An economic assessment of sericulture enterprise in rain-fed areas of Jammu region

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Abstract

The study conducted in the Jammu region of J&K state has investigated the economics of sericulture farming in three districts namely, Kathua, Rajouri and Udhampur by taking 270 silkworm rearers, 90 from each district through primary survey during the year 2017-18. The study has revealed that sericulturists of Kathua district incurred highest establishment cost per acre (₹ 14099.96) for the mulberry garden followed by Udhampur (₹ 13216.29) and Rajouri (₹ 12948.81) with overall average as ₹ 14007.70. Human labour, saplings, machine labour, farm yard manure (FYM) and fertilizers has been found to be the important components comprising the total cost of which human labour contributed the most towards the total cost followed by expenditure on saplings. Highest maintenance cost per acre per year for mulberry garden has been found to be borne by the sericulturists of Udhampur district (₹ 4872.88) followed by Kathua (₹ 4480.14) and Rajouri (₹ 4441.61) with overall average as ₹ 4685.52. Of the two components (manures and manuring and fertilizers and its application) comprising the total maintenance cost, manures and manuring contributed more towards the total cost as compared to that of fertilizers and its application. The cost incurred per ounce for cocoon production has been found to be highest in Kathua district (₹ 8953.03) followed by Rajouri (₹ 8760.36) and Udhampur (₹ 8262.77) with overall average as ₹ 8756.23. Variable cost has been the major component of the total cost and among the various items constituting the variable cost, the highest share has been found to be of human labour followed by leaf cost, transportation and marketing and cost of disease free layings in the study area. The rearers of Udhampur district (₹ 23940.00) earned highest income followed by Kathua (₹ 23268.60) and Rajouri (₹ 23063.33) with overall average as ₹ 23865.00. Furthermore, the results revealed highest benefit cost ratio in Udhampur district (2.90) followed by Rajouri (2.66) and Kathua (2.58) with overall average as 2.73. Garrett’s Ranking technique highlighted non-availability of shed, price variation, poor quality of seed, crop damage, delayed marketing of the produce and non-possession of required number of rearing kits as the major constraints related to cocoon production. The study suggested for provision of good quality seed, organizing departmental vans for transporting cocoons, exclusive development in the source of mulberry foliage by putting more area under bush type mulberry plants, introduction of price control measures (like MSP) for stabilizing the cocoon prices, and above all improvement in extension services as it is a pre-requisite for the progress and success of sericulture enterprise.

Keywords: Sericulture, cocoons, income, benefit cost ratio, extension services

Introduction

India is predominantly an agrarian economy as evident from the fact that half of its population is directly or indirectly dependent on agriculture for their livelihood (Anonymous, 2017) [1]. Further, about 70 per cent of India’s population resides in rural areas and more than 40 per cent of rural population still lives below the poverty line (Hosali and Murthy, 2015) [6]. In India, rapid increase in the population has resulted in decreased agricultural land holding size. The small size holdings by a large proportion of farmers’ in the absence of alternative sources of income is considered as one of the main factors of rural poverty and hindered agricultural growth. Also, the agriculture sector is confronted with a number of factors such as limited land availability, limited cash returns and is confined to one or two seasons in a year that limits its potential for generating new jobs in rural areas and thus pushes villages to look for supporting rural industries like sericulture, apiculture, poultry and dairying. Concerning this issue, the establishment of rural based industries like sericulture can be an efficient tool in creating new job opportunities as well as providing supplemental income to landless farmers, entrepreneurs...
and artisans throughout the year. Such an enterprise is highly suitable to highly populous countries like India where large number of rural people are jobless, landless and abundant labourers. Sericulture, rightly known as “Industry of the poor” is both an art and science of raising silkworms for silk production and has turned out to be a highly remunerative enterprise and promising rural industries because of its unique characteristics of being eco-friendly, agro-based, labour intensive, short gestation period, capacity to develop into a family enterprise with low capital investment, high output and reasonably good assured returns (Singh, 1994) [8]. Sericulture has gained a special place among the agro-based cottage industry of our country. Asia is the main producer of silk in the world contributing 95 per cent of the total global output, bulk of which comes from China and India. China has come up as the world's single biggest producer and chief supplier of silk to the world markets while India ranks second with respect to silk production having a share of about 15.49 per cent in the global production (Rattan, 2016) [7]. India is the only country in the world that can produce all the four commercially known varieties of silk namely, Mulberry, Eri, Tasar, and Muga with an advantage of practicing sericulture all through the year, thus, yielding a stream of about 4-6 crops due to its tropical climate. Due to the prevalence of favourable climatic conditions, mulberry is cultivated mainly in five states of the country namely, Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu and Kashmir called as traditional sericulture states that jointly account for about 97 per cent of each mulberry silk production as well as area under mulberry cultivation. Among these traditional sericulture states Karnataka is the principal silk producing state which accounts for about 58 per cent of the total mulberry raw silk production in the country (Bhat, 2014) [3]. The non-traditional sericulture states include Arunanchal Pradesh, Assam, Bihar, Chattisgarh, Himachal Pradesh, Jharkhand, Kerala, Maharashtra, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Manipur, Meghalaya, Tripura, Mizoram, Nagaland, Sikkim and Orissa.

