The Pharma Innovation Journal 2023; 12(3): 3217-3221

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(3): 3217-3221

www.thepharmajournal.com
Received: 07-12-2022
Accepted: 14-02-2023

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Women participation in production of mulberry silk in Chikkaballapur District of Karnataka, India

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Abstract
The present study aims at assessing the share of women in production and marketing of mulberry silk in Chikkaballapur district of Karnataka. The primary data was obtained from 90 sericulture farmers from six randomly selected villages and 35 silk reelers from two randomly selected blocks of Chikkaballapur district of Karnataka by conducting interviews with individual respondents. In mulberry establishment, overall farm level, women labour participation in weeding activities accounted for 21.36% of total man days, followed by mulberry planting (13.50%), and so on. In mulberry maintenance, (women employment) share of women labour was comparatively high in case of weeding with 6.96 man days (34.55%), followed by FYM application with 3.44 man days (17.08%) etc. The share of women labour was enumerated higher in case of feeding of silkworms (at different stages) with 5.02 man days (16.20%), followed by leaf harvesting with 3.83 man days (12.36%) and so on. The major utilization of women labour was found to be about 808.93 man-days (43.19%) in case of cooking with reeling of cocoons & changing water in the pans, followed by about 123.75 man days (6.60%) in cleaning and Sorting of cocoons and so on.

Keywords: Women share, mulberry silk, cocoon, marketing, silk reeling

1. Introduction
Sericulture is the oldest small-scale sustainable agribusiness practice in rural regions. It is a labour intensive and women friendly sector, traditionally engaging in individual households. It offers job opportunities for young men and women in rural communities. It is extremely competitive and capital-intensive enterprise and it is widely practiced all over India in rural and semi-urban areas (Yadav, 2008) [10].

Women form a significant workforce in the sericulture industry. Sericulture is a significant small scale agro-industry provides jobs for farm women and men. Women constitute 60% of the sericulture workforce (Central Silk Board, Bengaluru, 2022) [1]. The researchers have shown that women in sericulture industries are involved in mulberry cultivation, silkworm rearing, cocoon production, post-harvest practices of cocoons, and decision making. Mulberry planting, manuring, irrigation, weeding, mulberry leaf picking, mulberry leaf transportation, and leaf storage frequently include women in sericulture (Chowdhuri *et al*. 2011, Lakshmanan., 2012, Raveesha., 2016, Dewangan., 2017) [3, 7, 8, 4]. They are also involved in leaf-cutting, feeding, worm spacing, bed cleaning, mounting, cocoon harvesting, and disinfectant during silkworm rearing and women were also involved in post-harvesting activities of cocoons like silk reeling, silk spinning, silk twisting, silk weaving etc., Some are still involved in decision-making. They found that revealed about 60% of women, (about 57% in the first year and about 64% from the second year onwards) work in different sericultural on-farm and off-farm sectors. (Sarkar *et al.* 2017) [9]. Thus, the superiority of women workers in sericulture activities has been developed traditionally.

The role of women has become increasingly significant in recent years. It is an occupation by women for women because more than 60% of the workforce and 80% of the silk is consumed by women (Central Silk Board, Bengaluru, 2021). The present study aims at assessing the share of women in production and marketing of mulberry silk in Chikkaballapur district of Karnataka.

2. Research Methodology
The study is mainly based on the primary data regarding the participation of women in sericultural operations in Chikkaballapur district of Karnataka. To analyse the share of women in production and sericultural operations in Chikkaballapur district of Karnataka.

To analyse the share of women in production and marketing of mulberry silk, the different operations involved in sericulture, the work load carried out by women in various activities of mulberry silk production and generation of employment for the rural women from various sericultural operations.

