Sericulture

Introduction to Sericulture

1. Introduction

Sericulture has emerged as a meaningfull and viable agro-based cottage industry. It is being practicing in more than 30 countries across tropical and temperate regions produce silk, their combined production adds up to about 85,000 Metric Tonnes of raw silk in a year. Presently China, India, Japan, South Korea and Brazil are the leading silk producing countries. Japan which was once a leading silk producer until 1978. At present it is producing less than that of India and occupies only the third place in world raw silk production and slowly shifted to other commercial enterprises. China is temperate country, rank first in the world raw silk production an account for 57, 432 Metric Tonnes, among tropical countries, India is rank second in the world mulberry raw silk production of the major producer of silk an accounting for 15, 305 Metric Tonnes of raw silk from 1,79, 065 hectares of mulberry garden annually. Increasingly practiced under a variety of agro-climatic and socio- economic conditions, agro- based industry provides livelihood to millions of farmers, reelers and weavers. Availability of several wild silks notwithstanding, it is the mulberry silkworm *Bombyx mori* L, system that provides the highly prized silk textile, called the " Queen of Textiles "

Sericulture is acclaimed as an important agro-based labour intensive, export-oriented cottage industry, creating employment to at least 12 - 13 peoples per hectare of mulberry garden, well suited for economically backward sections of the underdeveloped and developed countries which have an agriculture base and problems of providing employment not only to the agriculture poor but also to the landless labourers. Sericulture technology is very simple. It can be followed even by illiterate farmers and most of the sericulture activities do not involve hard labour, as they can be attended conveniently by women's and old peoples. It has come to stay as a highly remunerative agro industry with less investment and rich dividends. It was introduced more than 200 years ago in India. In fact, it was Tippu Sultan, the King of Mysore, who organized this industry in 1780. The industry consists of three sectors that are linked to one another like a chain. They are mulberry cultivation and silkworm rearing, reeling of cocoons, twisting and weaving. The industry has undergone many severe vicissitudes due to various factors like diseases and wide fluctuations in the price of raw silk. Research and development are fundamental to the progress of any industry and sericulture is no exception to it. Realizing this, both central and state sponsored research institutes which were established essentially to link research and development to sericulture and reach it to the doorstep of those people depending upon the industry for livelihood.

Manufacturing of silk fabrics can be classified into two parts. The first part is sericulture, which involves four important operations, viz., mulberry cultivation which is like any other garden

crop, silkworm egg production, silkworm rearing and disposal of cocoons and engaging a large number of peoples including the household members like women's, children's and old peoples. In India both in univoltine and bivoltine areas of Jammu & Kashmir and Western part of Uttar Pradesh where only one or two cocoon crops are harvesting. Similarly, in tropical regions of West Bengal multivoltine pure races of silkworms and their hybrids are reared for commercial cocoon production. Karnataka, Andhra Pradesh and Tamil Nadu seed production can be continuously produced. Silkworm has four stages in their life cycle namely, egg, larva, pupa and adult. Rearing takes place in two different steps namely, chawki rearing and late age silkworms rearing. For latage silkworms rearing is conducting in separate and isolated model rearing house with good ventilation. Rearing is completed in 26 - 28 days.

The second part includes, silk reeling, twisting, dyeing, weaving, finishing and spun silk yarn manufacture. Reeling is unwinding of silk filament from boiled cocoon with the help of reeling devices. All these processes are industrial in nature. Silk industry, therefore, consists of cocoon production; post-cocoon technology including reeling; pre-weaving technology of twisting, dyeing, weaving and printing, as its chief stages.

2. Mulberry and Non Mulberry Sericulture

Silk reeling in India is totally traditional. It is estimated that 75% of silk goes to hand loom and 25% to power loom. Silk reeling takes place at high temperature and high speed reeling devices like Charaka, Cottage basin, Filature, Multi end and Automatic reeling machine. Silk weaving is a interlacing of warp and weft or in other words it is the conversion of yarn in to fabric on loom, which interlaces two sets of threads.

