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An Analysis of Silk Production in India

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Abstract:

Sericulture which has its origin in China is an age old industry in India. Silk route is one of the ancient internationally recognized route for global business for not only silk but also other important commodities. History reveals that silk is also used as an alternate currency (One of the important item to be exchanged in Barter System). India, silk has a prominent place since beginning and has glorious past and considered precious of great trading value.

Indian sericulture plays a prominent role both at National & International level. At National level, it is important source of remunerative employment for around 6 million people, particularly in rural areas and the majority of which are from a socioeconomically weaker section of society and women folk. Besides, it contributes significantly in earning valuable and sizeable foreign exchange for the country through export of silk goods. Moreover, this industry ensures supply of Raw silk to the domestic market.

At international level India enjoys a second position in raw silk production and contributes about 18% in total global raw silk production. It also plays an important role in imparting technical training and consultancy services to new emerging sericulture countries. Sericulture is practiced in 27 states of the country and current production of raw silk is to the tune of 18475 MT (Mulb+ Non). Whereas export of silk goods has touched new heights of Rs.3244.74 crores. Though India is second in silk production, next to China, but gap between the two is wide both in terms of quantity and quality as well. Hence this paper deals with the journey of Indian silk comprising history, present status of Indian silk industry. An attempt is also made to analyze the prospects of the state wise production of silk in India.

Keywords: *Indian sericulture, silk route, CSB Act No. IXI of 1948, silk production in several states of India*

1. Introduction

Silk being an exclusive fiber and popular as “Queen of Textiles”, the money moves from the rich and urban market to the poor and rural producers. As the developed countries retreating from the silk production in view of increased cost of human power, silk production provides hope and opportunities to the developing countries. Having realized the benefits of investing resources in sericulture, the Union Government and the States over the years have laid emphasis on programmes based on sericulture for rural development. The role of sericulture and silk manufacturing industry in putting the country in its present position in the global scenario and the potential that exists in the agrarian economy like India, in respect of agro-climatic zones, diversity in the variety of silk that no single country can boast of, skilled manpower that creates magic out of this queen of textiles cannot be overlooked by planner anymore.

India is credited for at least four distinctions in the world of silk. Indians are the largest consumers of silk. Second largest producers of silk, Largest importer of mulberry raw silk and producers of all four commercially exploited silk in the world viz., -Mulberry, Tasar, Eri and Muga and has been recording consistent growth in the production and productivity. As India encompasses wide geographical and agro-climatic variations, mulberry sericulture is distributed in temperate, sub-tropical and tropical regions, while the major share comes from the tropics.

Indian silk industry has moved on with long strides and its production has increased to about 18,320 MTs in 2007-08. Mulberry silk currently accounts for over 88% in the production total of all varieties of silk. About 53,814 villages of India are involved in growing silk cocoons by bringing approximately 185 thousand hectares of land under silkworm food plant cultivation. The total annual production of mulberry raw silk in India is 16,245 MTs, as per statistics of silk production, the major states producing mulberry silk are Karnataka, Andhra Pradesh & Tamil Nadu in South India; West Bengal & Manipur in East India, Uttrakhand, Himachal Pradesh and J&K in the North. The traditional silk producing states (Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and J&K) together account for 98% of the total mulberry silk produced in the country.

Hence this paper deals with the journey of Indian silk comprising history, present status of Indian silk industry. An attempt is also made to analyze the prospects of the state wise production of silk in India.

2. Origin and History

India is one of the 58 sericulture industries of the world. It has the unique distinction of being the only country in the world producing all the four varieties of silk, namely mulberry, tasar, eri and muga. No one really knows when sericulture came to India, but it existed in the Ganga-Bramaputra belts from time immemorial. The word Saree is derived from Sanskrit Shatto or Shatika, which was later abbreviated as Shadi or Sari. While some believe that it is derived from Seres meaning silk.

According to one view all domesticated forms of mulberry came from China. A Chinese princess got married to a king in Tibet in 140B.C. she brought some eggs of silkworms and some mulberry seeds hidden in her headdress. From Tibet sericulture came to India. According to the second view, put forward by N.G. Mukerjee, all mulberry insects originated somewhere on the slopes of Himalayas on the skirts of Mount Everest, from where they spread to warmer regions. Turanians and the Aryans entrapped them as slaves.

