The Pharma Innovation Journal 2022; SP-11(6): 267-270

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(6): 267-270

www.thepharmajournal.com
Received: 18-04-2022
Accepted: 22-05-2022

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An economic analysis of the production of mulberry silkworm cocoons and production constraints faced by farmers in the Kolar district of Karnataka

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Abstract
The present study was conducted in the Kolar district of Karnataka through a well-structured survey during 2019-2020 in the view to assess the economics of the production of mulberry silkworm cocoons. The multi-stage random sampling technique was employed to select taluk, villages, and farmers with a sample size of 60 farmers. The total cost of cocoon production was accounted for ₹33724 per 100 Disease Free Layings (DFLs), of which ₹31172 (92.43%) was incurred on variable costs and ₹2552 (7.57%) on fixed costs. Out of the total cost, the expenditure on mulberry leaves (48.16%) formed the major component followed by the cost of human labour (21.69%). The yield obtained by farmers was 100 kg per 100 DFLs. The net income obtained by farmers was accounted for ₹14438/100 DFLs with a gross income of ₹48162/ 100DFLs. The major constraints were the incidence of pests and diseases, lack of skilled labour, and temperature fluctuations.

Keywords: DFLs, total cost, cocoon production, net income, pests and diseases

1. Introduction
'Sericulture' is an art and science of rearing silkworms to produce cocoons and silk. It includes growing mulberry, rearing silkworms, reeling silk thread from cocoons, weaving the silk yarn, and further processing to produce the silk fabric (Kumar *et al.*, 2019) [5]. The cultivation of mulberry and rearing of silkworms are farm-based activities managed by the silkworm cocoon producers. Sericulture plays a vital role in the socio-economic development of the rural sector. It is a highly labour-intensive, profit-oriented, and low-input indoor activity that gives frequent periodicity of economic returns throughout the year. It is also well suited for the womenfolk of the rural sector. Sericulture has been an important income-generating cottage-based industry in the country. This industry has been providing sustainable income for different strata of people in rural society. Sericulture is providing employment opportunities to nearly 9.17 million people in the country (Anonymous, 2019a) [1]. The sericulture enterprise provides maximum (1000 Man days per acre) employment from the point of cultivation of mulberry to the final weaving stage (Suresh, 2017) [6].

The production of raw silk and silk fabrics is limited to only a few countries in the world. China occupies the first place with 120000 MT (75.16%) and India holds the second position with 35261 MT (22.09%) of total global silk production (www.inserco.org) [7]. Though India is the second-largest producer of raw silk with an area of 2.39 Lakh hectares under mulberry cultivation, the production of silk accounted for only 22.09 per cent of the total global raw silk production. But there is an increase of 11.2 per cent over the production achieved during the previous year. Mulberry silk accounts for 71.50 per cent (25344 MT) of the total raw silk production of 35468 MT (Anonymous, 2019a) [1]. The area under mulberry in Karnataka accounted for 104577.56 ha with the production of 83016.7 MT of silk cocoons and 11592.31 MT of raw silk with around 33 per cent of the country's raw silk production which ranks first in India. The number of sericulture villages is 10328 and 125545 families are depending on sericulture and it is being one of the important enterprises undertaken by the farmers of Karnataka in the general and southern part of Karnataka in particular (Anonymous, 2019b) [2].

Kolar district stands first in the area under mulberry cultivation with 19936 ha but stands 4th in the production of raw silk with 1273 MT after Mandya (2399 MT), Ramanagara (2044 MT), and Chikkaballapura (1645 MT) consequently in the state (Anonymous, 2019c) [3]. Therefore, keeping above mentioned issue in view and the importance of the sericulture industry and its contribution to the farm economy, the present study was undertaken to analyse the various.

aspects of the production of silkworm cocoons and the production constraints faced by the farmers.

2. Materials and Methods

Multistage random sampling technique was adopted in designing the sampling frame for the study to select taluk, villages, and farmers in the Kolar district of Karnataka. In the first stage, the Kolar district was selected purposively based on the highest area under mulberry cultivation in Karnataka and the scope for increasing cocoon production. In the second stage, Kolar taluk was selected based on the potentiality, highest area under mulberry, and highest cocoon production in the Kolar district. While selecting villages in the selected taluk for identifying the potentiality as well as the concentration of sericulture farmers, the experiences of the Sericulture Officers at the district and taluk level were taken by consultation. Out of all villages, 15 villages namely Chitnahalli, Sugaturu, Nayakarahalli, Ankathatti, Hoohalli, Uppakunte, Medihala, Gaddekannuru, Bennanguru, Annihalli, Somasandra, Balagere, Naganaala, Byappanahalli and Begli Benajenahalli were selected at random process for the study purpose. From each selected village, the list of all farmers engaged in sericulture was prepared. From the list of all farmers, a total of 60 sericulture practising farmers were selected at random. They were interviewed personally to elicit required information about production scenarios and constraints encountered by them, with the help of a well-structured and pre-tested schedule. Every possible care and effort was taken to ensure the accuracy and reliability of the data during the personal interview. This study was conducted during the agricultural year 2019-2020.

