

A CONCEPT PAPER ON THE DEVELOPMENT OF SERICULTURE AND SILK INDUSTRY IN LATIN AMERICAN REGIONS

1. INTRODUCTION

The major silk producing countries in Latin American regions are Brazil, Argentina, Bolivia, Columbia, Cuba, Ecuador, Mexico, Paraguay, Peru and Venezuela. Major share of the silk in the region is produced in Brazil. Brazil occupies a prominent position in the international silk market due to the superior quality of raw silk produced in different production bases of the country. Besides Brazil, the other Latin American countries have initiated the development of sericulture as an alternative economic activity for the small farms. Each one of the Latin American countries that invested in sericulture has considerable number of farmers who could benefit from this labour intensive avocation.

There is great potential to develop sericulture as an economically viable rural avocation in this region due to the salubrious climatic conditions suitable to mulberry cultivation and silkworm rearing. Labour Force Participation Rate is high in Sericulture. The region is also bestowed with adequate human resources to undertake the labour intensive activities associated with silk industry. Although sericulture was introduced in many Latin American countries with the support of Government agencies and international organizations, the industry could not set it foot firmly or sustain and carry forward the growth momentum initially witnessed in some pockets. In order to carry forward the industry for the sustained growth, the various linkages needed for the industry should be established in an organized manner; at the same time empower the grass root level stakeholders in improving their skills. Perhaps, the successful model of Sericulture practice in a tropical country like India could be replicated in the region. It is also critically important to facilitate convergence of assistance extended by the various agencies along with the right kind of technical expertise and support available for the sector.

There are significant shifting in silk production bases in the world, whether within the countries or across the countries, due to rapid industrialization and urbanization. There are also considerable changes in production processes, product choice, nature of products, quality requirements, trade practices, etc. However, the good news is that the demand for silk is on the upward trajectory and it is expected that this trend may continue for another two decades. This gives greater opportunity for developing silk industry in Latin American countries due to shrinking of silk production bases in traditional areas. The silk industry also shares the global goals embedded as Millennium Development Goals (MDG) set by the United Nations. Considering these factors in mind, the ISC is planning to take up coordinated efforts to introduce and

develop silk industry in an organized manner in potential areas of Latin American countries.

2. Silk cocoon production in Latin America

Sericulture has great potential to generate jobs and income among small farmers. In Latin America, a network called Red Andina de la Seda, presently known as Red Latinoamericana de la Seda was established in February 2001 to promote local and regional synergies, enabling cooperation among Latin American countries to endorse concrete actions towards sustainable development of sericulture.

As shown in Table 1 below there were a total of 306 silkworm rearing farmers spread across different countries belonging to the Red Latinoamericana de la Seda, with a production of 6528 kg of cocoon in 2010. Colombia accounted for the highest share of 79 % of this production.

Table 1: Silk cocoon production status of Red Latinoamericana de la Seda - Year 2010

Country	Craftsmen (No.)	Silkworm rearers (No.)	TOTAL (No.)	Cocoon production (kg)	%
ARGENTINA	15	30	45	-	-
BOLIVIA	12	3	15	42	1
COLOMBIA	155	180	335	5175	79
ECUADOR	25	10	35	517	8
PERU	49	78	127	794	12
CUBA		2	2	-	-
GUATEMALA	10	3	13	-	-
TOTAL	266	306	572	6528	100

Source: Red Latinoamericana de la Seda (Cifuentes, 2012)

A brief account of the status of sericulture industry in Latin American countries is given below:

2.1. Argentina

In 2004, Argentine National Congress enacted the Law No. 25,747, regulated by Decree 526 in 2007, as a way to promote and accelerate sericulture activities in the country. The decree establishes the creation of tax incentives to encourage industrial scale of cocoon production in the country. Among provinces that joined the terms of Law No. 25,747, are Salta, Catamarca, La Pampa and Misiones. However, the

combination of actions from state institutions and companies did not make a significant impact on the development of sericulture industry.

