An Economic Analysis of Growth in Trends of Area, Production and Yield of Sericulture Cultivation In Karnataka

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Abstract

The present study investigates the trends in the growth of area, production, and productivity of sericulture cultivation in Karnataka state. Sericulture cultivation involves the cultivation of silk through the production of mulberry and the rearing of silkworms, primarily Bombyx mori, to obtain silk cocoons, which are subsequently processed into raw silk. It is a labour-intensive, agro-based activity that plays a vital role in supporting rural livelihoods. Karnataka is the largest producer of silk in India, accounting for approximately 50 - 55% of the nation's total silk production. Sericulture, as an agro-based industry, plays a significant role in the rural economy, with mulberry cultivation covering nearly 1.2 - 1.4 lakh hectares. The sector supports rural livelihoods by providing regular employment opportunities, particularly in rainfed and marginal areas where alternative crops are often less remunerative. The study is mainly based on two objectives: (i) to examine the growth and development of sericulture cultivation in Karnataka; and (ii) to analyze the trends in the growth of area, production, and productivity of sericulture cultivation in the state. The study adopts a research methodology based on secondary data collected for the period from 2015 to 2023. As per the result, the correlation coefficient of 0.8319 indicates a very strong relationship. As the government and farmers increase the area under mulberry cultivation, the production of raw silk follows a significant upward trajectory. With a *P-value* of 0.0054, the result is highly significant. This means there is less than a 1% probability that this relationship is due to random chance.

Keywords: Sericulture; Area; Production; Yield; Trendline Growth; Correlation.

Introduction

Sericulture is a cornerstone of Karnataka's rural economy, generating sustainable income and employment, particularly small/marginal farmers and women. Contributing significantly to India's total silk production, Karnataka's silk industry (mainly mulberry) drives rural development, provides continuous year-long employment, and boosts both local and state-level income through commercial, labor-intensive, and eco-friendly practices.

As India's leading silk producer, the state sustains livelihoods for over 10.67 lakh people through mulberry cultivation and cocoon production, with women comprising over 60% of the workforce. Beyond its social significance, sericulture contributes substantially to the textile sector and overall economic development. Karnataka occupies a prominent position in India's sericulture sector and is the largest producer of silk in the country, contributing nearly 50–55 percent of the total national silk output. Mulberry cultivation in the state covers about 1.2–1.4 lakh hectares, providing a stable source of income and regular employment to rural households. The industry is especially significant in rainfed and marginal areas, where alternative agricultural activities are often less profitable. Moreover, Karnataka's high-quality mulberry silk yarns and fabrics enjoy strong demand in international markets

such as Europe, Japan, and the United States, thereby contributing to foreign exchange earnings and strengthening the state's textile economy.

Objectives of the Study

1. To examine the role and development of sericulture cultivation in Karnataka; and
2. To analyze the growth in trends of area, production, and productivity of sericulture cultivation in the state.

Hypothesis

1. There is a significant linear relationship between the area under cultivation and cocoon production in Karnataka.

Materials and Methods

The study is mainly based on secondary sources of data. The data has been collected from various reports of Karnataka Government- sericulture department reports, Economic survey of Karnataka, Directorate of Economic and Statistics, Department of Agriculture, Silk Board of India and Karnataka, scholarly journals, newspapers, sericulture relevant websites, etc.

Statistical Tools: The study employed a combination of descriptive and analytical statistical techniques to examine the growth, trends, and relationships in the area, production, and yield of sericulture cultivation in Karnataka. The primary tools used include percentage analysis, Compound Annual Growth Rate (CAGR) to quantify annual growth trends, and correlation analysis to assess the relationships between variables such as area, production, and yield. All analyses were conducted using SPSS 21 and Gretl software, ensuring both accuracy and robustness in the statistical interpretation.

Role of Sericulture Farming in Karnataka

Sericulture farming plays a vital role in the agricultural and industrial economy of Karnataka. As an agro-based and labor-intensive activity, it provides substantial employment opportunities in rural areas, particularly to small and marginal farmers, landless laborers, and women. The year-round nature of sericulture operations—such as mulberry cultivation, silkworm rearing, cocoon production and silk reeling—ensures a steady source of income and reduces seasonal unemployment in the agricultural sector. Sericulture is especially important in rainfed and drought-prone regions of Karnataka, where traditional crops often yield low returns. Mulberry cultivation requires comparatively less land and can be practiced efficiently on marginal soils, making it a viable and profitable alternative for farmers. The integration of sericulture with other agricultural activities enhances farm diversification and contributes to income stability.

