducts. Net income was obtained by deducting the total cost of production from gross income. Cost: benefit ratio (CBR) was also calculated considering gross returns and total costs incurred in producing cocoon per acre per crop. The analysis of data was carried out by adopting the statistical tools like frequencies, percentages and mean.

**RESULTS AND DISCUSSION**

**Socio-economic status of sericulturists**

Data on the socio-economic status of the sericulturists of the study area like education, family size and land holding are presented in Table 1.

**Table 1 : Socio-economic status of sericulturists in Surankote Tehsil, Poonch District (n = 14)**

Sr. No.	Category	Criteria	No. of farmers	%
<b>(1) Education (in standards)</b>				
a	Illiterate	0	1	7.14
b	Primary	1-4	1	7.14
c	Middle	5-8	3	21.4
d	Secondary	9-12	9	64.28
<b>(2) Family size (No.)</b>				
a	Big	> 6	4	28.57
b	Medium	4-6	10	71.4
c	Small	< 4	0	0
<b>(3) Land holding (Acres)</b>				
a	Big	> 2	5	35.7
b	Medium	1-2	3	21.4
c	Small	< 1	6	42.85

Education level (in standards) among the sericulturists of the study area varied considerably. Among the 14 respondents, 1 of there are illiterate which constitute 7.14%, followed by 3 farmers (21.4%) who are studied up to middle school, 9 farmers (64.28%) up to secondary level and 1 farmers (7.14%) up to primary level. Majority of the respondents (10) are having medium family size (in numbers) between 4-6 representing 71.4%, followed by 0 farmers (0%) possessing a small family (<4) and 4 farmers (28.57%) holding big family (>6). Among the 14 farmers considered for the study, 5 farmers holds large land holding (>2 acres) which constitutes 35.7%, followed by medium land holding (1-2 acres) which represents 3 farmers (21.4%) and only 6 farmers (42.85%) are small land holding (<1 acre).

**Costs and returns in mulberry production**

Data on the costs and returns in mulberry production among the sericulturists of the study area are tabulated in table 2. Majority of the respondents (6) are in a possession of small mulberry garden for rearing (< 0.25 acre) which constitute 42.85%, followed by 7 farmers (50%) represents more than 0.25-0.375 acres and 1 farmers are holds between > 0.375 acres of mulberry garden which represents 7.14%. Majority of the farmers (3) invest less than ₹ 3000 for bullock power for one acre per year representing 21.4%, followed by 8 farmers (57.14%) invest between ₹ 3000-5000 and only 3 farmers spent more than ₹ 5000, which constitute 21.4% of the respondents. In mulberry cultivation, majority of the farmers (9) invest ₹6000-10000 towards labour for one acre per year which represents 64.28%, followed by 2 farmers (14.28%) who invest more than ₹ 10000 and only 3 farmers invest less than ₹ 6000 (21.4%). In mulberry cultivation, majority of the farmers (8) invest less than ₹ 3000 for cost of manure representing 57.14%, followed by 3 farmers spent between ₹ 3000-5000 (21.4%) and only 3 farmers (21.4%) invest more than ₹ 5000. In respect of purchase of fertilizers for mulberry production, maximum number of farmers (5) invest an amount of ₹ 1300-2600 which constitute 35.7%, followed by 1 farmers invest more than ₹ 2600 (7.14%), and only 2 farmers invest less than ₹ 1300 (14.28%) and 6 farmers didn't invested any money (42.85%). Among the 14 farmers, 2 farmers (14.28%) invested more than ₹ 20000 for mulberry leaf production per acre per year, followed by 10 farmers invest between ₹ 10000-20000 representing 71.42% and 2 farmers invest less than ₹ 10000 (14.28%).

**Table 2: Costs and returns in mulberry production among the sericulturists (n = 14)**

Sr. No.	Category	Criteria	No. of farmers	%
<b>(1) Area under mulberry (acres)</b>				
a	Big	> 0.375	1	7.14
b	Medium	0.25-0.375	7	50
c	Small	<0.25	6	42.85
<b>(2) Bullock power (₹ )</b>				
a	High	>5000	3	21.4
b	Medium	3000-5000	8	57.14
c	Low	<3000	3	21.4
<b>(3) Labour for mulberry cultivation (₹ )</b>				
a	High	>10000	2	14.28
b	Medium	6000-10000	9	64.28
c	Low	<6000	3	21.4
<b>(4) Manure (₹ )</b>				
a	High	>5000	3	21.4
b	Medium	3000-5000	3	21.4
c	Low	<3000	8	57.14
<b>(5) Fertilizers (₹ )</b>				
a	High	>2600	1	7.14
b	Medium	1300-2600	5	35.7
c	Low	<1300	8	57.14
<b>(6) Cost of mulberry leaf production (₹ /acre/year)</b>				
a	High	>20000	2	14.28
b	Medium	10000-20000	10	71.42
c	Low	<10000	2	14.28