According to an internal study, lack of coordination and common goals, originating from ignorance or indifference to the potential of sericulture, and the existence of individual interests above the collective interest have prevented cooperation among the players. This has created a situation wherein each sector becomes isolated from the other thereby disrupting sericulture development. The study emphasized that under any circumstances; there would be people or companies that can bring success by finding the path at their own initiatives. However, for aiming the development of a sector, continuous efforts must be made to ensure the integration of the various activities of the value chain, but also ensuring that a fair price for each activity is equitably distributed.

2.2. Bolivia

Bolivia had their own sericulture projects financed by Propise - Pilot Proyecto Serícola del Centro de Investigación Tropical Agriculture (CIAT), through funding sources of the Bolivian Government, resources of United States Agency for International Development (USAID PL480) and World Bank resources. From 1990 to 1997, two companies of Korean origin had operated in Bolivia for the production of silk cocoons.

After the failure of these projects due to the 1998 crisis and in an attempt to explore new markets for sericulture, a silkworm cocoon drying unit was opened in the town of La Guardia in 2000 through a cooperation project by the silk rearing farmers through Government support. At the same time, city of Santa Cruz, through the Provincial Resolution No. 532/2000 created a three-year plan (2000-2003) for development of the Project, 'Technology Transfer Sericulture – PROTTESE'. The objective of this project was to develop and transfer technology to farmers through specialized technical assistance for the implementation of mulberry cultivation and silkworm rearing as an alternative sustainable income generation for household farmers. In 2004, the production suffered a halt and subsequently farmers were supported by the establishment of a revolving fund, financed by IILA - Instituto Italo-Latino Americano, dedicated to finance the production and purchase of cocoons.

2.3. Colombia

During 1980s, two Korean companies established themselves in the cities of Pereira (Cokosilk SA) and Popayan (Cosedas). These investments were motivated by the high prices of raw silk in the international market. In 1992, the price of silk in the international market drastically declined, leading to the immediate closure of the

Cosedas Company, and a complete change in the initial design of the Cokosilk Company in the city of Pereira.

In 1993, a bilateral agreement was signed between Colombia and the European Union (Project ALA 91/31), aiming to cultivate around 1,500 hectares of mulberry trees that would support the production of cocoons to be reeled on a reeling unit to be installed in the municipality of Santander Quilichao. In 1994, the Centro de Desarrollo Tecnológico de Sericulture - CDTs was created with the objective to develop a technology to promote sericulture through development of silkworm hybrids adapted to Colombia. Subsequently, silkworm eggs produced by CDTs were exported to Bolivia, Ecuador, Venezuela and the Canary Islands.

In 1998, the EU decided to terminate the support to sericulture department of Cauca, since the project did not progress as planned, causing frustration among silkworm rearing farmers. But one group remained motivated and in 2000, founded the Corporation for the Development of Cauca Sericulture - Corseda, which integrated silk producers and artisans of the region, as well as ten local organizations. Corseda aimed at self-sustainability to cope with any crisis encountered in the future. In order to reduce conflicts of interest between silkworm rearing farmers and artisans in an attempt of a continuous integration process, Corseda created quality standards for cocoon, and also a minimum selling price index for fabrics to prevent unfair competition between organizations and artisans in each one of their groups.

Corseda could coordinate 170 silkworm rearing farmers and 120 artisans in the municipalities of El Tambo, Timbío, Popayan, Piendamó, Morales, Caldono, Santander and Quilichao Caloto (Vieites *et al.*, 2010). They were grouped into five associations of silkworm rearing farmers and five associations of artisans and farmers. Among the associates, the illiteracy levels were around 65 % with 75 % of families below the poverty line. The articulation process of Corseda substantially altered the relationship between producers and artisans. It made them to realize the need for interdependence and the necessity of an organization that would mediate to resolve conflicts and provide services for the development of sericulture in Cauca. The involvement of affiliates in the Corporation enhanced transparency among the management and members. Corseda is also a place to meet friends, a guaranteed market for cocoon producers and a safe and close source of raw materials to artisans.