In addition to its rural livelihood benefits, sericulture significantly supports the state's textile and industrial sectors. Karnataka is the leading silk-producing state in India, contributing nearly half of the country's total silk output. The production of high-quality mulberry silk has established Karnataka as a key supplier in both domestic and international markets. Silk exports from the state generate foreign exchange earnings and strengthen India's position in the global silk trade.

Results and Discussion

Growth Rates and Trends in Area, Production and Yield of Sericulture Cultivation in Karnataka

Sericulture is one of the major employment generating sectors in the State and its growth has immense employment generation potential, particularly in rural Karnataka. Ramanagara and Shidlaghatta are known as the largest cocoon markets in Asia. Karnataka is the top producer of mulberry raw silk in India, contributing a significant share of national silk output and often producing over 40 % of the country's raw silk. Sericulture includes mulberry cultivation, silkworm rearing, and cocoon and raw silk production as integrated farm-based activities. Sericulture is a major rural employment generator in Karnataka. It provides regular work for sericulturists and reelers (farmers plus

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silk processing workers). It offers subsidiary income alongside agriculture, valuable in years of crop risk. While historically concentrated in Kolar, Mandya, Mysore, Bangalore Rural, and Tumkur, sericulture has now spread widely, with activity in districts like Belagavi, where mulberry cultivation and cocoon production are also increasing.

The area under mulberry cultivation expanded to 1.18 lakh hectares in 2024-25, which is the largest area under sericulture in the state in 15 years. The raw silk production for the preceding year (2023-24) was 12,463 MT, accounting for around 42% of the country's total mulberry raw silk production. The state is the largest producer of mulberry silk in the country. As of 2024–25, mulberry is cultivated on about 1.2 lakh hectares across Karnataka. Cocoon production was approximately 93,624 tonnes, and raw silk output reached around 13,278 tonnes, showing continuous year-on-year growth. Raw silk production improved from 11,823 tonnes (2022–23), 12,463 tonnes (2023–24), and 13,276 tonnes (2024–25).

Through this study, Karnataka continues to be the "Silk Hub" of India, contributing approximately 32%–33% of the country's total raw silk production. Between 2015 and 2024, the sector saw a transition from traditional high-volume cultivation to a focus on high-yield Bivoltine silk to compete with international standards. The following table represents the estimated trends in mulberry area (hectares), cocoon production (metric tonnes), and raw silk production of sericulture cultivation based on reports from the Central Silk Board and the Department of Sericulture, Karnataka during from 2015-16 to 2023-24.

Table- 1: Trends in in Area, Production and Yield of Sericulture Cultivation in Karnataka (2015 to 2023)

Year	Mulberry Area (Hectares)	Raw Silk Production (Metric Tonnes)	Avg. Yield (Raw Silk kg/ha)
2015-16	82,350	9,820	119.2
2016-17	88,410	9,571	108.3
2017-18	93,640	10,750	114.8
2018-19	1,02,450	11,592	113.1
2019-20	1,05,076	11,290	107.4
2020-21	1,07,600	10,250	95.3
2021-22	1,12,350	11,292	100.5
2022-23	1,15,400	11,812	102.4
2023-24	1,18,500	12,050	101.7

Source: Various Reports of Sericulture Department, Economic Survey of Economics – 2015 to 2023-24.

The above table data show a clear expansion of mulberry cultivation area in Karnataka from 82,350 hectares in 2015–16 to 1,18,500 hectares in 2023–24, reflecting sustained policy support and farmer adoption of sericulture as a viable livelihood. However, the increase in raw silk production, from 9,820 to 12,050 MTs during the same period, has been relatively modest compared to area growth. This indicates that production growth has been driven mainly by area expansion rather than productivity improvements. Average yield exhibits a declining and fluctuating trend over the years. Yield was highest in 2015–16 (119.2 kg/ha) and gradually declined, reaching a low of 95.3 kg/ha in 2020–21, largely due to disruptions caused by the COVID-19 pandemic, including labour shortages, market instability, and reduced rearing cycles. Although yields improved slightly in the post-pandemic period, they have not returned to earlier levels, remaining close to 100–102 kg/ha by 2023–24.