India is producing all the commercial varieties of silk, viz., mulberry, tasar, eri and muga. All the four varieties of silk play a prominent role in the development of silk industry. Tassar silk is produced by tropical tasar, temperate tasar, Chinese tasar and Japanese tasar silkworm, these are semi domesticated rearing is conducting in outdoor by feeding *Terminalia arjuna* and *Terminalia tamantosa*. Eri silk is produced by *Phylosamia ricini,* it is domesticated, rearing is indoor by feeding *Ricinus communist*. L, and *Heteropanax fragrans.* Muga silk is produced by *Antheraea assama*, it is semi domesticated rearing is outdoor by feeding *Michilus bombycina* and *Litsaea polyantha*. In the group of natural fibres, which comprises cotton, wool and silk, production of silk being 17, 305 M. T. per annum an account only 0.3 per cent of total textile fibres. It is very interesting to note that despite enormous increase in the production of man-made fibres in recent years global silk production has maintained steady levels. In recent years, China has emerged as a major producer of raw silk, while sericulture is a dying industry in Japan. Japan has reduced the production of raw silk

from 48,000 Metric Tonnes in 1935 to 8,431 Metric T onnes. in 1986. China has emerged as the foremost producer of raw silk assuring nearly 60 per cent of the global production of raw silk.

Sericulture activity had technological advantages since it required lesser water for cultivation of mulberry. On the economic front, it remained to be a highly labour intensive activity providing vast scope for both on-farm and off-farm employment. Further, sericulture activities had proved to be economically more profitable than other crops. The main reason being that a number of cocoon crops raised on a given piece of irrigated land could be anywhere between four to six cocoon crops per year. On a rain-fed piece of land, the farmer could raise at least two to three cocoon crops per year. Thus, the income flow was regular and assured in sericulture than in the case of any other cash crops on irrigated lands.

All the sericultural activities are village based and hence prevent migration of peoples from rural to urban areas in search of job. Sericulture could be a more advantageous agro-industry for improving the economy of the deprived sections of the society like schedule castes and schedule tribe. Non mulberry sericulture is practiced by the tribal's. It provides self-employment opportunities to the educated youth in its varied sectors.

3. Sericulture in India (Part – 1)

Sericulture is an agro-based cottage industry in India, which has witnessed many prospects and problems since second century B.C. It is one of the highly remunerative occupations implemented in rural India for the upliftment of rural economy and to derive rural energy. In India, of 6, 29,143 villages, sericulture is being practiced in about 59,528 villages which will be 9.5%. Indian sericulture has shown a dynamic growth during last few years. This industry provides employment for the rural folk throughout the year irrespective of seasons. The modern silk industry in India has grown to meet the domestic rather than export requirements and this is fact of great importance for the industry. Further, this industry provides employment opportunities to about 6 million peoples in India and play a key role in the uplift of rural economy besides earning considerable foreign exchange. Like Chaina, India has a culture in which silk occupies a dominant position. It is most suited for our country where in majority mainly depend on agriculture for their livelihood. On the other hand, this agri-business is most suitable to earn substantial income in drought condition especially in arid and semiarid zones. In drought conditions, when most of the agricultural crops do not revive after a few showers, mulberry being a perennial crop will sprout and yield leaves for rearing of silkworms. Added to this, the never-ending demand for silk throughout the world assures foreign exchange for India. There is high export possibility creating trade surplus. Sericulture is good source for earning foreign exchange. Presently India is earning about 850 crores from export of silk fabrics and garments.

Although the silk production was there for long in India, the progress made during the last 50 years is very significant. However, it is yet to attain global standards in producing quality silk. In the beginning, cultivation of mulberry garden and production of silk was mainly confined to the States of Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu and Kashmir. In recent decades the sericulture Industry has spread to other states and agricultural zones. Presently, the total area under mulberry garden in India is around 1, 79, 065 hectares with different mulberry genotypes of varied performance. As for the survey of Industrial Silk Association, the world raw silk production in 2011 was 85, 812 Metric Tonnes, of which India's share is an accounting for 18.85% of the total raw silk production. Sericulture in Karnataka has occupied a premier position of with an annual production of 98.64 tonnes of raw silk (2011-12) from 1.77 lakh hectares of mulberry garden accounting for 74.15% of total production of silk in India.