**Costs and returns in cocoon production**

The results of the data on the costs and returns in cocoon production among the sericulturists of the study area are presented in table 3. Among the 14 farmers, 5 farmers invest less than ₹ 1000 towards depreciation cost on rearing house and equipments which constitutes 35.7%, followed by 2 farmers invest more than ₹ 2000 representing 14.28% and 7 farmers invest between ₹ 1000-2000 representing 50%. Majority of the farmers (9) rear silkworms between 10-16 DFLs per batch representing 64.28%, followed by 4 farmers rear less than 10 DFLs which constitutes 28.57% and only 1 farmers reared more than 16 DFLs (7.14%). All the 14 farmers got free chawki silkworms, rearing materials and free disfectants from the UT Sericulture department. In silkworm rearing, majority of the farmers (9) provide bed size of less than 100 sq. ft representing 64.28%, followed by 3 farmers provide bed size between 100-200 sq. ft. constitutes 21.4% and only 2 farmers provide bed size of more than 200 sq. ft. (14.28%). Among the 14 respondents, 9 farmers invest less cost (< ₹ 500) towards hiring charges of mountages which constitutes 64.28%, followed by 3 farmers invests between ₹ 300-500 representing 21.4% and only 2 farmers (14.28%) who invests more than ₹ 300. In silkworm rearing, 9 farmers

invest an amount of ₹ 6000-10,000 towards labour charges for silkworm rearing representing 64.28%, followed by 2 farmers (14.28%) who invest less than ₹ 6000 and only 3 farmers (21.4%) invest more than ₹ 10, 000 as labour cost. Among the 14 farmers, 8 farmers obtained an yield of 20-30 kg/10-16 DFLs representing 57.14%, followed by 1 farmer (7.14%) with > 30 kg and 5 farmers (35.7%) obtained poor yield (< 20 kg). Among the 14 farmers, 8 farmers secured medium price for cocoons (₹ 650-750) representing 57.14%, followed by 4 farmers (28.57%) who got good price (> ₹ 750) and only 2 farmers (14.28%) got less price (< ₹ 650). Among the 14 respondents, 5 respondents (35.7%) obtained less revenue (< ₹ 15000), followed by 2 farmers (14.28%) with higher revenue (> ₹ 20000) and rest of the 7 farmers who had a total revenue of ₹ 15000-20000, which represents 50%. Majority of the respondents (6) secured less net returns (< ₹ 3000), which constitutes 42.85%, followed by 5 farmers with medium net returns between ₹ 3000-5000 representing 35.7% and rest of the farmers (3) obtained higher net revenue > ₹ 5000 (21.4%). Majority of the respondents (8) invest between ₹ 100-140 for production of 1 kg cocoons (57.14%), followed by 3 farmers who invest less than ₹ 100, which constitutes 21.4% and only 3 farmers (21.4%) invest more than ₹ 140.

**Table 3: Costs and returns in cocoon production among the sericulturists of Tehsil Surankote, Poonch District (n = 14)**

Sr. No.	Category	Criteria	No. of farmers	%
<b>1 Depreciation cost on rearing house and equipments (₹)</b>				
a	High	> 2000	2	14.28
b	Medium	1000-2000	7	50
c	Low	< 1000	5	35.7
<b>2 No. of DFLs per batch</b>				
a	High	> 16	1	7.14
b	Medium	10-16	9	64.28
c	Low	< 10	4	28.57
<b>3 Cost of DFLs / chawki worms (₹)</b>				
a	High	-	-	-
b	Medium	-	-	-
c	Low	-	-	-
<b>4 Cost of disinfectants (₹)</b>				
a	High	-	-	-
b	Medium	-	-	-
c	Low	-	-	-
<b>5 Cost of silkworm rearing materials (₹)</b>				
a	High	-	-	-
b	Medium	-	-	-
c	Low	-	-	-

Sr. No.	Category	Criteria	No. of farmers	%
<b>6 Silkworm rearing bed size (sq. ft.)</b>				
a	Big	> 200	2	14.28
b	Medium	100-200	3	21.4
c	Small	< 100	9	64.28
<b>7 Moutage hiring charges (₹)</b>				
a	High	> 500	9	64.28
b	Medium	300-500	3	21.4
c	Low	< 300	2	14.28
<b>8 Labour for silkworm rearing (₹)</b>				
a	High	> 10000	3	21.4
b	Medium	6000-10000	9	64.28
c	Low	< 6000	2	14.28
<b>9 Cocoon yield</b>				
a	High	> 30	1	7.14
b	Medium	20-30	8	57.14
c	Low	< 20	5	35.7
<b>10 Cocoon price (₹ /kg)</b>				
a	High	> 750	4	28.57
b	Medium	650-750	8	57.14
c	Low	< 650	2	14.28
<b>11 Total revenue (₹)</b>				
a	High	> 20000	2	14.28
b	Medium	15000-20000	7	50
c	Low	< 15000	5	35.7
<b>12 Net returns (₹)</b>				
a	High	> 5000	03	21.4
b	Medium	3000-5000	5	35.7
c	Low	< 3000	6	42.85
<b>13 Cost of cocoon production (₹ /kg)</b>				
a	High	> 140	3	21.4
b	Medium	100-140	8	57.14
c	Low	< 100	3	21.4