The study was carried out in Chikkaballapur district of Karnataka. Multistage simple random technique is adopted to select the farmers. Karnataka State and Chikkaballapur district is purposively selected for the study and two taluks i.e., Chintamani and Shidlaghatta is randomly selected based on the highest area and cocoon production in the district. From each selected blocks three villages were selected randomly. Under the Sidlaghatta and Chintamani blocks, six villages were selected for the study. The selected villages from the Shidlaghatta block were Doddadasenahalli, Kundalagurki and Handiganala and in Chintamani block, selected villages were Jodihosahalli, Nayindrahalli, and Bhaktharahalli were randomly selected. From each village 15 mulberry growing and mulberry cocoon producing farmers were selected randomly and stratified into three groups based on two criteria i.e., area under mulberry and Disease-Free Layings (DFLs) of silkworms rearing. Farmers are stratified based on the area under mulberry was, 1) marginal farmers (< 1 hectare), 2) small farmers (1-2 hectares), and 3) medium farmers (> 2 hectare), and second criteria based on DFLs was, 1) marginal farmers (< 100 DFLs), 2) small farmers (100-200 DFLs) and 3) medium farmers (>200 DFLs) and from selected blocks, 35 reelers intermediaries are selected who are using the cottage basin reeling technique, thus the total sample size of the study would be constituting 125 respondents.

3. Analytical tools

3.1 Tabular analysis

Tabular analysis was used for analysing the primary raw data collected from farmers and intermediaries for analysing the participation of women in different sericultural activities using averages, percentages and other methods with help of advanced Microsoft excel.

4. Results and Discussion

4.1 Share of women labour in the establishment of mulberry plantation

An effort had been made to examine the role of women in different mulberry operations, starting from mulberry planting to leaf harvesting. Table 1, displayed the proportion of women labour involved in the operation wise establishment of the mulberry crop that could be employed to one acre of mulberry garden.

From the table 1, it was noticed that at overall level, the total labour requirement was estimated to be 49.40 man days, amongst women contribution it was about 25.38 man days (51.38%). In labour share of women, contribution was highest in case of weeding with 10.49 man days, followed by planting with 6.63 man days, FYM application with 3.51 man days and so on. The contribution of women labour to the total requirement of labour was found to be highest in case of medium farmers with 25.68 man days, followed by small and marginal farmers with values 25.31 man days and 25.28 man days, respectively. It is inferred from the table1, that the women labour requirement was found to be almost same as the farm size increased from marginal to medium category farmers.

4.2 Operation wise share of women labour in mulberry maintenance: An effort had been made to observe the participation of women in different mulberry operations. Sericulture enterprise is highly labour intensive in all its operations. For mulberry cultivation, both men & women labours are necessary. Mulberry production employs labour at different operations like weeding, application of manures, fertilizers, spraying of PPC to protect crop from pest and diseases and irrigation. Table 2 presents the share of women labour employment in the cultivation of mulberry crop by operation wise that can be employed to one acre of mulberry crop. From table 2, it is depicted that at overall level, the total labour requirement was found to be 20.14 man days, further women employment was about 11.48 man days (57.00%). Detailed analysis indicated that the share of women labour, was highest in case of weeding with 6.96 man days (34.55%), followed by FYM application with 3.44 man days (17.08%) and irrigation with 0.66 man days (3.27%) and so on. It was obvious from the table 2, that the share of women labour was comparatively high when compared to men labour in mulberry operations such as weeding. The share of women labour to the total requirement of labour was found to be comparatively large in case of medium farmers with 12.10 man days, followed by small and marginal farmers with figures 11.42 man days and 10.68 man days, respectively.

It is inferred from the table that the women labour requirement was found to be highest for medium farmers as compared to other categories of farmers. The observed cause for this was that mulberry maintenance demanded high weeding operation, fertilizer applications, FYM application, and more frequent irrigation to produce high-quality of mulberry production. It is a labour-intensive process that necessitated the use of additional labour as the size of mulberry garden increases.

4.3 Share of women labour in mulberry silk cocoon production per batch: Mulberry silk cocoon production is one of the important operations in the sericulture enterprise. From table 3, it was observed that at overall level, the total labour requirement was found to be 30.97 man days, amongst women contribution was about 18.59 man days (60.02%). The share of women labour contribution was enumerated highest in case of feeding of silkworms (at different stages) with 5.02 man days (16.20%), followed by leaf harvesting with 3.83 man days (12.36%) and cocoon harvesting with 3.64 man days (11.75%). It was crystal clear from the table that the share of women labour in cocoon production was comparatively high than that of men labour in mulberry cocoon production such as feeding of silkworms, leaf harvesting, cocoon harvesting and collection of ripe silkworms for mounting.