The data collected were tabulated and subjected to percentage analysis. Costs and returns covering the fixed cost and variable cost were calculated. The cost of DFLs includes the cost involved in rearing the early or first two stages of silkworms (chawki). The cost of family labour was imputed at the wage rate paid to the hired casual labour. The prevailing wage rate for human labour was ₹300 per man-day. The cost of paraffin paper and newspaper were ₹20 and ₹10 per kg. The paraffin paper was used for rearing the early stages of silkworms and preventing the withering of the chopped leaves and also help to maintain proper humidity in the rearing bed. The depreciation charges of rearing equipments and apportioned cost of rearing house was calculated by using the given below formula,

$$\text{Annual Depreciation} = \frac{\text{Purchase value or construction value of assets} - \text{Junk value}}{\text{Expected life of the assets}}$$

To analyse the profitability of silkworm cocoon production, gross income, net income, and Benefit: Cost ratio was calculated.

B: C Ratio = Gross Returns / Total Expense

The production constraints were identified based on the opinion survey in the study area. Garrett's ranking technique was applied to rank a set of factors as perceived by the sample respondents based on their priority. The order of merit assigned by the respondents was converted into scores using the following formula given by Garrett and Woodworth (1969) [4].

$$\text{Per cent position} = 100\ (R_{ij} - 0.5) / N_j$$

Where,

R_{ij} = the rank of the i^{th} item by j^{th} individual
N_j = the number of items ranked by the j^{th} individual

The factor with the highest mean score was considered to be the most important constraint. Thus, the mean score for each constraint was ranked by arranging them in descending order.

3. Results and Discussion

3.1 Costs of silkworm cocoon production

Mulberry silkworm rearing, being completely domesticated, demands specified environmental conditions. Usually, late age rearing of silkworms is recommended to the sericulture farmers because chawki worms (up to two instars) are susceptible to infections and vulnerable to adverse weather conditions. So farmers were buying chawki worms from the chawki rearing centres for cocoon production. At the end of the fifth instar, the ripened worms were shifted to mountages for spinning of cocoons, in which two types of mountages were used in the study area *viz*, bamboo and plastic mountages. After the complete spinning of cocoons, farmers were harvesting the cocoons, graded them according to their quality, and packed them loosely in netted bags before marketing. The costs involved in these activities from the purchase of DFLs (chawki) to the harvest of cocoons are presented in Table 1.

A perusal of Table 1 revealed that the cost structure of the farmers in cocoon production, where the total cost was accounted for ₹33724/100DFLs, of which ₹31172 (92.43 %) was incurred on variable costs and ₹2552 (7.57 %) on fixed costs (including rearing house). Out of the total cost of silkworm rearing, the expenditure on mulberry leaves (48.16 %) formed the major component followed by the cost of human labour (21.69 %) in which the imputed cost of family labour was 13.69 per cent and the cost of hired labour was 8.00 per cent. However, the cost of mulberry leaves was also estimated through imputed value because the majority of farmers did not purchase mulberry leaves from outside, although some of them were purchasing mulberry leaves as and when necessary, so those prices were also included to estimate the cost of mulberry leaves. The expenditure on DFLs was 6.80 per cent, disinfectants was 4.62 per cent, and hiring of mountages was 3.80 per cent. However, some farmers were using their mountages but the majority were hiring the mountages. So the imputed cost of mountages was taken under depreciation separately in fixed costs and average hiring charges under variable costs.

Table 1: Total cost of mulberry silkworm cocoon production (Unit: ₹/100 DFLs)

Sl. No.	Particulars	Cost (₹/100 DFLs)	Per cent of the total cost
A.	Variable costs		
1.	Cost of DFLs	2294	6.80
2.	Human labour		
	a) Family labour	4618	13.69
	b) Hired labour	2698	8.00
	Total labour	7316	21.69
3.	Disinfectants		
	a) Liquid disinfectant	966	2.86
	b) Bed disinfectant	243	0.72
	c) Lime	247	0.73
	d) Bleaching powder	105	0.31
4.	Paraffin paper	205	0.61
5.	Newspaper	106	0.31
6.	Mulberry leaves	16241	48.16
7.	Hiring of mountages	1282	3.80
8.	Electricity charges	128	0.38
9.	Interest on working capital @ 7%	2039	6.05
	Sub total	31172	92.43
B.	Fixed cost		
1.	Depreciation of rearing house and equipments	2385	7.07
2.	Interest on fixed capital @7%	167	0.50
	Sub total	2552	7.57
C.	Total cost (A+B)	33724	100

3.2 Returns from silkworm cocoon production

Table 2 shows that the cocoon yield obtained by farmers was 100 kg per 100 DFLs. It was higher than the standard because chawki rearing centres provided more DFLs to attract customers. However, the yield was obtained in the form of good-quality cocoons and jelly cocoons (second grade). The proportion of jelly cocoons generally increases with the intensity of disease in a rearing house. These cocoons being unsuitable for reeling or seed purposes were often sold off for a single negotiated price for the local buyers. Whereas, by-product consists of fodder or crop waste and litter which were generally used by the farm households themselves as fodder for cattle and manure respectively. The net income obtained by silkworm cocoon producing farmers accounted for ₹14438/100 DFLs with a gross income of ₹48162/100 DFLs. The total cost of production was ₹337 per kg of cocoons with B: C ratio of 1:1.43. So that, farmers can receive ₹ 1.43 per rupee invested.