The Compound Annual Growth Rate (CAGR) provides a smoothed annual growth rate for the sericulture sector in Karnataka, helping to filter out the year-to-year volatility caused by climate and market price shifts. The calculated over the period from 2015-16 to 2023-24, the growth rates reflect a sector that is expanding its physical footprint while also undergoing a significant quality transition.

<p align="center">**Table –2 Growth Rates for Sericulture Cultivation in Karnataka (2015–2023)**</p>

| Indicators	CAGR (%)	Trend Slope	R2 (Reliability)
Mulberry Area (Ha)	**4.65%**	+4,469 Ha/yr	0.971 (Very High)
Production (MTs)	**2.59%**	+256 MT/yr	0.626 (Moderate)
Avg. Yield (kg/ha)	**-1.97%**	-2.23 kg/ha/yr	0.628 (Moderate)

Source: Complied Researcher

As per the table, it indicates that every year, on average, roughly 4.65% more land was added to mulberry cultivation. The production is growing (2.59%), but at a slower rate than the land area. The negative CAGR in yield (-1.97%) doesn't mean the industry is failing; rather, it reflects three specific structural shifts.

Trendline Analysis for Growth Rates of Sericulture Cultivation

The trend lines clearly indicate differing growth patterns among the mulberry area, raw silk production, and yield. The Mulberry area exhibits a strong and consistent upward trend throughout the period, confirming the continuous expansion of sericulture cultivation in Karnataka. Based on the data for Karnataka's sericulture sector from 2015 to 2023, the following trendline results present the three key performance indicators.