The contribution of women labour to the total requirement of labour was found to be highest in case of medium farmers with 29.54 man days, followed by small and marginal farmers with values 19.65 man days and 11.45 man days, respectively. It is inferred from the results that share of women labour was found comparatively higher in case of medium category farmers i.e., increasing trend with increase in the size of DFLs of silkworms rearing.

4.4 Annual share of women labour in mulberry raw silk production

An effort was made to enumerate the employment generation through reeling operations, and the results were presented in the Table 4. Every process needs effective utilization of human labour to be cost-effective and successful.

It is evident from the table that the total labour in mulberry raw silk production per year for 6 basins was found to be 1872.94 man days, which includes 1167.75 man days (62.30%) of women labour and 706.19 man days (37.70%) of men labour. The major requirement of women labour was found to be about 808.93 man days (43.19%) in case of cooking with reeling of cocoons & changing water in the pans, followed by about 123.75 man days (6.60%) in cleaning and sorting of cocoons and rewinding & skeining of about 108.89 man days (5.81%) and so on.

It was indicated from the table that the family labour utilization pattern in mulberry raw silk production per year for 6 basins was found to be 652.06 man days, which includes 258.35 man days (39.62%) of women labour and 393.69 man days (60.38%) of men labour. The major requirement of women labour was found to be in case of cooking with reeling of cocoons and changing water in the pans about 157.92 mandays (24.21%), followed by cleaning and sorting of cocoons of about 52.97 man days (8.12%) and so on.

It was further observed from the table that the hired labour utilization pattern in mulberry raw silk production per year for 6 basins was found to be 1220.97 man days, which comprised of 909.40 man days (74.48%) of women labour and 311.50 man days (25.52%) of men labour. The major requirement of women labour was revealed to be in case of cooking with reeling of cocoons & changing water in the pans of about 651.01 mandays (53.31%), followed by rewinding & skeining of about 102.82 man days (8.42%) sand so on.

It is inferred from the results that the share of women labour was observed higher in hired labours compared to family labour. Women played a major role in all its silk reeling operations.

Table 1: Operation wise share of women labour in establishment of mulberry plantation

(Man days/acre)

Sl. No.	Operations	Marginal farmers		Small farmers		Medium farmers		Overall	
		Women	Men	Women	Men	Women	Men	Women	Men
1.	FYM/manure application	3.24 (6.67)	4.71 (9.70)	3.64 (7.41)	4.35 (8.85)	3.53 (7.02)	4.58 (9.10)	3.51 (7.14)	4.50 (9.16)
2.	Transportation of mulberry cutting or sapling	0.70 (1.44)	3.09 (6.36)	0.72 (1.46)	3.09 (6.29)	0.71 (1.41)	3.13 (6.22)	0.71 (1.44)	3.11 (6.33)
3.	Planting of mulberry saplings or cuttings	6.53 (13.45)	6.35 (13.08)	6.64 (13.08)	6.31 (12.84)	6.68 (13.27)	6.30 (12.52)	6.63 (13.50)	6.32 (12.87)
4.	Fertilizer application	0.40 (0.82)	1.63 (3.35)	1.35 (3.35)	1.73 (3.2)	0.27 (0.53)	1.93 (3.83)	0.33 (0.67)	1.78 (3.62)
5.	Spraying of plant protection chemicals	0.09 (0.18)	1.75 (3.60)	0.07 (0.14)	1.82 (3.70)	0.08 (0.15)	1.89 (3.75)	0.08 (0.16)	1.83 (3.72)
6.	Irrigation	1.00 (2.06)	1.80 (3.70)	1.09 (2.21)	1.75 (3.56)	1.22 (2.42)	1.70 (3.37)	1.12 (2.28)	1.74 (3.54)
7.	Weeding	11.09 (22.85)	1.98 (4.07)	10.25 (20.87)	2.97 (6.04)	10.43 (20.73)	2.92 (5.80)	10.49 (21.36)	2.74 (5.58)
8.	Mulberry leaf harvesting	2.23 (4.59)	1.94 (3.99)	2.55 (5.19)	1.78 (3.62)	2.76 (5.48)	2.21 (4.39)	2.51 (5.11)	1.97 (4.01)
	Sub total	25.28 (51.09)	23.25 (47.91)	25.31 (51.54)	23.80 (48.46)	25.68 (51.04)	24.63 (47.96)	25.38 (51.38)	24.02 (48.62)
	Grand total	48.53 (100)		49.11 (100)		50.31 (100)		49.4 (100)	

Note: Figures in the bracket indicate percentage value to the total.