Sericulture is one of the traditional occupations of Jammu and Kashmir that has assumed special significance as subsidiary occupation. Having potential to generate attractive income it supplements the income of the famers in addition to their returns from other crops as it integrates well with the farming systems and thus plays a very important role in the rural development. Several socio-economic studies have affirmed that the benefit-cost ratio in sericulture is highest among comparable agricultural crops (Ganghopadhyay, 2008) [4]. It helps in improving the economic condition of the landless farmers and weaker sections of the society as most of the families engaged with this venture belong to economically backward sections of the society like scheduled castes, schedule tribes and adivasis. It is practiced in 20 districts of the state out of which major silk producing districts are Anantnag, Kupwara, Pulwama, Baramula, Ganderbal, Udhampur, Rajouri, Reasi and Kathua. About 30455 families in the state are engaged with this venture producing about 973 MTs of silk cocoons and generating an income of about ₹ 2224 lakh (Anonymous, 2016) [2]. With this background, the present study was undertaken with the following objectives:

- To estimate the costs and returns from sericulture production.
- To identify the constraints in sericulture production.

### Study Area and Methodology
Multi-stage sampling technique was adopted for accomplishing the objectives of the study. At the first stage, three districts namely Kathua, Rajouri and Udhampur were purposively selected based on highest number of silkworm rearers and cocoon production as the sericulture has flourished well in these districts of Jammu region. Then, two development blocks from each selected district were selected purposively based on same criteria. Further, three villages from each selected block were selected randomly and at the final stage, 270 silkworm rearers (15 from each village, 45 from each block and 90 from each selected district) were randomly selected and interviewed using pre-tested schedule during the year 2017-18.

### Analytical Procedure
#### Computation of costs and returns
For the computation of costs and returns, various cost concepts framed by CACP were used and the input items included under each category of cost are indicated below:

- **Cost A**: Hired human labour, hired and owned bullock labour, hired and owned machine labour, value of farmyard manure, value of chemical fertilizers, irrigation, value of plant protection, land revenue, depreciation charges, value of seed (DFLs), value of disinfectants, interest on working capital, other miscellaneous cash expenses.
- **Cost B**: Cost A + rental value of leased in land
- **Cost C**: Cost B + interest on fixed capital
- **Cost D**: Cost B + rental value of owned land
- **Cost E**: Cost D + imputed value of family labour
- **Cost F**: Cost E + imputed value of family labour

### Garrett’s Ranking Technique
The constraints and problems faced by the silkworm rearers in silkworm rearing and cocoon production were analyzed using Garrett’s ranking technique (Garrett and Woodworth, 1969). The ranks given by each respondent were converted into per cent position by using the formula:

\[
\text{Per cent position} = \frac{100 \times (R_{ij} - 0.5)}{N_j}
\]

Where

- \(R_j\) = Rank given to \(i^{th}\) constraint by the \(j^{th}\) individual,
- \(N_j\) = Number of constraints ranked by the \(j^{th}\) individual

The estimated per cent positions were converted into scores using Garrett’s table. The mean score values estimated for each factor were arranged in the descending order. The constraint with the highest mean score was considered as the most important one and others followed that order.

