

A Review On The Role Of Sericulture Activities For Sustainable Development

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Abstract:

Since ancient times, sericulture—the raising of silk worms—has been a cottage industry in practically every region of the globe. There are five types of silk worms that are used for commercial purposes worldwide, and they are customarily raised in various locations. The only nation that still uses traditional methods for raising all five species of silk worms is India. The women in the community have historically engaged in this household activity, which gives them some extra money to supplement their family's income and give them a sense of financial independence. Economic development, which reduces poverty, particularly in rural regions, is essential for social development. Additionally, sericulture is a sustainable business since its by-products are used as a source of protein energy or as manure for the plantations. This makes sericulture a green cottage company.

Keywords: sustainable development, silk, economy, rural

Introduction:

The manufacture of silk through the scientific and artistic process of sericulture has been a part of many nations' histories, cultures, and economies for thousands of years. It entails raising silkworms and removing the silk fibres from their cocoons. From raising silkworms to spinning silk threads, sericulture is a difficult and multifaceted process that calls for close attention to detail at every step.

The practice of raising silkworms and making silk fabric were closely-kept secrets in ancient China, which is where sericulture first emerged (Roogta and Parker, 2005). Through trading routes like the Silk Road, The Silk Road" the Chinese monopoly on silk manufacture soon extended to other countries of Asia, including Japan, Korea, and India, and eventually reached the Western world (source: National Geographic Society, 2019). The methods and practices of sericulture changed over time, resulting in improvements in the production of silk and the creation of silk industries all over the world.

Commercially Exploited Varieties of Silk Insects:

There are five varieties of commercially exploited silk varieties in the world; viz. *Bombyx mori* (Mulberry silk), *Antheraea proylei* (Oak Tasar silk) & *Antheraea mylitta* (Tropical Tasar), *Antheraea assamensis* (Muga silk) and *Samia ricini* (Eri silk). India is bestowed with all these five varieties of commercially exploited silk insect species (Source: CSB Annual Report 2017-18).

***Bombyx mori* (Mulberry Silk):**

The most common and extensively manufactured kind of silk in the world is mulberry silk. It comes from the cocoons of the *Bombyx mori* silkworm species, which only consumes mulberry leaves for food (Hamamura *et al.*, 1962). Mulberry tree cultivation is essential to the effective breeding of silkworms. The silk from mulberry trees is prized for its glossy appearance, delicate texture, and softness. It is highly prized in the textile industry for its stamina and capacity to take up dyes, producing colours that are bright and durable (Chenthilnayaki *et al.*, 2004). Mulberry silk is utilised to make a variety of opulent silk goods, such as accessories, apparel, and bedding.

***Antheraea assamensis* (Muga Silk):**

Assam, in northeast India, is the only place to find muga silk, a rare and valuable kind of silk Singh & Chakravorty (2006). The muga silkworm, or *Antheraea assamensis*, is the species of silkworm that produces it (Tikader *et al.*, 2013). Muga silkworms consume the leaves of *Litsaea polyantha* (sualu) and *Machilus bombycina* (som) trees (Neog *et al.*, 2005) Muga silk is renowned for having a naturally occurring golden-yellow colour that doesn't need to be dyed (Tikader *et al.*, 2013). It is remarkably strong and has a shiny texture. Muga silk is used to make shawls, scarves, and other luxury textile items in addition to traditional Assamese clothing like sarees and mekhela chadors.

***Antheraea mylitta* (Tasar Silk):**

The genus *Antheraea* has numerous species of silkworms that make tasar silk, which is a form of wild silk Singh & Chakravorty (2006). India is where it is mostly grown, especially in areas like Jharkhand, Chhattisgarh, and Bihar. Tasar silkworms consume a variety of trees, including as oak, arjun, and sal (Sharma *et al.*, 1995). While tasar silk lacks the inherent lustre and strength of mulberry silk, it is rougher in texture (Das *et al.*, 2005). It is frequently used to create home furnishings, décor, sarees, and garment materials. Because of its rustic beauty, tasar silk is prized and frequently combined with other fibres to produce distinctive textile blends (Gahlot and Pant, 2011).

***Antheraea pernyi* (Temperate Tasar Silk):**

Tasar silk that is produced in temperate climates, mostly in China and Japan, is known as Temperate Tasar Silk (Liu *et al.* 2010a). The cocoons spun by the Chinese oak silk moth, or *Antheraea pernyi*, a kind of silkworm, are the source of the silk. The cultivation of host trees like as oak, cherry, and chestnut is necessary for the manufacture of temperate tasar silk, as the silkworms feed on these trees (Chen, 1994). Usually, the cocoons are boiled during the harvesting procedure in order to remove the silk strands without damaging the pupa inside.