2.4. Cuba

Considering sericulture as one of the important modules for agricultural diversification within a sustainable regional development policy, Cuban government established "Indio Hatuey", a Programme for Sericulture Research, Innovation and Production in 2004 at the Experimental Station of Pastures and Forages. The main

objective of the programme was to introduce and promote sustainable development through production and trade of silk items. Results obtained since 2006 at Indio Hatuey SCFE show that, on small scale, high quality cocoons can be produced in Cuba. Sericulture fits into the agricultural diversification policy that seeks alternatives to sugarcane cultivation. The growth of tourism is an attractive market for handmade silk products that can be produced in the country.

2.5. Ecuador

The silk cocoon production in Ecuador in 2010 was 517 kg. The country had only ten silkworm rearing farmers and 25 artisans due to reduction in the number of silkworm rearing farmers since 2004. Red Latinoamericana de la Seda reported that in 2004, there were 500 trained farmers and more than 110 hectares of mulberry trees were planted in 11 different provinces. There were a hatchery for silkworm eggs and acquisition cocoon unit at Penipe. At the distribution center, there were about 990 kg of first grade dry cocoon, 82 kg of second quality dry cocoon (produced in the years 2001, 2002 and 2003), along with a stock of processed yarn and finished piece goods. The center also has a wing for training in handicraft production, where about 95 craftsmen were trained in reeling, dyeing and weaving processes.

2.6. Mexico

In order to support sericulture among the vulnerable rural communities, the Ministry of Agriculture and Rural Development (SAGAR) implemented the National Sericulture Project in 1991. Since 2009, the Mexican Government, through the State System of Family Development (DIF), the Ministry of Rural Development (SEDER) and Ministry of Agriculture Livestock, Rural Development, Fisheries and Food (SAGARPA), supports sericulture, distribute young silkworms to silkworm rearing farmers and artisans of the regions of Sierra Norte Valle Central y Mixteca.

From 1995 to 2012, about 15 million heads of silkworms were delivered to the sector, which now has 100 ha of mulberry planted in different parts of the State of Oaxaca. The Silkworm production centers set up under the Project, provide extension services to small farmers in the region.

2.7. Paraguay

The federal Government of Paraguay has been supporting the sericulture activities in the country. During 2003, the Ministry of Agriculture and Livestock (MAG) proposed to implement the National Sericulture Plan for the diversification of family farming activities. The objectives of the Sericulture Plan was; to strengthen sericulture as a cost effective alternative for small farmers, optimize the use of resources available

and involve the public and private sectors to improve the living standards of rural households involved in sericulture practice.

Earlier during 1988, a private company was set up by Italian investors aiming cocoon production and silk reeling. The company, Seda y Fibras Srl started its activities of technology transfer, encouraging the development of sericulture in the region and also production of thrown silk. The supply of raw material *i.e.*, silk cocoons and raw silk was mostly from Brazil and Turkey, since the raw silk production could meet only 6 % of thrown silk produced by Seda y Fibras.

In 2011, Seda y Fibras Srl signed a cooperation agreement with the Brazilian University, the State University of Maringá – UEM located in the State of Paraná. The agreement's objective was the maintenance of University's silkworm germplasm bank and also the development of a breeding program to improve silkworm hybrid races belonging to University. The research project also aimed at the development of stronger and more productive hybrids.

2.8. Peru

In an attempt to promote sericulture as an alternative to diversify the activities of small farmers, on May 5, 2005, Peruvian government promulgated the Law on the Promotion and Production of Sericulture and Mulberry Cultivation. This law considered sericulture as an important economic activity and a priority among programs as alternative for cultivation of coca in Peru. In 2006, there were several on-going projects of different dimensions in Peru, and in the central jungle area, there was a total area of 10 hectares of mulberry, 50 silk rearing farmers and ten artisans. In 2007, the Regional Government of Cusco and Peru held a workshop on sericulture, aiming to sensitize official authorities, heads of public institutions, regional and local members of private sector to support this initiative.