3. Objectives of the study

The following are the objectives of the present study,

- To present an overview of India's silk production.
- To analyze the state wise production of silk in India.

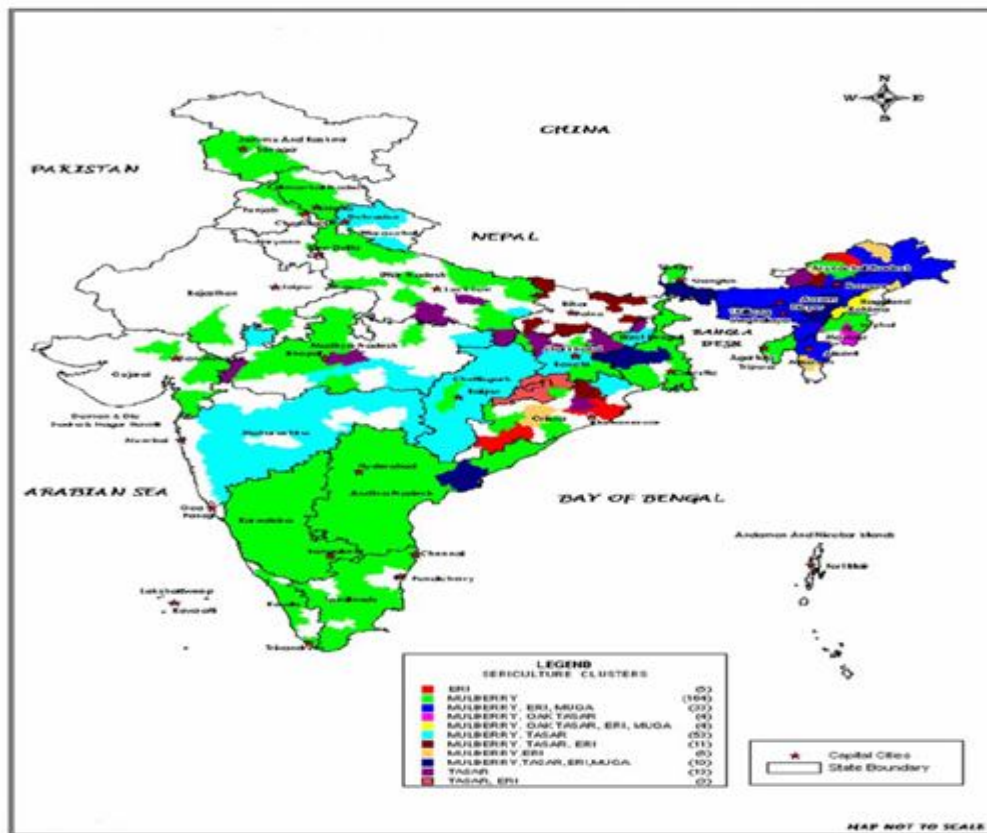


Figure 1: Silk Producing States of India (Map)

Source: Central Silk Board

In India with a contribution of nearly 13.77 per cent of the world raw silk production, the production of pure silk fabric accounts to nearly 140 million sq. meters per year. Out of the total fabric produced 60 – 70 percent of the soft silk constitutes handloom silk. Special types of silk viz., Crepe, Georgette and Chiffon etc., contribute around 10 – 12 percent of the total silk fabrics.

3.1. Types of Silks

There are four major types of silk of commercial importance, obtained from different species of silkworms which in turn feed on a number of food plants. Except mulberry, other varieties of silks are generally termed as non-mulberry silks. The non-mulberry silk is recently christened as “Vanya Silk”, due to its wild nature. India has the unique distinction of producing all the commercial varieties of silk.

3.1.1. Mulberry Silk

Bulk of the commercial silk produced in the world comes from this variety and often refers to mulberry silk. Mulberry silk comes from the silkworm, *Bombyxmori*L. which solely feeds on the leaves of mulberry plant. These silkworms are completely domesticated and reared indoors.