Temperate tasar silk is distinguished by its coarser and thicker texture in contrast to tropical tasar silk (Chen *et al.*, 1981), which is made in warmer climates. Its distinctive attractiveness is enhanced by the natural golden colour of the silk threads. The main applications of temperate tasar silk are in the textile industry for items like sarees, clothing, and home furnishings. It is prized for being strong and resilient to damage, which makes it appropriate for a range of uses (Liao *et al.* 2007). This technique for extracting silk guarantees the ethical and environmentally friendly manufacture of temperate tasar silk. Tasar silk that is temperate provides a distinctive substitute for other varieties of silk, which benefits the textile sector. It is a sought-after material for making unique and opulent things because of its peculiar texture and natural golden-copperish tone (Li *et al.*, 2017).

***Samia ricini* (Eri Silk):**

Samia ricini, a species of silkworm, produces eri silk, often referred to as endi or errandi silk. Since eri silkworms naturally have the ability to emerge from their cocoon, they are not killed during the cocoon harvesting procedure, in contrast to other varieties of silk. Therefore, this type of silk is known as *ahimsa* silk (Aishwariya, 2020). Castor leaves are among the plants that eri silkworms eat. Eri silk is appropriate for winter clothing because of its warm, fuzzy texture, which is reminiscent of wool (shetty and Samson, 1998). Often combined with other fibres, it can also be used alone as a fabric for scarves, stoles, shawls, and traditional clothing (Sarmah *et al.*, 2013). Japan, several regions of Southeast Asia, and Northeast India are major consumers of eri silk (Omollo *et al.*, 2016).

The aforementioned varieties of silk each have unique qualities, methods of production and cultural importance that add to the industry's richness and diversity. *Bombyx mori*, the scientific name for the mulberry silkworm, is the main focus of sericulture. This bug gets all of its nourishment from mulberry leaves. Mulberry trees are widely grown, especially the white mulberry (*Morus alba*), to aid in the breeding of silkworms (Horie, 1978). The silkworm has four unique life stages: the egg, larva, pupa, and adult moth. During its larval stage, the silkworm constructs a cocoon composed of a single silk thread that can span several hundred metres (Roychoudhury, 2003). The cocoons are carefully picked and treated to produce silk. In order to encourage the emergence of adult moths, traditional procedures require exposing the cocoons to a controlled environment; however, this approach causes damage to the silk thread (Ross, 2014). An alternate technique known as "reeling" is used, in which the cocoons are boiled to kill the pupa inside in order to maintain the quality of the silk. After being meticulously unwound from the cocoon, the silk thread is spun into silk yarn, which can then be further processed to create a variety of products, including raw silk, spun silk, and silk fabric (Sonwalkar, 1984).

Sericulture and Sustainable Development:

The process of raising silkworms for the purpose of producing silk, or sericulture, is crucial to sustainable development. The following are a few ways that sericulture supports sustainability:

Economic Development and Alleviation of Poverty:

Sericulture offers prospects for generating revenue, particularly in rural areas. Roughly 52,360 of the 6, 38,588 villages in India are home to sericulture operations, employing roughly 7.52 persons. 9, 47,631 families make their living from sericulture. (Source: CSB, 2009-10). It promotes farmers' lives and gives them jobs. The silk industry supports both the

regional and national economies through silk growing, silk reeling, weaving, and trading (Roy et al., 2012). According to Vijaykumar *et al.* (2007), a hectare of mulberry produces employment for 13–16 people annually. Their location-specific analysis shows that 11 man-days are needed to produce one kilogramme of raw silk, which can employ 30 man-days to produce silk fabric. In addition to providing employment opportunities for farmers, sericulture also contributes to the growth of ancillary industries such as textile manufacturing and fashion (Ma, 1996). The demand for silk products not only stimulates local businesses but also creates export opportunities, further bolstering the overall economic development of the region (Hanumappa and Erappa, 1985). By empowering marginalised communities and small-scale producers, sericulture provides a means of reducing poverty (Rubia *et al.*, 2019). It offers a substitute source of income and lessens reliance on conventional agriculture Lewis, D. (2003), which is susceptible to a number of variables like pests, market swings, and climate change. In sericulture, silk-producing insects are cultivated and silk is produced. Silk is highly sought after in both domestic and foreign markets Marsh, B. (2012). This sector of the economy not only gives farmers a living but also opens up job opportunities at every stage of the production process, from silk cultivation to processing and manufacturing G.S. Rani (2006) Furthermore, sericulture fosters knowledge transfer and skill development, enabling people to rise above the socioeconomic divide and become independent (Kassa, 2005).