### Results and Discussion
#### Cost structure of sericulture farming in selected districts of Jammu region

##### Establishment cost of Mulberry Garden
The operation wise establishment cost of mulberry garden (Table 1) indicated that the sericulturists of Kathua district incurred highest cost (₹ 14099.96) followed by Udhampur (₹ 13216.29) and Rajouri (₹ 12948.81) with overall average as ₹ 14007.70. The expenditure on human labour, planting material, machine labour and farm yard manure (FYM) were observed to be the important components among the various
items that constituted the total cost. Human labour was the major component of the total cost for which the highest figure was observed in Kathua (₹ 4520.51) and lowest in Rajouri (₹ 3808.00) with overall average as ₹ 4374.95. The next highest share was found to be of planting material and was found highest for Kathua (₹ 3380.56) again and lowest in Udhampur (₹ 2960.00) with overall average as ₹ 3255.00. The next important component i.e. expenditure on farm yard manure was recorded highest in Udhampur (₹ 2368.41) and lowest in Rajouri (₹ 2078.84) with overall average as ₹ 2225.84.

**Maintenance cost of Mulberry Garden**

The per year maintenance cost of mulberry garden (Table 2) revealed that the total maintenance cost was highest in Udhampur (₹ 4872.88) followed by Kathua (₹ 4480.14) and Rajouri (₹ 4441.61) while overall average turned out to be ₹ 4685.52. Of the total maintenance cost, the highest contribution was of manures and manuring towards the total cost rather than fertilizers and its application. Maintenance cost among the selected districts was noticed highest in Udhampur (₹ 3168.41) and lowest in Rajouri (₹ 2878.84) with overall average as ₹ 3025.84 while the expenditure on fertilizers and its application was ₹ 1212.45, ₹ 1265.67 and ₹ 1289.85 in Kathua, Rajouri and Udhampur, respectively with overall average as ₹ 1261.00.

**Cost of Silkworm Rearing**

The per ounce cost structure of cocoon production (Table 3) revealed that the rearers of Kathua district incurred highest cost (₹ 8953.03) followed by Rajouri (₹ 8760.36) and Udhampur (₹ 8262.77) with overall average as ₹ 8756.23. Of the two components comprising the total cost (i.e. fixed and variable cost), variable cost was the major component which constituted 85.26, 85.10 and 85.80 per cent while the fixed cost constituted 14.73, 14.90 and 14.19 per cent in Kathua, Rajouri and Udhampur, respectively. However, at overall level the variable and fixed cost constituted 85.75 per cent and 14.24 per cent, respectively. Among the various items comprising the variable cost, the highest share was of human labour followed by leaf cost, transportation and marketing and cost of disease free layings (DFLs). Human labour contributed 54.17, 51.53, 53.13 and 52.48 per cent towards total cost in Kathua, Rajouri, Udhampur and at overall level, respectively while the leaf cost constituted 13.92, 15.86, 14.29 and 15.84 per cent in Kathua, Rajouri, Udhampur and at overall level, respectively. The next important component in the list was transportation and marketing of cocoons the share of which was found to be 6.88, 7.26, 7.49 and 7.09 per cent to the total cost in Kathua, Rajouri, Udhampur and at overall level, respectively.