The mulberry sector continues to be predominantly rural and small farmer-based, with post cocoon activities in the cottage and small industry sector. Mulberry silk contributes to around 80% of the silk production. In India, the major mulberry silk producing States are Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu and Jammu & Kashmir which together contributes 97% of country's total mulberry raw silk production.

3.1.2. Tasar

Tasar (Tussah) is copperish beige colour, coarse silk mainly used for furnishings and interiors. It is less lustrous than mulberry silk, but has its own feel and appeal. Tasar silk is generated by the silkworm, *Antheraea mylitta* D which mainly thrive on the food plants of Asan and Arjun. The rearings are conducted outdoor in nature on the trees. In India, tasar silk is mainly produced in the States of Jharkhand, Chhattisgarh and Odissa, besides Madhya Pradesh, Maharashtra, Bihar, West Bengal and Andhra Pradesh. Tasar culture is the mainstay for many tribal communities in India.

3.1.3. ERI

Also known as Endi or Errandi, Eri is a multivoltine silk spun from open-ended cocoons, unlike Other varieties of silk. Eri silk is the product of the semi domesticated silkworm, *Philosamia Ricini* that feeds mainly on castor leaves. Eri Silkworm being polyfagous has wide range of food Plants such as Tapioca/cassava, Papaya, Payam, Kessaru and Barkessuru etc. Eri-culture is a Household activity practiced mainly in North Eastern Region for protein rich pupae, a delicacy for the tribals in the region. Resultantly, the eri cocoons are open-mouthed and are spun. The silk was used indigenously for preparation of *chaddars*(wraps) for own use by the tribals. Eri silk fabric is a boon for those who practice absolute non-violence and do not use any product obtained by killing any living creature. Eri silk now popularized as "Ahinsa Silk". Now Eri silk is getting popular the world over due to the isothermal properties which make it suitable for eri shawls, jackets and blankets. In India, Eri culture is practiced mainly in the North-Eastern States.

It is also getting popularized in Bihar, West Bengal, Odisa, Uttar Pradesh and Andhra Pradesh.

Eri silk is suitable for knit products, under wears, kids wear, denim and other fashion garments.

3.1.4. Muga

This golden yellow colour silk is prerogative of India and the pride of Assam State. It is obtained from the wild multivoltine silkworm, *Antheraea assamensis*. These silkworms feed on the aromatic leaves of Som and Soalu plants and are reared outdoor on trees similar to that of tasar.

This fabric is one of the world treasures of fine silk fabrics, woven on foot-powered, hand operated looms, which creates a subtle unevenness. The natural shimmery golden colour of this rare, wild silk needs no dye to enhance its exquisite beauty. It is a high value product used in products like sarees, mekhalas, chaddars, etc. Muga culture is specific to the State of Assam and an integral part of the tradition and culture of that State. However, the muga culture is getting popularized to other States like West Bengal, Meghalaya and Nagaland due to the availability of Som and Soalu plants. Muga is now used to replace *zari* in sarees and for surface ornamentation is garments / apparels, etc.

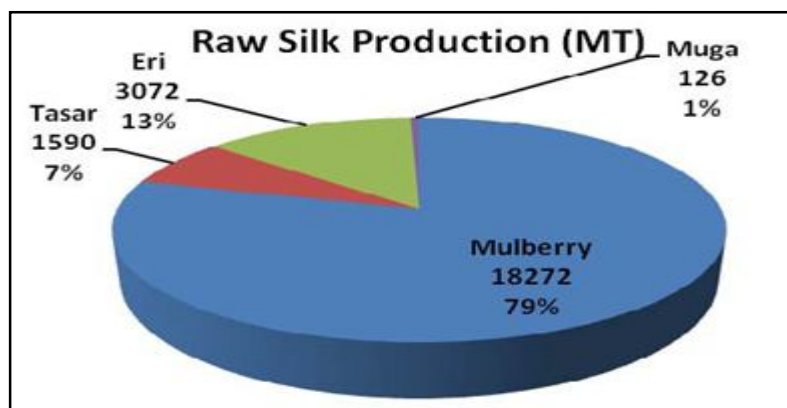


Figure 2: Category wise Raw Silk Production in India (2011-12)
Source: MSFI and FTSI, DGCI&S, Kolkata

The above Figure reveals that Raw silk production of Mulberry 18272MTs (79%), Eri Silk Production was 3072MTs (13%) and remaining 1716MTs (8%) Raw Silk Production of Tasar and Muga.