Table 2: Operation wise share of women labour in mulberry maintenance

(Man days/acre/crop)

Sl. No	Operations	Marginal farmers		Small farmers		Medium farmers		Overall	
		Women	Men	Women	Men	Women	Men	Women	Men
1	FYM application	3.42 (19.01)	4.07 (22.62)	3.44 (16.98)	4.74 (23.40)	3.46 (16.05)	4.97 (23.06)	3.44 (17.08)	4.67 (23.18)
2	Fertilizers application	0.27 (1.50)	1.08 (6.00)	0.24 (1.18)	1.62 (8.00)	0.27 (1.25)	1.6 (7.42)	0.25 (1.24)	1.44 (7.14)
3	Spraying of PPC	0.09 (0.50)	0.75 (4.16)	0.12 (0.59)	1.09 (5.38)	0.28 (1.29)	1.40 (6.49)	0.17 (0.84)	1.13 (5.61)
4	Weeding	6.36 (35.35)	0.37 (2.05)	6.95 (34.32)	0.29 (1.43)	7.36 (34.15)	0.39 (1.80)	6.96 (34.55)	0.34 (1.68)
5	Irrigation	0.54 (3.00)	1.04 (5.78)	0.67 (3.30)	1.09 (5.38)	0.73 (3.38)	1.09 (5.05)	0.66 (3.27)	1.08 (5.36)
	Sub Total	10.68 (59.36)	7.31 (40.64)	11.42 (56.39)	8.83 (43.60)	12.10 (56.14)	9.45 (43.86)	11.48 (57.00)	8.66 (43.00)
	Total	17.99 (100)		20.25 (100)		21.55 (100)		20.14 (100)	

Note: Figures in the bracket indicate percentage value to the total.

Table 3: Share of women labour in mulberry silk cocoon production per batch

(Man days/batch)

Sl. No.	Operations	Marginal farmers (< 100 DFLs)		Small farmers (100-200 DFLs)		Medium farmers (> 200 DFLs)		Overall	
		Women	Men	Women	Men	Women	Men	Women	Men
1.	Chawki worm rearing	0.29 (1.53)	0.52 (2.76)	0.63 (1.90)	0.77 (2.32)	0.71 (1.45)	0.54 (1.10)	0.42 (1.35)	0.99 (3.19)
2.	Packing and transportation of mulberry leaves	0.52 (2.76)	0.73 (3.87)	0.69 (2.08)	1.33 (4.02)	0.66 (1.35)	0.82 (1.67)	0.61 (1.96)	1.22 (3.93)
3.	Feeding of silkworms	3.35 (17.78)	2.70 (14.33)	5.90 (17.85)	5.15 (15.58)	7.62 (15.59)	7.72 (15.80)	5.02 (16.20)	4.42 (14.27)
	a) 3rd Instar/stage	0.25 (1.32)	0.53 (2.81)	0.66 (1.99)	0.83 (2.51)	0.87 (1.78)	1.31 (2.68)	0.51 (1.64)	0.72 (2.32)
	b) 4th Instar/stage	0.64 (3.39)	0.58 (3.07)	1.08 (2.00)	1.14 (4.26)	1.57 (3.21)	1.37 (2.80)	0.96 (3.09)	0.92 (2.97)
	c) After 4th Instar/stage still cocoon formation	2.46 (13.05)	1.59 (8.43)	4.16 (12.58)	3.18 (9.62)	5.18 (10.60)	5.04 (10.31)	3.55 (11.46)	2.78 (8.97)
4.	Application of disinfectants	0.52 (2.76)	0.34 (1.80)	1.05 (3.17)	0.75 (2.26)	1.45 (2.96)	1.29 (2.64)	0.89 (2.87)	0.66 (2.13)
5.	Mulberry leaf harvesting	2.47 (13.11)	1.65 (8.75)	2.49 (7.53)	3.14 (9.50)	6.18 (12.65)	5.22 (10.68)	3.83 (12.36)	2.84 (9.17)
6.	Collection of matured silkworms for mounting	1.52 (8.06)	0.77 (4.08)	4.11 (12.43)	1.58 (4.78)	5.83 (11.93)	2.35 (4.81)	3.49 (11.26)	1.35 (4.35)
7.	Cocoon harvesting	2.36 (12.52)	0.62 (3.29)	4.11 (12.43)	0.58 (1.75)	5.91 (12.09)	1.00 (2.04)	3.64 (11.75)	0.67 (2.16)
8.	Cleaning of rearing house for next batch	0.42 (2.22)	0.06 (0.31)	0.67 (2.02)	0.10 (0.30)	1.18 (2.41)	0.37 (0.75)	0.69 (2.22)	0.17 (0.54)
	Sub total	11.45 (60.77)	7.39 (39.23)	19.65 (59.45)	13.40 (40.55)	29.54 (60.47)	19.31 (39.53)	18.59 (60.02)	12.38 (39.98)
	Grand total	18.84 (100)		33.05 (100)		48.85 (100)		30.97 (100)	