**Concept wise Costs and Profits from Cocoon Production**

The cost distribution of cocoon production along with the profits from silkworm rearing in the study area (Table 4) depicted that the highest cocoon yield was obtained by the rearers of Udhampur district (25.20 kgs) followed by Rajouri (25.02 kgs) and Kathua (24.93 kgs) with overall average yield as 25.08 kgs. Also the gross income was found to be highest in Udhampur (₹ 23940.00) and lowest in Kathua (₹ 23063.33) while the overall gross income was found to be ₹ 23865.00. The concept wise analysis of costs revealed that cost A; A; A were worked out to be same as no rearer was found leasing in land. Cost A was found highest in Rajouri (₹ 4129.50) and lowest in Udhampur (₹ 3768.02) with overall average as ₹ 4038.77. Similarly cost B2; B2; B2 were found same as none of the rearer was found leasing out the land and was observed to be highest for Rajouri (₹ 4245.98) and lowest for Udhampur (₹ 3872.71) with an overall average of ₹ 4150.10. Again, cost C1; C1; C1 were noticed to be same and was highest in Kathua (₹ 8953.03) and lowest in Udhampur (₹ 8262.77) with overall average as ₹ 8745.22. The income over various cost concepts indicated that net returns over cost A were highest in Udhampur (₹ 20171.98) and lowest in Kathua (₹ 19073.22) with an overall average of ₹ 19826.23. The same pattern was observed for returns over cost B i.e. highest in Udhampur (₹ 20067.29) while lowest in Kathua (₹ 18959.93) with overall average as ₹ 19714.90. The returns over cost C were observed to be ₹ 14110.30, ₹ 14508.24 and ₹ 15677.23 in Kathua, Rajouri and Udhampur with overall average figure as ₹ 15119.78. The return per rupee investment or the benefit cost ratio over cost A was observed to be highest in Udhampur (6.35) and lowest in Rajouri (5.63) with 5.91 as overall average. Furthermore, the returns over cost B were observed to be highest in Udhampur (6.18) and lowest in Rajouri (5.48) with overall average as 5.75. However, over cost C the returns were observed highest in Udhampur (2.90) while lowest in Kathua (2.58) with the figure at the overall level as 2.73.

### Table 1: Establishment cost of mulberry garden in selected districts of Jammu region (₹/acre)

| Sr. No. | Particulars                     | Kathua   | Rajouri  | Udhampur | Overall |
|---------|--------------------------------|----------|----------|----------|---------|
| i)      | Human labour (family)          | 4520.51  | 3808.00  | 3808.78  | 4374.95 |
| ii)     | Machine labour                 | 2100.23  | 2059.52  | 2064.71  | 2098.45 |
| iii)    | Saplings/Planting material     | 3380.56  | 3035.00  | 2960.00  | 3255.00 |
| iv)     | FYM                            | 2086.49  | 2078.84  | 2368.41  | 2225.84 |
| v)      | Fertilizer                     | 812.45   | 865.67   | 889.85   | 861.00  |
| vi)     | Interest on working capital    | 1199.72  | 1101.77  | 1124.53  | 1191.87 |
| Total   |                                  | 14099.96 | 12948.81 | 13216.29 | 14007.10 |

### Table 2: Per year maintenance cost of mulberry garden in selected districts of Jammu region (₹/acre)

| A.             | Maintenance cost (2nd year onwards) | Kathua   | Rajouri  | Udhampur | Overall |
|----------------|-------------------------------------|----------|----------|----------|---------|
| i)             | Mannures and manuring               | 2886.49  | 2878.84  | 3168.41  | 3025.84 |
| ii)            | Fertilizers and its application     | 1212.45  | 1265.67  | 1289.85  | 1261.00 |
| iii)           | Interest on working capital         | 381.20   | 297.10   | 414.62   | 398.68  |
| Total          |                                     | 4480.14  | 4441.61  | 4872.88  | 4685.52 |
The constraints faced by the sample silkworm rearers of Kathua, Rajouri and Udhampur district were ranked using Garrett’s Ranking technique which highlighted about twenty constraints regarding cocoon production in the study area. The major constraints in Kathua district were non-availability of shed, price variation, poor quality of seed, crop damage and non-possession of required number of rearing kits were observed to be the major constraints. However, the least ranked constraints included most needy awareness about pre and post disinfection, guidance and training, non-availability of seed, etc., lack of transport facilities, lack of technical availability of shed, price variation, poor quality of seed, crop damage and non-possession of required number of rearing kits were observed to be the major constraints. In Rajouri also poor quality of seed, crop damage, price variation, non-availability of shed and non-possession of required number of rearing kits were the major problems. Furthermore, at overall level non-