3.2. Silk Production Process

Mulberry Silk Production Process is schematically presented in below

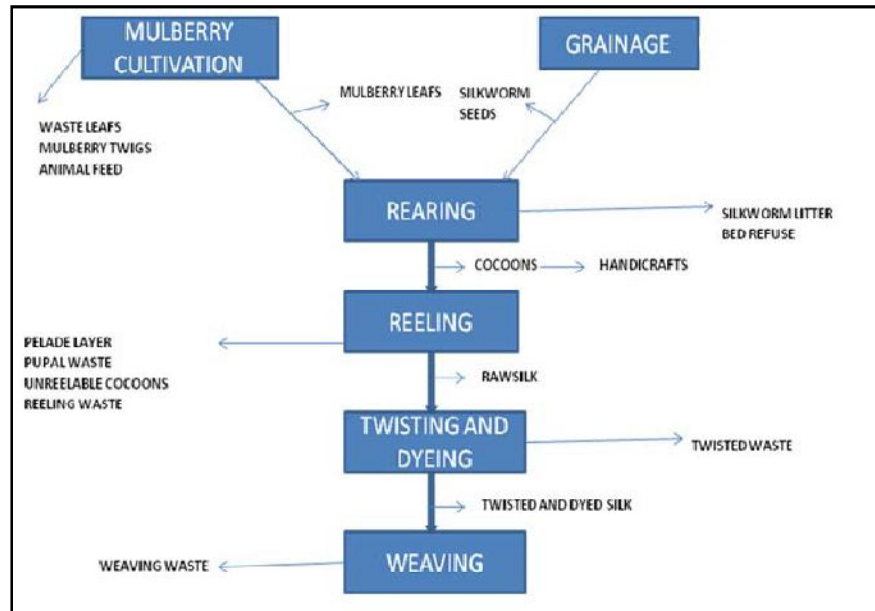


Figure 3: Mulberry Silk Production Process
 Source: MSFI and FTSI, DGCI&S, Kolkata

The stages of silk production are as follows

1. Sericulture is the cultivation of cocoons for their filaments.
2. Breeding of silkworm occurs once in a year but under scientific conditions, they may hatch three times a year.
3. The female moth lays around 350 to 400 eggs and the moths die soon after. As they are subject to hereditary infection, the eggs from infected moths are destroyed which results into production of fine silk. Larvae of about 3mm are hatched from the eggs.
4. For about 20 to 30 days, they are carefully nurtured and are fed five times a day on chopped mulberry leaves.
5. The caterpillar have small openings under their jaws called spinnerets through which they secrete a protein like substance. This substance solidifies when it comes in contact with air and the filament, thus formed is spun around the silkworm in the figure resembling the digit 8. In three days the cocoon gets completed, which is about a peanut shell's size. The filament is held together by sericin or silk gum.
6. The life of the worm is ended by the process of 'stoving' or 'stifling' in which the cocoons are heated. Some of the cocoons are preserved so that the pupa inside them develop into moths for further breeding.
7. Cocoons are sorted based on their color, size, shape and texture. Then they are immersed in hot and cold water to soften the sericin so that filament could be unwound into one continuous thread.
8. The raw silk is unwound from cocoons and is collected into skeins in the factories known as Filature. Three to ten filaments are together reeled for producing the desired diameter of raw silk thread.

Year	Quantity(MT)	Trend
2006-07	18475	100
2007-08	18320	99
2008-09	18370	99
2009-10	19690	107
2010-11	20410	111
2011-12	23060	123

Table 1: Raw Silk Production in India

Note: Figures of India is for financial year from April to March next year

Source: Compiled from website of International Sericulture Commission updated as on August 2012.

The above table reveals that in the year 2007-08 the production of silk was 18320MTs. For the year 2011-12 the production has been increased to 23060MTs and the trend percent also has increased during the period.

