

Sericulture and Silk Production

Problem/Need

The ancient technique of rearing silkworms for production of silk yarn (and weaving it into expensive cloth) is widely practiced today. Over Rs. 1000 crores worth of silk is produced in India annually by more than 27 lakh people, over half of them being women. There is a huge export market too for silk cloth and garments.

However, as in so many other traditional industries, the primary producers get only a fraction of the profits which are usually cornered by middle men and trading houses. Consequently the mulberry cultivators and silk reelers, weavers, etc., continue to live in dismal conditions. They also face hardships arising from pests, non-availability or poor quality of raw materials and price manipulations.

Sericulture and silk production have an enormous potential in our country provided it is made available to rural people, especially women, and its marketing is organized independently. It can serve as an excellent mode for employment generation and augmentation of income. This requires not only providing fresh technological inputs to primary producers but more importantly, evolving and establishing new systems of organizing production and marketing.

Technology Package

The technology of sericulture and silk production is well-known. In brief, various aspects involved in it are as follows:

Mulberry Cultivation: Silkworms feed on mulberry leaves. Hence the rearing of silkworms involves cultivation of mulberry trees, which provide a regular supply of leaves. Worms are introduced through DFLs (Disease Free Layings, i.e. eggs) procured from a quality centre (called grainage). In India, the bulk of mulberry cultivation is done by small farmers (< 4 acres land), usually in clusters of 300-400.

Rearing: The silkworms are actually larvae of the silkworm. They are reared in specially made trays in rooms with controlled temperature and humidity and regularly fed mulberry leaves. At a certain stage they convert themselves into cocoons. These cocoons are made from a single filament of material secreted by the pupa and wrapped around itself for protection. These filaments upon hardening constitute silk. On an average, 1 acre of plantation would yield 240 kg of cocoons in an year, starting from 100 DFLs. Depending upon whether it is dryland or irrigated mulberry, farmers can harvest the cocoons 4 to 8 times in an year.

Reeling: The removal of silk yarn from the cocoons is called reeling. This is done by first cooking them in water to remove the gum, which holds it together, and then unwinding the filaments (reeling). Usually 8-10 cocoons are reeled together. There are three methods for reeling: the charkha, the slightly more advanced cottage basin and the costly automatic machines.

Twisting: Prior to weaving, the raw silk is boiled in water to remove remaining gum, dyed and bleached, and then woven into the garment – usually on handloom. In some cases the woven cloth may be dyed and bleached.

Species of Silkworms: There are four different species of moths, cocoons of which yield differing types of silk:

- **Mulberry Silk** is the most common among them contributing to nearly 95% of world's silk production. It is produced from the cocoons of the moth *Bombyx mori*. Within the species there are many varieties, mainly differentiated according to the number of generations produced annually under natural conditions. Then, hybrids of various kinds have also been developed. Multivoltine varieties (laying eggs several times a year) have been widely propagated to push up yields, but many feel that they are more vulnerable to pests and hence risky for small farmers. The government provides DFLs of various species through its outlets.
- **Eri** silkworm has two varieties – a wild one and a domesticated one bred on castor leaves. The filament is neither continuous nor uniform. Hence the moths are allowed to emerge before commencing reeling. A white or bright red silk is produced.
- **Tasar** silkworms are wild. The Indian Tasar worm feeds on trees of Terminalia species and other minor host plants, while the Japanese and Chinese worms feed on oak and other allied species. Reeling can be done as with mulberry worms.
- **Muga** silkworm is found only in Assam. It feeds on two local species of shrubs – Machilus bombycina and Litsae polyantha, producing a strong, golden yellow thread.

System Design

Under the prevailing system in India, all the functions described above are usually carried out by different sets of people and there exists a well-established system of markets where the products of each stage are sold/bought. Being dominated by rich traders, it is here that most of the profits are siphoned off. Hence, in the new technology package, an alternative system is envisaged of a cooperative or collective kind where functions are decentralized yet under the larger umbrella of a people's organization. The final products are then marketed centrally. Expert inputs are made available for both technical and managerial aspects including marketing. Consequently the high prices available for silk clothes would mean higher returns to the primary producers at various stages.

Rearing Equipment	
Item	Rate (Rs.)
Rearing Trays (3.5' bamboo)	30
Rearing stands	300
Ant wells	5
Feeding working stands	50
Leaf chambers	350
Leaf chopping boards	60
Leaf chopping knives	50
Thermometers	50
Hygrometers	200
Sprayers (foot operated)	1000
Mats	25
Reeling and Weaving Equipments	
Item	Rate (Rs.)
Reeling/Spinning machine	4,000
Handlooms	5,000
Twisting machine	50,000
Warping and other accessories	25,000

Equipments and Machinery: Requirements will depend on the functions and stages of the process being undertaken. Variations and innovations are also possible. An illustrative list with typical costs is given in the Table (given above). Prices are only indicative.

Economics

An indication of the economics of setting up a unit for production of silk is given below, as per Aishwaryagram's experience. These figures are for a 5 acre irrigated plantation over 2 years.

Economics	
Rearing	
Total leaf yield	90,000 kgs
Rearing capacity @ 1000 kgs leaf/100 DFLs	90 ounces of DFLs
Cocoon Production @ 40 kgs cocoon/100 DFLs	3600 kgs
Yarn Production	
Reeling Capacity	4 kg/day
No. of working days	250
No. of reeling machines	2
Raw silk produced	360 kgs
Weaving	
No. of looms required	5
Working days	300
Capacity of loom	3 m/day
Qty. of silk cloth produced	9252 m
@ 1m per 35g (less 10% wastage)	
Cost of silk @ Rs. 50/m	Rs.4,42,600

Helpline:

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