Among the 14 respondents, majority (1) of the farmers are illiterate which constitute 7.14% and only 9 farmers (64.28%) are secondary level, about the family size, majority of the respondents (10) are having medium family size (in numbers) between 4-6 representing 71.4% and 4 farmers (28.57%) holding big family (>6). About the land holding, among the 14 farmers, 5 farmers holds large land holding (>2 acres) which constitutes 35.7% and only 6 farmers are small land holding (<1 acres). Socio-economic characters of sericulturists varied markedly and thus these have a great bearing on the economics of mulberry and cocoon production along with the knowledge level and adoption of sericultural technologies. Majority of the respondents (6) are in a possession of less area of mulberry garden for rearing (<0.25 acre) which constitutes 42.85% and 7 farmers are holds between 0.25 to 0.375 acres of mulberry garden which represents 50%. Bullock power, majority of the farmers (3)

invest less than ₹ 3000 for one acre per year representing 21.4% and only 3 farmers spent more than ₹ 5000 which constitute 21.4% of the respondents. Among 9 farmers invest ₹ 6000-10000 towards labour for one acre per year which represents 64.28% and only 3 farmers invest less than ₹ 6000 rupees (21.4%). Majority of the farmers (8) invest less than ₹ 3000 which represents 57.14% and only 1 farmers (7.14%) invest more than ₹ 2600, about fertilizers for mulberry cultivation, maximum number of farmers (5) invest an amount of ₹ 1300-2600 which constitute 35.7% and only 8 farmers invest less than ₹ 1300 (57.14%). 10 farmers (71.42%) invest more than ₹ 10000 for mulberry leaf production per acre per year and 2 farmers invests less than ₹ 10000 (14.28%). Lakshmanan *et al.* (1997) conducted study to work out the cost and return profile per hectare of mulberry in Salem and Dharmapuri districts of Tamil Nadu. They estimated that an average of ₹ .52, 1.28, 1.16 and 1.09 were incurred in producing one kg of mulberry leaf, while in the case of cocoon it worked out to be ₹ 79.46, 64.24, 63.73 and 54.31 for holding different size groups I (0.01-0.50 ha), II (0.51-1.00 ha), III (1.01-1.50 ha) and IV (>1.50 ha), respectively. The value of depreciation cost of rearing house and equipments in the study area revealed that, among the 14 farmers 5 farmers invest less amount (< ₹ 1000) which constitutes 35.7% and only 2 farmers (14.28%) invest more than ₹ 2000. Further, with regard to number of DFLs per batch, majority of the farmers (9) reared between 10-16 layings representing 64.28% and only 4 farmers reared more than 10 layings (28.57%), about cost of DFLs / chawki silkworms, among 14 farmers, 14 farmers were receiving chawki silkworms from UT Sericulture department. About cost of disinfectants, all farmers got free disinfectants from UT Sericulture department. Towards cost of silkworm rearing materials, all farmers got free rearing materials from UT Sericulture department, about silkworm rearing bed size (sq.ft.), majority of the farmers (9) provide bed size of less than 100 sq.ft. which represents 64.28% and only 2 farmers provide bed size of more than 200 sq. ft. (14.28%). About moutage hiring charges, among the 14 respondents, 2 farmers invests less cost (< ₹ 300) for the moutages hiring charges which constitutes 14.28% and only 9 farmers (64.28%) invest more than ₹ 500. About labour for silkworm rearing, more farmers (9) invest between ₹ 6000-10000, which represents 64.28% and only 3 farmers (21.4%) invests more than ₹ 10000 for silkworm rearing. In cocoon yield, among the 14 farmers, 8 farmers obtain average yield (20-30kg) representing 57.14% and rest of the 5 farmers (35.7%) obtain poor yield (<20kg). About cocoon price, among the 14 farmers 8 farmers obtain medium price (₹ 650-750) representing 57.14% and only 2 farmer (14.28%) secure less price (Rs.< 6500). Nohmi *et al.* (1992) reported that it is essential to decrease the cost of labour especially labour used for ploughing, fertilizer application, cultivation