In 2008, the governments of Peru and China have entered into a Memorandum of Understanding establishing guidelines for cooperation, which includes the implementation of a pilot project with the cultivation of two hectares of mulberry in the National Agrarian University of La Selva in Huanuco (Amazonia). The project aimed at cultivation of 14000 ha. of mulberry in due course to produce silk for the Asian market, while promoting joint research and exchange of information which are relevant to implementation and development of projects in areas of extreme poverty.

2.9. Venezuela

Sericulture in Venezuela began in the mid-nineteenth century in Merida, Venezuelan Andes. In 1983, a company, Veneseda was founded in Mérida, dedicated

to the study and dissemination of processes and techniques of sericulture and silk weaving. Veneseda maintained a close contact with cultural and educational institutions in the country to disseminate sericulture and silk weaving technologies. In this direction, a cooperation agreement was signed between the Ministry of Agriculture, organizations devoted to regional development and with foreign companies of the sector.

In the early 90s, as an alternative activity for the development in different parts of the country, a project was designed based on the export of cocoon that later would be processed in the country itself. This initiative had faced serious setback due to the sharp decline in the price of raw silk in international market, making cocoon production not competitive in comparison to other farming alternatives.

Even during 1990s, the company resumed its initial orientation, promoting the entire production process that can generate handmade pieces needed for the domestic market in Venezuela. The search for international cooperation agreements has continued and in 2012, with the support of IILA - Istituto Italo-Latino Americano, Veneseda received, as a donation, a machine for silk yarn twisting from an Italian company named Torcitura di Domaso.

2.10. Brazil

Brazil is the second largest exporter of raw silk. China is by far the first. The State of Paraná accounts for 91.95 % of the Brazilian silk cocoon production and about 88 % of the Brazilian production of silk yarn is exported as raw silk or thrown silk. When the world market suffered an unfavorable trend for export of raw silk, there was a disincentive attitude in rural areas, especially among producers who work under a partnership system, causing a decline in the number of Paraná silkworm rearing farmers, which reduced from 7914 in 1998 to 3947 in 2010. Table 2 depicts the data on cocoon production in Brazil between 1991 and 2012.

Table 2: Silk cocoon production (Tons) by Brazilian companies (1991 to 2012)

Company / Year	Bratac	Kanebo/ Fujimura	Cocamar	Kobes	Shoei	Cooperseda	TOTAL
1991 / 92	7865	3603	2663	1460	1514	481	17586
1992 / 93	8784	3909	2777	1464	1779	421	19134
1993 / 94	9048	3716	2299	1200	1719	278	18260
1994 / 95	8477	3454	1727	1075	1527	CD	16260
1995 / 96	9046	3185	1293	1111	733		15368
1996 / 97	8999	3332	1376	1104	CD		14811

1997 / 98	9175	3792	1627	CD			14594
1998 / 99	6603	2669	1033				10305
1999 / 00	5495	2343	635				8473
2000 / 01	6290	2900	726				9916
2001 / 02	6897	2381	960				10238
2002 / 03	6871	2204	891				9966
2003 / 04	5504	1853	648				8005
2004 / 05	4833	1767	546				7146
2005 / 06	5609	1877	565				8051
2006 / 07	6516	2101	CD				8617
2007 / 08	4709	1557					6266
2008 / 09	3610	1225					4835
2009 / 10	3368	1071					4439
2010 / 11	3037	CD					3037
2011 / 12	2601						2601

Source: BRATAC, 2012; CD - Closed Down.

Subsequent to the reduction in silk cocoon production, Brazilian silk reeling industry became almost idle as the production level was not enough to meet the increased demand for raw silk. The fluctuation in raw silk price in the international market had a direct influence on prices paid for the cocoons produced in the country. In 1989, when the international market flourished, the average price paid to the producer in Brazil was US\$ 3.51/kg of fresh cocoons. Decline in the price of silk yarn in the international market in early 90s had kept the price paid to fresh cocoons from 1991 to 2000 around US\$ 2.19/kg of fresh cocoons. From May 2010 to January 2001, the average price paid was US\$ 2.51/kg of fresh cocoons.