The following Figure shows the raw silk production in India diagrammatically,

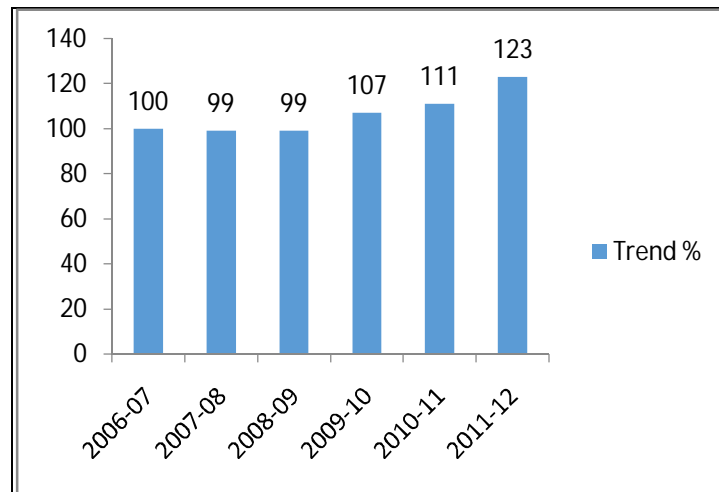


Figure 4: Raw Silk Production in India

3.3. State Wise Silk Production in India

In India, several states like Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal, and Jammu and Kashmir produce silk these states contribute more for the total production of silk in the country. The following pages analyse the production of silk made by these states.

Year	Quantity(MT)	Trend
2006-07	7883	100
2007-08	8240	105
2008-09	7238	92
2009-10	7360	93
2010-11	7338	93
2011-12	7796	99

Table 2: Silk Production in Karnataka

Source: Compiled from State Department of Sericulture of All States

The above table reveals that in the year 2008-09 the production was 7238MTs. For the year 2007-08 the production has been increased to 8240MTs and trend per cent also has increased during the period.

The following Figure shows the raw silk production in Karnataka diagrammatically

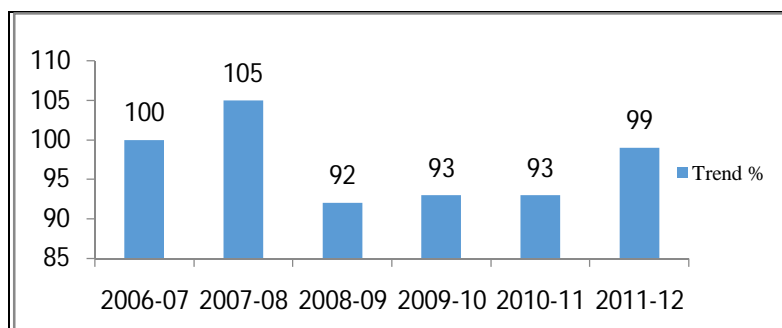


Figure 5: Silk Production in Karnataka

Year	Quantity(MT)	Trend
2006-07	1125	100
2007-08	1368	122
2008-09	1411	125
2009-10	1233	110
2010-11	1182	105
2011-12	1418	126

Table 3: Silk Production in Tamil Nadu

Source: Compiled from State Department of Sericulture of All States

The above table reveals that in the year 2010-11 the production of silk was 1182MTs. For the year 2011-12 the production has been increased to 1418MTs and trend per cent also has increased during the period.

The following Figure shows the raw silk production in Tamil Nadu diagrammatically,

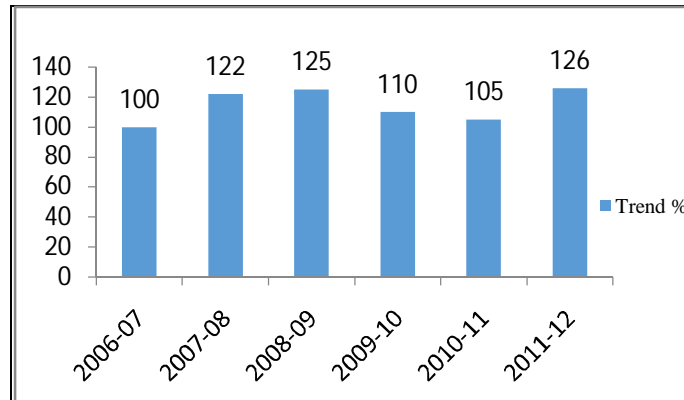


Figure 6: Silk Production in Tamil Nadu

Year	Quantity(MT)	Trend
2006-07	5556	100
2007-08	4497	81
2008-09	4512	81
2009-10	5137	93
2010-11	5170	93
2011-12	6454	116