Note: Figures in the bracket indicate a percentage value.

Table 4: Women labour share in mulberry raw silk production per year

(Man days/6 Basins)

Sl. No.	Operations	Family labour		Hired labour		Total	
		Women	Men	Women	Men	Women	Men
1.	Procurement of mulberry silk cocoon	0.00 (0.00)	77.26 (11.84)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	77.27 (4.12)
2.	Cleaning and sorting of cocoon	52.97 (8.12)	0.00 (0.00)	70.78 (5.79)	0.00 (0.00)	123.75 (6.60)	0.00 (0.00)
3.	Cooking cocoon, reeling and changing water in the pans	157.92 (24.21)	170.32 (26.12)	651.01 (53.31)	241.39 (19.77)	808.93 (43.19)	411.71 (21.98)
4.	Dead pupae collection, jute extraction and feeding fuel/firewood	27.92 (4.28)	2.27 (0.34)	68.47 (5.60)	0.00 (0.00)	96.39 (5.14)	2.27 (0.12)
5.	Re-winding and Skeining	6.07 (0.93)	18.59 (2.85)	102.82 (8.42)	64.77 (5.30)	108.89 (5.81)	83.36 (4.45)
6.	Packing of raw mulberry silk	13.47 (2.06)	58.82 (9.02)	16.32 (1.33)	5.34 (0.52)	29.79 (1.59)	65.16 (3.47)
7.	Sale of raw mulberry silk	0.00 (0.00)	66.42 (10.18)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	66.42 (3.54)
	Sub total	258.35 (39.62)	393.69 (60.38)	909.40 (74.48)	311.50 (25.52)	1167.75 (62.30)	706.19 (37.70)
	Grand total	652.06 (100)		1220.97 (100)		1872.94 (100)	

Note: Figures in the bracket indicate the percentage value to the total.

5. Conclusion

Women form a significant workforce in the sericulture industry. Sericulture is a significant small scale agro-industry provides jobs for farm women and men. Since women play such an important part in sericulture sector, opportunities are opened up for them and they become actively involved in a number of ways, including socially, economically, politically, and in other areas. The study is revealed that the participation of women labours was higher while compared to men labours. The establishment of the mulberry garden, mulberry crop maintenance, cocoon production and silk reeling activities contains several operations from land preparation to mulberry leaves harvesting and feeding of silkworms, application of disinfectants, mulberry leaves harvesting, and harvesting of cocoons and cooking with reeling of cocoons, cleaning and sorting of cocoons etc. Women have proved tenacity and strength in all of these occupations. performed their duties expertly. It makes sense that women are key players in the sericulture sector.

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