



## Analysis of Yield Gaps in Sericulture: A Cross Sectional Study in Chitradurga District of Karnataka State

B. T. Sreenivasa\* & Hirianna\*\*

\*Central Sericultural Research and Training Institute, Mysore – 570 008, India.

\*\*Basic Seed Farm, NSSO, Central Silk Board, Chikkamalavadi, Kunigal – 572 130, India.

\* Corresponding Author

### Abstract

The study on the yield gaps in mulberry leaf and cocoon production was taken up in Chitradurga district of Karnataka at farmer's level. A total of 155 samples were drawn from three taluks at random. The magnitudes of yield gaps at different levels were quantified and the possible reasons for such existence were reported. In the case of mulberry leaf production ( $V_1$ ), the gap was high in the farm size group I as compared to other two groups II and III. Similarly, the same position was also observed in cocoon production. However, the gap was very less in the case of holding size group III (large) which was mainly due to higher adoption of recommended technologies and better allocation of resources. The study suggest that extension agents should educate the small farmers (holding size I) on the importance of adoption of recommended sericulture technologies to get higher benefits in sericulture.

### Introduction

Mulberry sericulture is a labour-intensive industry in all its phases, namely, cultivation of silkworm food plants, silkworm rearing, silk reeling and other post cocoon processes such as twisting, dyeing, weaving, printing and finishing. It provides employment to approximately 58 lakh persons annually, most of them being marginal and small farmers (Lakshmanan 2007). Micro level studies reveal (Lakshmanan *et al.*, 1996, 1997ab, 1998ab, 1999; Lakshmanan and Geetha Devi, 2000, 2005) that one acre of mulberry sericulture generated around 506.20 man days from leaf to cocoon production for one year period and assured periodical income throughout the year.

In the global context, silk accounts for about 0.2 per cent of total textile fiber production (ITC, 2000). However, in value terms, silk stands for high value export oriented items in the world trade. India poised to reach the position of second largest silk producer after the Republic of China in the world. The country produces all the four known commercial silk varieties, *viz.*, mulberry, Tasar, Eri and Muga. Of the total silk production (23679 MT), mulberry silk alone accounted for 79.03 per cent during 2012-13. In spite of the annual compound growth rate of 4.93 per cent of mulberry raw silk production during 1980-2004-05, the country has to import huge quantity of raw silk from the Republic of China and other countries every year to meet the growing domestic as well as export demand (Lalshmanan, 2006). This has led to import of silk to the tune of 4,951 tonnes during 2012-13. It shows that the industry needs to augment domestic silk production to bridge the gap between demand and supply of quality silk production in the country.

The R&D units of Central Silk Board have evolved a number of new sericulture technologies to increase quality and productivity of silk and it has been popularized in the field. However, the newly evolved productivity-oriented technologies are not fully utilized by the farmers (Lakshmanan *et al.*, 1998a, b and Lakshmanan, 2006). This partly explained the reasons for the existence of yield gaps at the farmer's field. It is reported that there is a wide yield gap that exist between the actual yield obtained by farmers and the potential yield, which could be possibly produced with the existing new technologies in the field (Lakshmanan, 1999).

Since Karnataka is being the pioneer state in mulberry silk production in the country, earned Rs. 746.09 crores by exporting silk products, accounted for 30.58 per cent of the total agricultural exports of Karnataka during 2002-03 (Deshapande and Prachitha, 2005), the silk potential has yet to be fully tapped as against the potential yield (Vijaya Prakash and Dandin, 2005a,b). Therefore, in order to find out the extent of yield gaps in the field, it is necessary to study the magnitude of the yield gaps in mulberry as well as cocoon production at different levels. Against this background, a study was conducted to analyze (i) the existence of yield gaps in mulberry and cocoon production at different levels; (ii) factors associated with the existence of yield gaps at different levels in both mulberry cocoon production; and (iii) suggestion to narrow down the yield gaps in the study regions.

### Methodology

A study was conducted in sericulture taluks Challakere, Hiriya, Molakalmur taluks of Chitradurga district in Karnataka using a pre-tested schedule for collection primary data. Each taluk, 50 farmers were randomly selected. Thus, the study constituted a total of 155 sample farmers. The collected data were post-stratified into three groups, *viz.*, small (mulberry holding size up to 1 acre); medium (1.01 to 2.00 acre) and large (more than 2 acre). The potential yield for mulberry and cocoon were obtained from REC (Farm), Chitradurga which used to compare with the yield obtained from the farmer's field with different holding size. For this study,  $V_1$  mulberry variety and bivoltine hybrid *ie.*,  $CSR_2 \times CSR_4$  were considered. The following analytical method was used to quantify the yield gaps at different levels.

**(a) Yield Gap Analysis**

Total Yield Gap (TYG)

It is the difference between the potential yield ( $Y_p$ ) and the actual yield ( $Y_a$ ).

This total yield gap comprises yield gap-I and yield gap – II

$$\text{Yield Gap – I (per cent)} = \frac{Y_p - Y_d}{Y_p} \times 100$$

It is the difference between the potential yield ( $Y_p$ ) and the potential farm yield ( $Y_d$ ).

$$\text{Yield Gap – II (per cent)} = \frac{Y_d - Y_a}{Y_d} \times 100$$

It is the difference between the potential farm yield ( $Y_d$ ) and actual yield ( $Y_a$ ).