Table 2: Yield and Returns of silkworm cocoon production (₹/100 DFLs)

Sl. No.	Particulars	Unit	Price (per unit)	Quantity (per 100 DFLs)	Returns (₹/100 DFLs)
1.	Cocoon yield	kg	445.37	100	44537
2.	Jelly cocoon yield	kg	100	10.25	1025
3.	Fodder	quintal	150	4	600
4.	Litter	tonnes	1000	2	2000
5.	Gross income	₹	-	-	48162
6.	Total costs	₹	-	-	33724
7.	Net income	₹	-	-	14438
8.	Cost of production	₹/kg	-	-	337
9.	B: C Ratio	-	-	-	1.43

3.3 Production constraints

It is essential to note the important production constraints encountered by farmers which helps in minimizing their costs. Therefore, an opinion survey was carried out to elicit the perceptions of the respondent farmers on constraints in the production of cocoons. So that the constraints were identified and were ranked using the Garrett ranking technique which is represented in Table 3.

The majority of the respondent farmers felt that the incidence of pests and diseases was the major constraint (Garrett mean score 79.26) in which the major pest was the uzi fly. It was followed by the lack of skilled labour (Garrett mean score 60.41), it was difficult to carry out the sericultural operations as silkworm rearing is a labour intensive enterprise. The farmers thought that temperature fluctuations (Garrett mean score 56.64) were also the constraint in cocoon production. It affected the health of silkworms, thereby the yield of cocoons was also much affected. Temperature fluctuations found during the different seasons of a year was the reason for the incidence of many diseases in silkworm.

The respondents also experienced a lack of basic amenities like stands, nets, mountages, *etc*., and a lack of technical guidance. Even though a lot of efforts were carried out by sericultural officers, marginal and small farmers were lacking the guidance mainly due to their skeptical nature and their less participation in sericultural developmental programmes. The rearing equipments viz, feeding stands, mountages, etc. were costly, hence it was difficult to access these equipments. Even though the government was providing subsidies on various equipments, it was not available to all the farmers. Other minor constraints include the non-availability of good quality mulberry leaves, improper disinfection, lack of advanced technology, and difficulty in obtaining good quality DFLs.

Table 3: Constraints of sample farmers in the production of cocoons (Unit: Garrett mean score)

Sl. No.	Constraints	Score	Rank
1.	Pests and diseases of silkworms	79.26	I
2.	Labour scarcity	60.41	II
3.	Temperature fluctuations	56.64	III
4.	Lack of basic amenities like stands, nets, mountages, *etc*.	52.21	IV
5.	Lack of technical guidance	51.33	V
6.	High cost of silkworm rearing equipments	45.91	VI
7.	Non-availability of good quality mulberry leaves	43.35	VII
8.	Improper disinfection	41.60	VIII
9.	Lack of advanced technology	41.20	IX
10.	Difficulty in obtaining quality DFLs	24.56	X

4. Conclusion

Sericulture is well suited to the agro-climatic condition of the Kolar district. The farmers can get profit from this enterprise because of periodic income and direct marketing in the government commercial cocoon markets. To reduce the incidence of diseases of silkworm good quality DFLs must be purchased from the reputed chawki rearing centres. Preventive measures can be taken during indoor operations of the rearing process with proper disinfection of the rearing house and also rearing appliances. Hygienic conditions should be maintained in the microclimate of the rearing house. The use of the recommended quantity of bed disinfectants is also important. To reduce the infestation of uzi flies, the use of uzinets all around the entry points to the rearing house, use of uzi traps, use of *Nesolynx thymus* pouches in the rearing house and mountage sheds were suggested. The construction of an anteroom can also prevent uzi fly entry into the rearing area. Farmers should visit the Sericulture department to know the updates and also they can be benefitted by purchasing required amenities with subsidies.

5. References

1. Anonymous. Annual Report (2018-19), Central Silk Board, Bengaluru, Karnataka, 2019a, 77.
2. Anonymous. Annual Report (2018-19), Department of Sericulture, Government of Karnataka, 2019b, 2-5.
3. Anonymous. Seri-States of India 2019- A Profile, Central Silk Board, Government of India, 2019c, 55-56.
4. Garett EH and Woodworth RS. Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd., Bombay, 1969, 329.
5. Kumar GA, Reddy BS, Goudappa SB, Hiremath GM, and Patil SS. Growth performance of silkworm cocoon production in Karnataka, India. International Journal of Current Microbiology and Applied Sciences. 2019;8(11):674-682.
6. Suresh. Economic analysis of resource use efficiency in sericulture. Indian Journal of Sericulture. 2017;47(1):29-33.
7. [Weblink: http://www.inserco.org]. [Visited on 2020 July 16].