Silk has become inseparable part of Indian culture and tradition since several countries because of the fine quality, lustrous and traditional colours. In recent years, the tradition of women fabric has been coupled with more pragmatic points an account of the latest printing technology.

The process of modernisation could not pick up the required momentum as it over ignored some pertinent issues connected with the sericulture industry, which was earlier confined to few traditional districts viz., Kolar, Bangalore, Tumkur, Mandya and Mysore has now expanded to all the erstwhile 27 districts of the state. Continuous efforts made to improve the quality of silk by introducing rearing of bivoltine and bivoltine hybrids is met with little success. Similarly the introduction of CSR bivoltine hybrids developed with the help of JICA even though has brighten the prospects of the industry is facing several practical problems to popularise them in large scale.

At this juncture a specific reference should be made with regard to the research work carried out in various research institutes to evolve improved mulberry cultivars suitable to different agro climatic zones. During the past two decades, efforts were made to popularize the cultivation of improved mulberry varieties (M_5, S_{36}, V_1, DD, S_{13}, S_{34}, MR_2, etc) in Karnataka and the neighbouring states under both irrigated and rain fed conditions.

4. Sericulture in India (Part – 2)

In India both univoltine and bivoltine areas of Jammu and Kashmir, and western part of Uttar Pradesh where only one or two cocoon crops are raised. Similarly in tropical regions of West Bengal, even though multivoltine pure races of silkworms and their hybrids are reared for commercial cocoon production. India is the major producer of silk (15,000 MT) in the tropical belt. Karnataka, Tamilnadu, Andhra Pradesh, West Bengal and Jammu and Kashmir are the major traditional sericultural states contributing to about 88% of the raw silk produced. The major silk producing states in India are Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu and Kashmir

for mulberry silk. Bihar, Orissa and Madhya Pradesh are known for tasar silk and assam for eri and muga silks. Even Manipur and Meghalaya are producing eri silk. Karnataka stands first in silk production and then comes Andhra Pradesh and Tamil Nadu. But today sericulture is being practiced in all the districts of the state. However, sericulture is being introduced in all the states and union territories of the country. The Government of India and the state government have given greater emphasis for the development of sericulture industry. The Central Silk Board has been directly implementing certain pilot projects for the development of both mulberry and non-mulberry sericulture. With the advent of World Bank aided National Sericulture Project (NSP), sericulture has extended its tentacles in non-traditional areas in Assam, Arunachal Pradesh, Bihar, Gujarat, Himachal Pradesh, Haryana, Kerala, Maharashtra, Meghalaya, Manipur, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tripura and Uttar Pradesh. These projects actively engage in the extension and egg production programmes. In addition, several non-governmental organizations, co-operative sectors and private agencies have thrown their might in uplifting the sericulture industry, in general, in the country.

Karnataka with a geographical area of 1,91,791 km^2 is situated in the Southern part of the Indian peninsula stretching from 11.31 and 18.45 north latitude and 74.12 and 78.40 east longitude. It is one of the 28 states and 7 union territories of India and happens to be the eight largest states in the country in both area and population. The state enjoys tropical climate with favourable conditions like moderate rainfall, temperature, atmospheric humidity and good sunshine, on the average. Karnataka has large range of cash crops with varied agro climatic conditions. It ranges from very moist rainy monsoon climate on the West Coast, the Western Ghats and Malnad area to the arid and semiarid climate of the interior central and Northern districts.