Environmental Conservation and Preservation of Biodiversity:

Compared to many other textile industries, the production of silk is thought to be an environmentally friendly one. Sericulture doesn't involve the use of hazardous chemicals, a lot of water, or a lot of land. In comparison to the manufacture of synthetic fibre, its carbon impact is comparatively lower, and it supports sustainable patterns of use and production (Hogeboom *et al.*, 2017). In addition, sericulture promotes biodiversity as it relies on the cultivation of mulberry trees, som, soalu, castor, kesseru, tapioca, oak, etc. which provide habitat for various species (Wani *et al.*, 2018) Farming and maintaining of natural host plant forests promote the preservation of natural environments, stops deforestation, and preserves biodiversity. By promoting the cultivation and maintenance of mulberry trees, sericulture helps to create a sustainable habitat for silkworms. This in turn supports the overall biodiversity of the ecosystem, as it provides a stable food source for other organisms such as birds and insects that rely on silkworms for sustenance (Kalita and Dutta, 2014).

Waste Utilisation:

Sericulture encourages waste utilisation while reducing trash creation. Damaged cocoons and residual silk threads are examples of waste products made from silk that may be recycled or used for textiles, cosmetics, and medicine, among other things. By vermicomposting silk industry wastes can be transformed into manure (Shanmugam and Ramamoorthy, 2014). This method lessens the amount of garbage that is disposed of and supports a circular economy. In addition, different silk worm species utilized in sericulture also promotes the utilization of species specific food plant leaves. These leaves can be harvested from existing wild trees or cultivated specifically for sericulture, providing an opportunity to make use of land that may otherwise be unused. By utilizing these resources efficiently, sericulture contributes to sustainable waste management and resource conservation.

Social Development and Rural Development:

Kassa (2005) stated that by empowering women and marginalised communities, sericulture may have a good social influence. Women actively participate in sericulture tasks such as breeding silkworms, sorting cocoons, and weaving silk in many silk-producing locations. Participation like this advances communal growth, social cohesiveness, and gender equality (Kassa, 2013). Furthermore, sericulture provides economic opportunities for these communities, allowing them to become financially independent and improve their overall quality of life (Geetha and Indira, 2010). This not only boosts their self-esteem but also reduces their dependence on external sources for livelihood. Additionally, the involvement of women in sericulture challenges traditional gender roles and stereotypes, promoting a more inclusive and progressive society (Geetha and Indira, 2011).

By providing a sustainable source of income (Rubia *et al.* 2019), sericulture aids in lowering the rate of rural-to-urban migration. It promotes balanced regional expansion and lessens urban overpopulation by fostering the rise of rural infrastructure, healthcare, education, and general well-being. Furthermore, sericulture also contributes to the preservation of traditional rural livelihoods and cultural heritage. The cultivation of silk not only provides employment opportunities for rural communities but also helps in maintaining their unique traditions and skills, which have been passed down through generations (William, 1839).

Customised Knowledge and Cultural Heritage:

The practice of sericulture is strongly ingrained in the customs of many different areas, and its continued practice aids in the preservation of customary knowledge, methods, and craftsmanship. By fostering cultural variety and historical conservation, this cultural preservation aids in the sustainable development of communities (Varadarajan, 1988). Furthermore, the sericulture industry provides economic opportunities for local communities, as it creates jobs and

generates income through the production and sale of silk products. This not only contributes to the overall growth of the community but also helps in maintaining a sense of pride and identity among its members (Sinha, 1989). Additionally, the exchange of sericulture techniques and traditions between different regions promotes cultural exchange and understanding, fostering global connections and appreciation for diverse cultural heritage (Jacoby, 2004).

Conclusion:

In summary, the intriguing and age-old art of sericulture includes the raising of silkworms, the harvesting of silk fibres, and the creation of magnificent silk goods. It blends innovation and tradition and has enormous cultural, economic, and environmental value. Sericulture, a sustainable enterprise that supports many people's lives and preserves an important portion of our common history, is nevertheless essential to the global textile industry. All things considered, sericulture is a sustainable practice that can help achieve a number of Sustainable Development Goals (SDGs), including gender equality, decent work and economic growth, no poverty, responsible consumption and production, and sustainable cities and communities.

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