Table 4: Silk Production in Andhra Pradesh

Source: Compiled from State Department of Sericulture of All States

The above table reveals that in the year 2007-08 and 2008-09 the production was 4497MTs and 4512MT. For the subsequent three years the silk production has been increased and trend per cent also has increased during the period.

The following Figure shows the raw silk production in Andhra Pradesh diagrammatically,

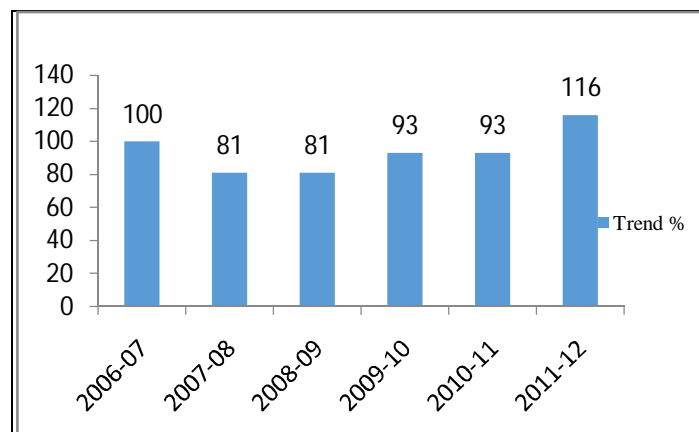


Figure 7: Silk Production in Andhra Pradesh

Year	Quantity(MT)	Trend
2006-07	1633	100
2007-08	1700	104
2008-09	1852	113
2009-10	1915	117
2010-11	1935	119
2011-12	1980	121

Table 5: Silk Production in West Bengal:

Source: Compiled from State Department of Sericulture of All States

The above table reveals that in the year 2007-08 the silk production was 1700MTs. For the year 2011-12 the production has been increased to 1980MTs and trend per cent also has increased during the period.

The following Figure shows the raw silk production in West Bengal diagrammatically,

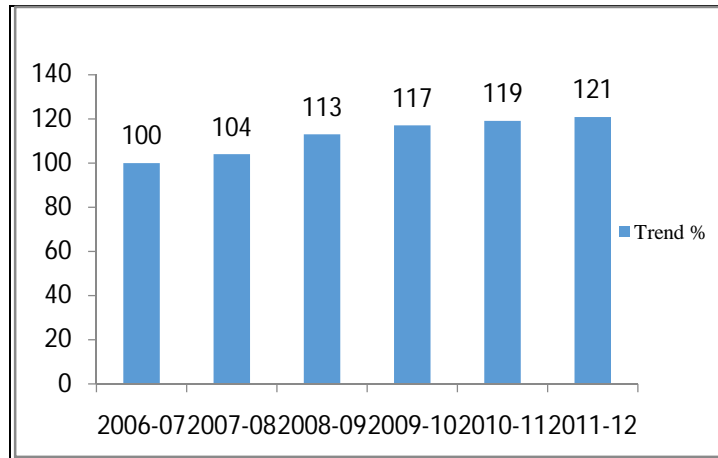


Figure 8: Silk Production in West Bengal:

Year	Quantity(MT)	Trend
2006-07	102	100
2007-08	105	103
2008-09	102	100
2009-10	111	109
2010-11	120	118
2011-12	133	130

Table 6: Silk Production in Jammu & Kashmir:

Source: Compiled from State Department of Sericulture of All States

The above table reveals that in the year 2008-09 the silk production was 102MTs. For the year 2011-12 the production has been increased to 120 MTs and trend per cent also has increased during the period.