Sericulture, which is one of the important cash crops mainly in the Southern region of Karnataka, has been in practice for more than 200 years. Because it involves low investment. Once the plantation is established it will continued to yield for 15 to 20 years with minimum expenditure for maintenance. Therefore maximum turnout can be obtained with minimum investment. Karnataka is the apex silk producing state in the country an accounting for 60 per cent of silk production. Out of the cultivable area of about 14.0 million ha, mulberry is being grown in nearly 0.15 million hectares an accounting for 1.07 per cent of the cultivable area. In this State rearers are practicing improved method of mulberry cultivation and silkworm rearing.

V_1, M_5, S_{36} and S_{54} mulberry varieties are under cultivation to rear bivoltine, multivoltine, cross breed and CSR hybrid silkworm varieties. Karnataka enjoys a salubrious climate for rearing of silkworms thought the year. In commercial sericulture, cocoons are produced both for silk and seed. The harvested cocoon has to be properly stored till they are shifted for quality silk extraction. In seed production, proper care of seed cocoons is necessary to achieve high moth emergence for the

production of viable eggs of quality to aim at successful cocoon crop production. Karnataka is not only the major silk producing state in India but with its well established organization, infrastructure and research activities, it also expertise in providing the necessary technical know-how for the all round development of sericulture.

5. Mulberry Sericulture

Mulberry is an outstanding bio-energy, drought resistant tree/shrub which could be grown in different types of soil both under irrigated and rain fed conditions. In addition to being fed to silkworms, mulberry is used in industry, medicine, aqua-culture, agro-forestry, social forestry, water-shed management and drought prone area development programmes. In sericulture, the most important factor is the cultivation of elite mulberry varieties exhibiting desirable agronomical and commercial traits. It is an established fact that about 60% of the total cost of silk production is attributed to mulberry production alone. Therefore, it is very important to select high yielding varieties with better quality leaves. In mulberry cultivation, attention must be given to both quality and quantity of leaves. They must be high yielding with low inputs. However, they must be able to produce still higher yields with better agronomical inputs.

In addition, they should exhibit wide adaptability and tolerance to varied climatic factors and resistance to pests and diseases. Among the important factors contributing for the successful harvest of cocoon crops, mulberry leaf stands first (38.2%) compared to climate (37.00%), rearing technique (9.3%), silkworm race (4.2%), silkworm eggs (3.1%) and other factors (8.2%). Hence, the profitability depends on the quantity of quality leaves produced in a unit area over a unit time.

The mulberry genotypes (*Morus Spp*.) are being cultivated from tropical to temperate regions in many countries of the world predominantly in Eastern, Southern and South Eastern Asia, Southern Europe, Southern North America, North Western South America and some parts of Asia. Different species of *Morus,* L. are widely distributed and used for various purposes. Though the primary use is to feed silkworms but is being used for multipurpose. Further, due to decline of sericulture in Japan, Korea, USSR the scientists are diverting their attention for using mulberry for fodder, fruit, pharmaceutical, agronomy, animal nutrition, landscape and gardening and other such purposes. Therefore, the prospects of mulberry culture should be viewed with long term maintenance and utilization in global perspectives.

Sericulture plays a vital role in transferring wealth from richer sections to poorer sections of the society. Silk is consumed mostly by the affluent and the money so spent by them on purchase of silk is distributed among the sericulturists like mulberry cultivators and cocoon producers, reelers, twisters, weavers and traders.

Unfortunately, in recent year's sericulture industry in India is passing through a critical stage and almost demoralized the cocoon and silk producers due to the steep fall in cocoon and silk prices. This is perhaps due to the effect of import of raw silk from China as well as its illegal entry into Indian market. If proper step are not taken it is an uphill task to protect and save the industry in view of the GAAT agreement. The contemplated measures to increase the import duty, tariff protection, fixing of support price for cocoon, payment of subsidies appear to be temporary solution. In order to salvage the industry from present crisis it is of vital importance to address the basic issues confronting the cocoon and silk producers. Importantly it is essential to improve the quality and reduce the cost of production to boost the sagging morale of the sericultural players.