There was a hike in cocoon price during the season in 2011/2012, influenced by the bullish international raw silk rate, wherein average price of R\$ 10.89/kg was paid to Brazilian producers for first grade fresh cocoons. During the season in 2012/2013, which started in September, 2012, the price fixed for first grade cocoons with 15 % silk content was R\$10.00/kg (US\$ 4.90/kg) and the estimated average price paid during the 2012/2013 crop was R\$ 11.90/kg (US\$ 5.83/kg) for first grade fresh cocoons, according to BRATAC (2012).

The above developments shows that the prospects of exporting Brazilian raw silk to the international market is quite optimistic, however it is necessary to firm up close partnerships with producers, producer groups and the Government departments like; Municipal, State and Federal agencies. In this line, IAPAR, EMATER and Federal and

State Universities of Paraná promoted several courses throughout the 2009/2010 Crop season, for the implementation of research projects aiming to modernize the silkworm rearing sector in Paraná.

Few Projects were taken up by the Government for the improvement of Brazilian silk production chain and boosting the production of silk products domestically so that the export of raw silk could be reduced considerably. In order to realize this, the Project Vale da Seda, proposed by Technology Incubator of Maringa, emphasized sustainable regional development and hence enabled the creation of a Cooperative of Silk Handicraft Producers - Artisans Brazil. This cooperative, formed by 40 women belonging to rural areas of Nova Esperança city, exported scarves and other handmade silk items to fair trade network called Artisans Du Monde, in France.

3. The constraints

Although the socio-economic and climatic conditions are ideally suited for practising sericulture and silk industry in the region, the industry could not sustain and emerge as an economically viable enterprise due to several reasons, the few of which are given below:

3.1. Absence of a backup mechanism

Sericulture and Silk Industry is a combination of agriculture, animal husbandry and textile industry. There are several activities associated with the industry constituting the silk value chain with the involvement of farmers, reelers, weavers, artisans, processors, designers, traders, exporters, etc. While introducing sericulture in new areas it is critically important to establish the required facilities and later link them at various levels. The other crucial factors are; governmental support, strong extension mechanism, advanced technologies and resources, skill development, marketing, and an assured consumption base in domestic or export market.

An analysis of the sericulture development in most of the Latin American countries shows that the back up mechanism needed for the sustainability of the industry could not be established in a proper manner. In some case there were no proper backward and forward linkages for utilizing the available facilities.

3.2. Lack of coordinated actions.

The development of sericulture and silk industry involves the participation of a number of agencies like; various government departments, financial institutions, non-governmental organizations, private parties and the stakeholders of the silk value chain. It is necessary that the efforts of these agencies must be coordinated at appropriate levels to ensure that the activities are linked and taken up with out any delay. It is

observed that the sericulture developmental activities taken up in Latin American region have serious problems of coordinated actions resulting which, the agencies were working in silos leading to low production, marketing issues, etc.

3.3. Effective utilization materials and resources

During the last two to three decades, except in Brazil, sericulture was introduced in few areas of Latin American countries in a limited manner by sourcing funds from international agencies or other funding agencies. However, the industry cannot sustain or develop the associated facilities in a limited manner as the silkworm cocoons need to be produced in bulk quantities to make the industry economically viable and sustainable in long run. The successful model of sericulture practised in India and Thailand (the socio-economic conditions of these countries are similar to Latin American countries) shows that the industry has been economically viable and sustainable when it was practised by a large number of people in identified communes, provinces or clusters. This would also facilitate to establish the required facilities that need to be effectively utilized with minimum coverage. Unfortunately, such careful and meticulous planning has not adopted while introducing the sericulture industry in many of these countries.