### Table 3: Cost structure of cocoon production in selected districts of Jammu region (₹/ounce)

| Sr. No. | Items                                    | Kathua | Rajouri | Udhampur | Overall |
|---------|-----------------------------------------|--------|---------|----------|---------|
| 1.      | Fixed cost                              | 1319.22| 1305.05 | 1172.96  | 1247.30 |
| i)      | Depreciation on rearing house and equipments | 1205.93| 1188.57 | 1068.27  | 1135.97 |
| ii)     | Interest on fixed capital               | 113.29 | 116.48  | 104.69   | 111.32  |
| 2.      | Variable cost                           | 7633.81| 7455.31 | 7089.81  | 7508.93 |
| i)      | Human labour (family)                   | 4849.63| 4514.38 | 4390.06  | 4595.12 |
| ii)     | Leaf cost*                              | 1246.10| 1389.70 | 1180.83  | 1386.53 |
| iii)    | Disease free layings (DFLs)             | 448.80 | 450.36  | 453.60   | 451.48  |
| iv)     | Disinfectants                           | 240.03 | 250.16  | 223.11   | 230.02  |
| v)      | Waste newspaper                         | 59.60  | 59.84   | 57.36    | 58.91   |
| vi)     | Coal                                    | 145.38 | 126.87  | 139.29   | 137.85  |
| vii)    | Transportation and marketing            | 615.98 | 636.36  | 619.29   | 621.23  |
|     | Interest on working capital             | 28.29  | 27.63   | 26.28    | 27.79   |
|     | Total cost                              | 8953.03| 8760.36 | 8262.77  | 8756.23 |

Note: * Includes both imputed and purchased value of leaves

### Table 4: Distribution of costs and measure of profits from sericulture/silkworm rearing in selected districts of Jammu region (₹/ounce)

| Items                          | Kathua | Rajouri | Udhampur | Overall |
|-------------------------------|--------|---------|----------|---------|
| Yield (kg)                    | 24.93  | 25.02   | 25.20    | 25.08   |
| Gross Income                  | 23063.33| 23268.60| 23940.00| 23865.00|
| Cost (₹/ounce)                |        |         |          |         |
| Cost A1                       | 3990.12| 4129.50 | 3768.02  | 4038.77 |
| Cost A2                       | 3990.12| 4129.50 | 3768.02  | 4038.77 |
| Cost B1                       | 4103.41| 4245.98 | 3872.71  | 4150.10 |
| Cost B2                       | 4103.41| 4245.98 | 3872.71  | 4150.10 |
| Cost C1                       | 8953.03| 8760.36 | 8262.77  | 8745.22 |
| Cost C2                       | 8953.03| 8760.36 | 8262.77  | 8745.22 |
| Net Income over above cost concepts (₹/ounce) |        |         |          |         |
| Cost A1                       | 19073.22| 19139.10| 20171.98| 19826.23|
| Cost A2                       | 19073.22| 19139.10| 20171.98| 19826.23|
| Cost B1                       | 18959.93| 19022.62| 20067.29| 19714.90|
| Cost B2                       | 18959.93| 19022.62| 20067.29| 19714.90|
| Cost C1                       | 14110.30| 14508.24| 15677.23| 15119.78|
| Cost C2                       | 14110.30| 14508.24| 15677.23| 15119.78|
| Benefit cost ratio            |        |         |          |         |
| Cost A1                       | 5.78   | 5.63    | 6.35     | 5.91    |
| Cost A2                       | 5.78   | 5.63    | 6.35     | 5.91    |
| Cost B1                       | 5.62   | 5.48    | 6.18     | 5.75    |
| Cost B2                       | 5.62   | 5.48    | 6.18     | 5.75    |
| Cost C1                       | 2.58   | 2.66    | 2.90     | 2.73    |
| Cost C2                       | 2.58   | 2.66    | 2.90     | 2.73    |