The following Figure shows the raw silk production in Jammu & Kashmir diagrammatically,

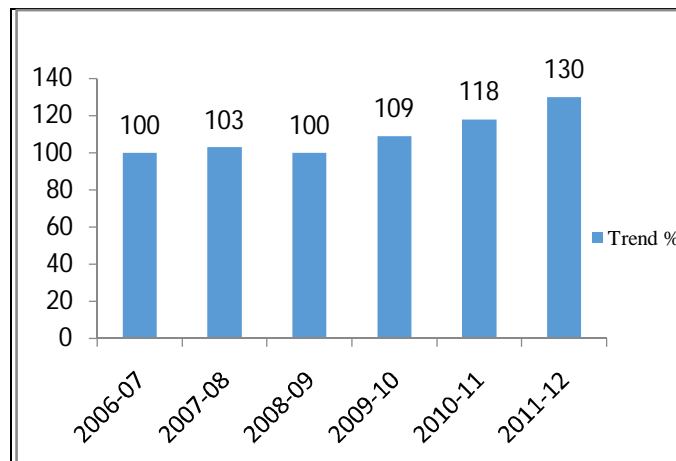


Figure 9: Silk Production in Jammu & Kashmir

3.4. State Wise Silk Production in India

An attempt is made to analyze the silk production of different states in India. Namely, Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal and Jammu & Kashmir. Tools like mean, Standard deviation and Co-Variance has been calculated to draw a meaning full conclusion.

3.5. Mean

The mean is used to measure the central tendency with regard to various aspects. The formula for calculating central tendency is as follows,

$$\text{Mean} = \frac{\sum X}{N}$$

3.6. Standard Deviation

To know how for the annual production of silk industries fluctuate from their mean perception (Central tendency). The standard deviation is calculated using the following formula;

$$\text{Standard deviation } \sigma = \sqrt{\frac{\sum x^2}{N}}$$

3.7. Co-Variance

To find out the consistency of silk production of India over the period of time Co-Variance is given below,
Co-Variance = Standard Deviation / Mean

3.8. State Wise Annual Production of Silk in India

3.8.1. Karnataka

Year	Quantity(MT)	X ²
2006-07	7883	62141689
2007-08	8240	67897600
2008-09	7238	52388644
2009-10	7360	54169600
2010-11	7338	53846244
2011-12	7796	60777616
	∑X = 45855	∑X² = 351221393

Table 7

Mean value = 7642.5

Standard deviation = 7650.94

Co-Variance = 100.11%

- Total production of silk in Karnataka is 45855 MT, then Mean value is 7642.5, Standard deviation value is 7650.94 and co-variance value is 100.11%.

3.8.2. Tamil Nadu

Year	Quantity(MT)	X ²
2006-07	1125	1265625
2007-08	1368	1871424
2008-09	1411	1990921
2009-10	1233	1520289
2010-11	1182	1397124
2011-12	1418	2010724
	∑X = 7737	∑X² = 10056107

Table 8

Mean value = 1289.5

Standard deviation = 1294.61

Co-Variance = 100.39%

- Total production of silk in Tamil Nadu is 7737 MT, then Mean value is 1289.5, Standard deviation value is 1294.61, and co-variance value is 100.39%.

3.8.3. Andhra Pradesh

Year	Quantity(MT)	X ²
2006-07	5556	30869136
2007-08	4497	20223009
2008-09	4512	20358144
2009-10	5137	26388769
2010-11	5170	26728900
2011-12	6454	41654116
	$\Sigma X = 31326$	$\Sigma X^2 = 166222074$

Table 9

Mean value=5221

Standard deviation=5263.43

Co-Variance=100.81%

- Total production of silk in Andhra Pradesh is 31326 MT, then Mean value is 5221, Standard deviation value is 5263.43, and co- variance value is100.8

3.8.4. West Bengal

Year	Quantity(MT)	X ²
2006-07	1633	2666689
2007-08	1700	2890000
2008-09	1852	3429904
2009-10	1915	3667225
2010-11	1935	3744225
2011-12	1980	3920400
	$\Sigma X = 11015$	$\Sigma X^2 = 20318443$

Table 10

Mean value=1835.83

Standard deviation=1840.22

Co-Variance=100.24%

- Total production of silk in West Bengal is 5855 MT, then Mean value is 1835.83, Standard deviation value is1840.22 and co- variance value is 100.24%.