3.4. Convergence of knowledge and resources

Significant efforts were made by the Governments of these countries to introduce sericulture and silk industry as a viable avocation for employment generation and poverty alleviation in rural areas. At the same time, there are attempts by other agencies like Universities, NGOs, and private parties to develop the industry. While financial resources were pooled from funding agencies and the Government, the technical knowledge was sourced from experts from different R&D institutions. One of the important missing links in all these efforts was the absence of convergence of knowledge and resources by different agencies in line with the socio-economic and climatic conditions of the country. The technical expertise required in these areas was mainly to establish the industry on a commercially viable model with the required linkages, especially with a stable market support. Unfortunately, sericulture practices introduced in these countries were not based on this sound principle.

3.5. Integration with Fashion industry

Silk and silk products are universally accepted as the darling of Fashion designers due to its inherent properties not found in any other fibres. There is a great deal of integration required to converge the product ranges with the current day requirement. This would have increased the demand for silk in the countries of Latin America like Brazil, where fashion and fashion industry holds significant importance in

the country's culture and civilization. Hence there is an immediate need for integrating the silk industry with the fashion sector of the region.

3.6. R&D Support

Substantial research work has been undertaken on mulberry silkworm, *Bombyx mori*, which has been domesticated long back. There are a number of innovations and technologies developed to make the practice economically viable, primarily among the primary producers. The basic tenants and utility of the resources vary significantly depending upon the agro-climatic conditions of the region. Hence there are is an urgent need for establishing strong R&D base for the sector in each of these countries. Unfortunately, R&D facilities available for the sericulture industry in the Latin American countries are very poor, except in Brazil.

4. The way forward

The international Sericultural Commission has undertaken an in-house review of the sericulture development in the Latin American countries. The ISC observed that there is a high potential to develop sericulture and silk industry as an economically viable enterprise for the rural people of the region because of the three major inherent advantages; (1) availability of agriculture land and ideal climatic conditions suitable for mulberry cultivation and silkworm rearing, (2) availability of adequate human resources, (3) the inherent inclination of the Latin American people to attend to skilled jobs. The other external factors that are critical and needed for the sustainability for the industry could be imbibed to the sector by careful and meticulous planning at the Governmental level. At this occasion, the International Sericulture Commission can play a crucial role to revive and introduce the industry in the region not only by extending support at its command but also source resources and support from other multilateral agencies and organizations. The following are the strategic plans conceived by the ISC for the region:

- (1) A preliminary diagnostic study by an international expert group (comprising field visit and discussion with the concerned agencies) can be undertaken in the region to get first hand information on the present status of sericulture and the prospect of reviving the industry in an organized manner. Experts required for undertaking this study can be deputed by the ISC under the Volunteer Expert Programme. The report submitted this Group would be the base paper for strategizing the sericulture development for the region in future.
- (2) A Meeting of the concerned Ministers of the Latin American countries would be organized by ISC and is proposed to be hosted by Brazil or the regional forum of the Latin American countries to enable ISC to make a presentation of the study and deliberate on the future course of action. ISC suggests that a Sericulture

Development Programme can be taken up for the Latin American region similar to the World Bank assisted sericulture Project taken up in India. This project should be an exhaustive all round developmental programme to build infrastructures for R&D, seed production, extension, marketing, etc., capacity building for various disciplines, initial support to the farmers, creating various linkages, develop the three tier seed multiplication system and tie up with the market. The Project can be placed before World Bank or similar international organization through the ISC.

- (3) Once the countries are in agreement to go ahead with the proposal, ISC would make an initial proposal to the World Bank or a similar agency for funding the Project. The correspondence with the funding agency and other technical clarifications on the matter would be dealt by the Project Team of ISC.
- (4) After a letter of initial consent is received from the funding agency, ISC would dispatch a Project Preparation Team (s) to each of these countries to visit the areas for preparing a comprehensive Sericulture Development Project for the regions. The locations for entire infrastructures, manpower requirements and linkages needed for the industry would be identified and made an integral part of the project component. ISC would act as the interface between the countries and the funding agencies for providing technical information or the clarifications on the issues thereof.
- (5) The ISC can provide other supports for the Project like; training, supply of materials and resources, consultancy, volunteers, etc.
- (6) In order to enable ISC to effectively intervene in the sericulture development of the region, the Countries in the Latin American Region may enroll as the Member Countries of ISC.