### Constraints faced by silkworm rearers (Garrett’s Ranking Technique)

The constraints faced by the sample silkworm rearers of Kathua, Rajouri and Udhampur district were ranked using Garrett’s Ranking technique which highlighted about twenty constraints regarding cocoon production in the study area. The major constraints in Kathua district were non-availability of shed, price variation, poor quality of seed, crop damage and non-possession of required number of rearing kits. Similarly, in Rajouri the ranking of various constraints revealed non-availability of shed, crop damage, poor quality of seed, price variation and delayed marketing of the produce as the major constraints. In Udhampur also poor quality of seed, crop damage, price variation, non-availability of shed and non-possession of required number of rearing kits were the major problems. Furthermore, at overall level non-availability of shed, price variation, poor quality of seed, crop damage and non-possession of required number of rearing kits were observed to be the major constraints.

### Table 5: Garrett’s Ranking Scores of constraints in silkworm rearing of Jammu region

| Constraints          | Garrett’s Mean Score | Rank |
|----------------------|----------------------|------|
| Kathua               |                      |      |
| Non availability of shed | 79.69              | I    |
| Price variation      | 78.06                | II   |
| Poor quality of seed | 76.92                | III  |
Crop damage & 71.30 & IV  
Non-possession of required number of rearing kits & 70.44 & V  

**Rajouri**  
Non availability of shed & 81.00 & I  
Crop damage & 78.27 & II  
Poor quality seed & 77.89 & III  
Price variation & 72.76 & IV  
Delayed marketing of cocoons & 61.54 & V  

**Udhampur**  
Poor quality seed & 81.50 & I  
Crop damage & 79.44 & II  
Price variation & 76.52 & III  
Non availability of shed & 70.37 & IV  
Non-possession of required number of rearing kits & 68.59 & V  

**Overall**  
Non availability of shed & 79.69 & I  
Price variation & 78.06 & II  
Poor quality seed & 76.92 & III  
Crop damage & 71.30 & IV  
Non-possession of required number of rearing kits & 70.44 & V  

**Conclusions**  
The study has thrown light on the importance of rural agro based cottage industries like sericulture that are instrumental in creating job opportunities by providing employment and income to the people in rural areas. The study has shown that the benefit cost ratio obtained in sericulture farming was more than one which makes it clear that the investment in sericulture is economically viable and commercially feasible. When compared among the districts comprising the study area, highest benefits over costs were enjoyed by the rearers of Udhampur district (2.90) followed by Rajouri (2.66) and Kathua (2.58) with overall benefits as 2.73 for the study area. The major constraints that were affecting the cocoon production included non-availability of shed, price variation, poor quality of seed, crop damage, delayed marketing of the produce and non-possession of required number of rearing kits while the least ranked constraints involved non-consideration to most needy while providing shed, distant market, no. of cocoon buyers, shortage and high cost of leaves, lack of health insurance, non-cooperation of family members, department charges for providing market facilities, seed, etc., lack of transport facilities, lack of technical guidance and training, non-availability of land for mulberry plantation, awareness about pre and post disinfection, awareness about leaf quality and feeding schedule, untimely supply of inputs and untimely payment for the produce. The study has suggested for provision of good quality seed, organizing departmental vans for transporting cocoons, exclusive development in the source of mulberry foliage by putting more area under bush type mulberry plantation, introduction of price control measures (like MSP) for stabilizing the cocoon prices, and above all improvement in extension services as it is a pre-requisite for the progress and success of sericulture enterprise.

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