and weeding in mulberry fields as well as silkworm rearing. Kumaresan *et al.* (2001) estimated that the cost of cocoon production was worked out to be ₹ 10,485.11 for CSR hybrids and ₹ 6917.04 for cross-breed. The high production cost for CSR hybrids was due to usage of more inputs, particularly leaf, disinfectants and rotary moutages. The average cocoon yield was 69.08 and 60.88 kg/100 DFLs for CSR hybrids and cross-breed, respectively. The average price realized for CSR hybrids was higher (₹ 195.93) due to good quality cocoons with low renditta compared to ₹ 127.67 for cross-breed. The net revenue was estimated to be ₹ 3,545.66 for CSR hybrids and ₹ 1,099.27 for cross-breed. The cost benefit ratio was worked out to be 1:1.34 and 1:1.16 for CSR hybrids and cross-breed, respectively. Among the 14 respondents, 5 respondents (35.7%) receive less revenue (< ₹ 15000) and rest of the 7 farmers obtain medium total revenue (₹ 15000-20000) representing 50%. About net returns, majority of the respondents (6) obtain less net returns < ₹ 3000, which constitutes 42.85%, followed by 5 farmers who obtain medium net returns between ₹ 3000-5000 representing 35.7% and rest of 3 farmers receive higher net revenue > ₹ 5000 (21.4%). About cost of cocoon production, majority of the respondents (8) invest between Rs.100-140 for productions of 1 kg of cocoons (57.14%), followed by 3 farmers invests less than ₹ 100 which constitutes 21.4% and only 3 farmers (21.4%) invest more than ₹ 140. Lakshmanan and Mallikarjuna (2006) reported that the cost of cocoon production per kg of cocoon increased from ₹ 70.43 during 1993-94 to ₹ 79.29 in 1995-96, which was due to the escalation of input prices. The average cocoon price increased from ₹ 81.12 to ₹ 105.53. Lakshmanan *et al.* (1997) estimated the economics of sericulture during 1993-1994 and reported that the cost benefit ratio was 1:1.30, 1:1.09, 1:1.77, 1:1.40 and 1:1.56 for Karnataka (irrigated), Karnataka (rainfed), Andhra Pradesh, Tamil Nadu and Kerala, respectively. Lakshmanan *et al.* (1999) worked out cost benefit ratio for different states *viz.*, Karnataka, Andhra Pradesh, Tamil Nadu and Kerala. The cost benefit ratio for Karnataka during 1995-96 and 1996-97 was 1:1.50 and 1:1.77, respectively. Similarly, for Andhra Pradesh during the period it was 1:1.31 and 1:1.39. For Tamil Nadu, it was 1:1.67 and 1:1.50 and for Kerala it was 1:1.72 and 1:1.67. For rainfed mulberry in Karnataka, the ratio was 1:1.30 and 1:1.39 for 1995-96 and 1996-97, respectively.

## CONCLUSION

About education level (in standards), among the sericulturists of the study area varied considerably. Among the 14 respondents, majority of the respondents have studied upto secondary level and one farmer was illiterate. According to family size maximum number of respondents possesses medium family size, about land holding majority of the farmers having medium holdings and few of them

had small land holdings. Majority of the farmers possess less than 0.25 acre area of mulberry and only few farmers having more area under mulberry, about investment on bullock power, most of the farmers invests more cost towards bullock power. In respect of labour for mulberry cultivation, majority of the farmers invests medium cost on mulberry. However, farmers spent fewer amounts towards manures and fertilizers for mulberry. Majority of the farmers invests more costs for production of mulberry leaves. In respect of silkworm rearing practices, less amount of money was spent towards depreciation value of rearing house and equipments. About number of DFLs per batch, majority of the farmers rear average number of DFLs per batch and few of them rear less DFLs. Further, all the farmers obtain free chawki worms from UT Sericulture department. About cost of disinfectants, all the farmers obtain free disinfectants from UT Sericulture department. Further, with respect to cost of silkworm rearing materials all the farmers obtain free rearing materials from UT Sericulture department. About rearing bed size, majority of the farmers provide small bed size and few of the farmers maintain medium bed size. About moutage hiring charges, majority of the farmers invests fewer costs and few of the farmers invest medium costs for moutages. About cocoon yield, majority of the farmers obtain medium yield and few of the farmers obtain least yield, about total revenue majority of the farmers receive less revenue and few of the farmers secure average revenue. However, about net returns, majority of the farmers obtain less net return and few farmers receive high net returns. In respect of cost of cocoon production, majority of the farmers spent average value of costs and few farmers with high cost of cocoon production. Mulberry cultivation and silkworm rearing practices have great bearing on the costs and returns in mulberry and cocoon production. Hence, efforts must be directed towards minimization costs and maximization of returns by providing adequate knowledge about the recent technologies to improve the economic status of sericulturists.

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