3.8.5. Jammu & Kashmir

Year	Quantity(MT)	X ²
2006-07	102	10404
2007-08	105	11095
2008-09	102	10404
2009-10	111	12321
2010-11	120	14400
2011-12	133	17689
	$\Sigma X = 673$	$\Sigma X^2 = 76313$

Table 11

Mean value=112.16

Standard deviation=112.78

Co-Variance=99.86

- Total production of silk in Jammu& Kashmir is 673 MT, then Mean value is 112.16, Standard deviation value is 112.78, and co- variance value is 99.86%.

3.9. State Wise Silk Production in India-Consolidated

Year	Karnataka Quantity (MTs)	Tamil Nadu Quantity (MTs)	Andhra Pradesh Quantity (MTs)	West Bengal Quantity (MTs)	Jammu & Kashmir Quantity (MTs)
2006-07	7883	1125	5556	1633	102
2007-08	8240	1368	4497	1700	105
2008-09	7238	1411	4512	1852	102
2009-10	7360	1233	5137	1915	111
2010-11	7338	1182	5170	1935	120
2011-12	7796	1418	6454	1980	133
Mean	7642.5	1289.5	5221	1835.83	112.16
Standard deviation	7650.94	1294.61	5263.43	1840.22	112.78
Co-variance	100.11%	100.39%	100.81%	100.24%	99.86%

Table 12

Source: Compiled from website of International Sericulture Commission updated as on August 2012.

The above table shows the production of silk-state wise-consolidated. It was found that among different states, Karnataka ranks first, followed by Andhra Pradesh, West Bengal, Tamil Nadu and Jammu & Kashmir.

The mean score and standard deviation also has been calculated to show the net result. The mean score and standard deviation show that among the several states in India, Karnataka state ranks first in silk production in the country.

4. Findings

- The production of silk in India for the year 2007-08 was 18320MTs. For the year 2011-12 the production has been increased to 23060MTs and the trend per cent also increased during the period. Hence, it is found that there is a steady growth in production of silk in India.
- The raw silk production of Karnataka in the year 2008-09 was 7238MTs. For the year 2007-08 the production has been increased to 8240MTs and the trend per cent also has increased during the period.
- The production of silk in Tamil Nadu in the year 2010-11 was 1182MTs. For the year 2011-12 the production has been increased to 1418MTs and the trend per cent also has increased during the period.
- The production of silk in Andhra Pradesh in the year 2007-08 was 4497MTs. For the year 2008-09 the production has been increased to 4512MTs. And the trend per cent also has increased during the period.
- The production of silk in West Bengal in the year 2007-08 the silk production was 1700MTs. For the year 2011-12 the production has been increased to 1980MTs and the trend per cent also has increased during the period.
- The production of silk in Jammu & Kashmir in the year 2008-09 the silk production was 102MTs. For the year 2011-12 the production has been increased to 120MTs and the trend per cent also has increased during the period.
- It was found that among the five states in India, Karnataka (7642.5) state ranks first in the production of silk followed by Andhra Pradesh(5221), West Bengal(1835.83), Tamil Nadu (1289.5) and Jammu & Kashmir(112.16), as shown by the mean score.
- It was found that among the five states in India, Jammu & Kashmir ranks first in the consistency of silk production as it shows as 99.86%. Karnataka ranks second in the consistency of silk production as it shows 100.11%, as shown by Co-variance.

5. Conclusions

Developing countries like India have still to rely very largely on the agriculture sector for economic development, which has occupied a vital place in the development, which has occupied a vital place in the development strategies of India. However, in recent years Indian agriculture is on the threshold of a stage of development characterized by a shift from static technology to modern technology. Sericulture is best suited to a country like India, where manpower and land resources are in surplus. It generates direct and indirect employment in various ways. By creating more employment opportunities in rural, urban and semi-urban areas, it not only arrests rural migration, but also promotes a series of cottage and small scale industries. 'Silk', the final product of the sericulture enterprise, has very good associations with customs and traditions of the people living all over the world. Further, with improvement in the economic conditions of the people, the demand for silk is also increasing within the county and abroad.

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