**Results and Discussion****Yield Gaps in Mulberry Leaf Production ( $V_1$  variety)**

The farmers cultivated predominately  $V_1$  mulberry variety in the study area. The existences of yield gaps of mulberry variety  $V_1$  at different stages were presented Table 1. It is observed that the yield gap at holding size -I (small) was found to be higher (21.98%) as compared to other farm size groups. This may be due to resource constraints and low adoption of recommended technologies by them.

In case of holding size -II (medium) the yield gap was much lesser than (12.75 %) that of holding size group-I. Similarly, the larger holding size group-III was also found to be lower as compare to size groups I and II respectively. The lower yield gap at holding size group III (large) was mainly due to higher adoption of recommended technologies and better management of cultivation practices. In absolute terms, the yield gap of variety  $V_1$  was 2685.785 kg, which is much lower than holding size group-I (5187.855 kg) and group-II (3008.26 kg). Considering all the size groups together, the gap was observed to be 17.48% which is marginally higher than the potential farm yield (16.45%). In quantitative terms, the gap was 4124.695 kg for pool data which is lower than potential farm yield (4648.125 kg). In summing up, the findings clearly shows that, the farmers of larger size group are better in terms of allocation of resources and management in the cultivation of  $V_1$  variety as compared to other two farm size groups as evident from the magnitude of yield gaps attained by them.

**Yield Gaps in Cocoon Production**

A bivoltine hybrid,  $CSR_2 \times CSR_4$ , is very popular in the non-traditional sericulture belt of Chitradurga district. A large number of farmers are rearing such hybrid throughout the year. It is estimated that 1125.130 kg /acre/year was harvested at potential farm level (REC, Chitradurga). This is being considered as bench mark yield for comparing yield realized by different farm size groups. The results of the existence of yield gaps in cocoon production at different levels are presented in Table-2. It is evident that there is a higher level of difference between the potential farm yield and yields obtained by the farmers. It is estimated that the gap between the potential yield and the farmers yield for all groups together was to the extent of 37.24 %. In the case of yield gap between farm size I and the potential yield, it was 43.43%, which much higher than all other groups. This may be due to the low adoption of technologies and poor resources of the small farmers (holding size I) in rearing of silkworm practices. Further, it is also observed that there is a marginal difference between farm size II and I in terms of yield gaps in cocoon production. Among the farm size groups, the size group III (large) has showed lesser magnitude of gap in cocoon production (31.70%) which is due to higher allocation of inputs as recommended and their higher knowledge level in silkworm rearing methods. These variations in adoption level have also been reported by several workers (Thiagarajan, 2002; Vijaya Prakash and Dandin 2005ab; Lakshmanan, 2007; Meenal, 2008 ;).

**Conclusion**

The study has clearly brought out that there is a wide yield gaps in mulberry leaf and cocoon production in the study regions of Chitradurga district. The magnitude of gap is much higher in the holding size I (small farmers) as compared to size II and III. Therefore, it is suggested that the extension functionaries should take adequate care and educate the farmers in adoption of improved technologies/practices to narrow down such yield gaps at different level. This would help not only to improve the farmers yield realization but also increase their income through sericulture in the long run.

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## Annexure

**Table 1: Yield Gaps in Mulberry Leaf Production ( V<sub>1</sub> variety)**

Sl.No	Particulars	Yield/acre (Kg)	Yield gap		Type of gaps
			(Kg/acre)	Per cent	
1	Experiment station yield*	28248.500	-	-	-
2	Potential farm yield**	23600.375	4648.125	16.45	Gap- I
3	Average farmers’ yield ( Pooled)	19475.680	4124.695	17.48	Gap- II
(a)	Holding size I	18412.520	5187.855	21.98	Gap- IIa
(b)	Holding size II	20592.112	3008.26	12.75	Gap -IIb
©	Holding size III	20914.590	2685.785	11.38	Gap -IIc

Note: \* Refers to maximum yield could be produced at CSRTI, Mysore (Genetically)

\*\* Yield realized at demonstration field (at REC, Chitadurga)

**Table 2: Yield gaps in Bivoltine Cocoon Production (CSR<sub>2</sub> x CSR<sub>4</sub>)**

Sl.No	Particulars	Yield/acre (Kg)	Yield gap		Type of gaps
			(Kg/acre)	Per cent	
1	Experiment station yield*	1275.350	-	-	-
2	Potential farm yield**	1125.130	150.22	11.78	Gap- I
3	Average farmers 'yield ( Pooled)	706.125	419.005	37.24	Gap- II
(a)	Holding size I	636.425	488.705	43.43	Gap IIa
(b)	Holding size II	649.225	475.905	42.29	Gap -IIb
©	Holding size III	768.450	356.68	31.70	Gap -IIc

Note: \* Refers to maximum yield could be produced at CSRTI, Mysore (Genetically)

\*\* Yield realized at demonstration field (at REC, Chitradurga)