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Trend of Sericulture Yield in Karnataka (2015-2024)
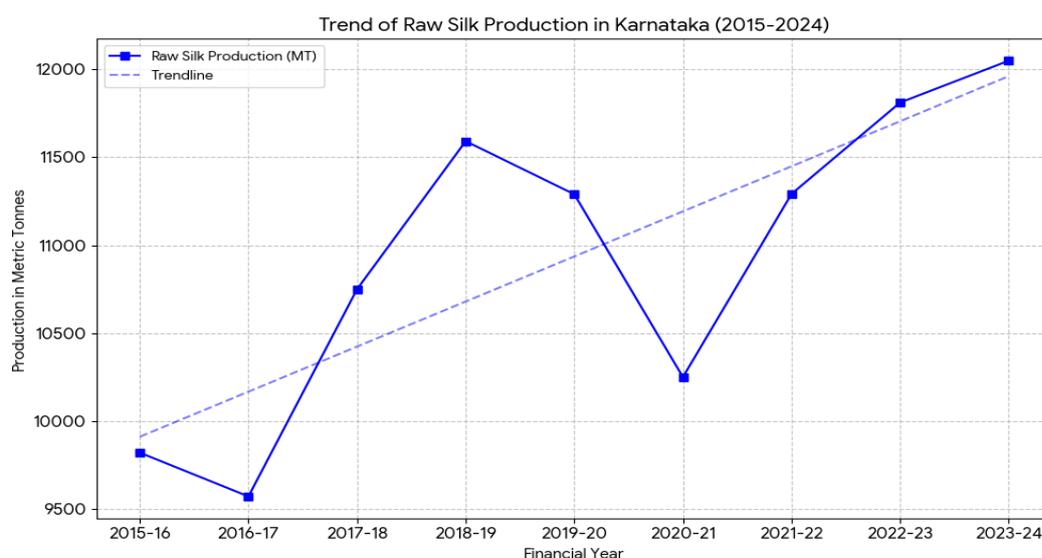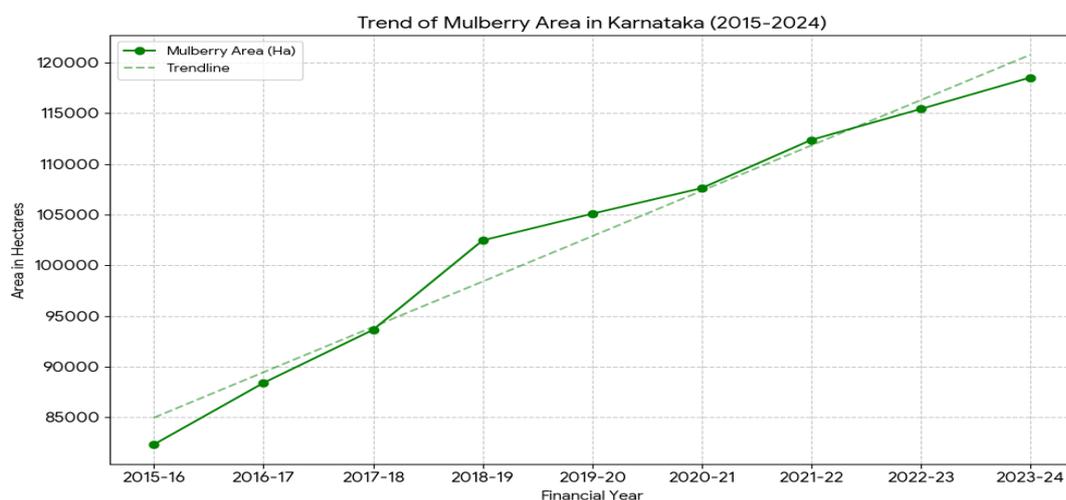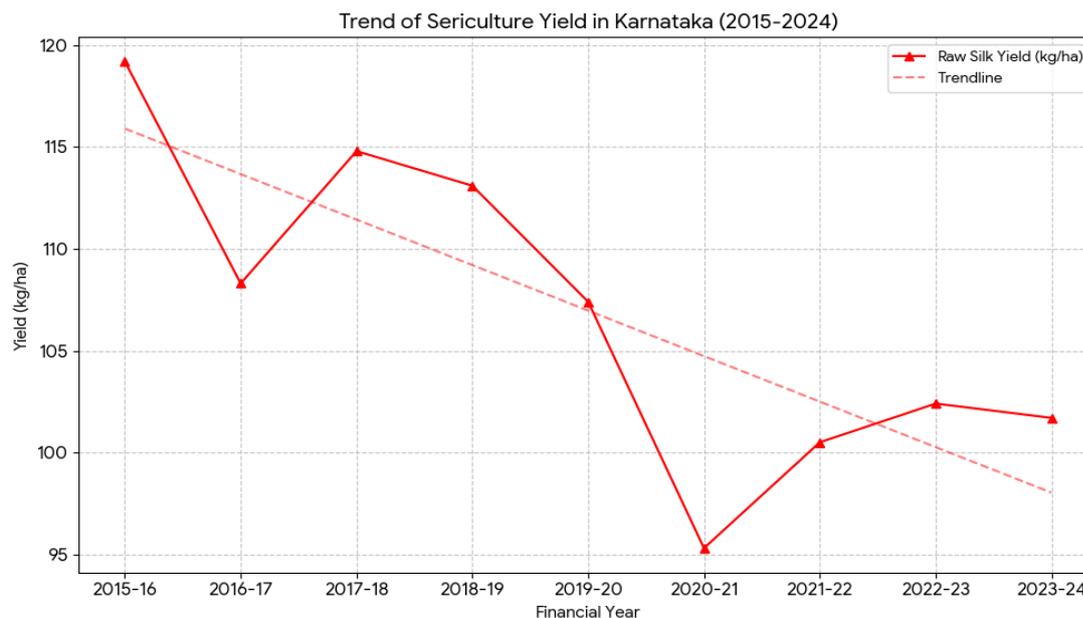
As per the graph, to provide a comprehensive Trendline Analysis, we use linear regression *(y = mx + c)* to identify the underlying direction of the sericulture industry in Karnataka. The R^2 value (Coefficient of Determination) indicates how well the trendline fits the actual data (1.00 is a perfect fit).

Mulberry Area Analysis- The Expansion Trend: The estimated trendline equation for mulberry area under cultivation is $y = 4469.0x + 84650.7$, with a coefficient of determination (R^2) of 0.97, indicating a very high degree of reliability and an almost perfect linear relationship over time. The positive slope of 4,469 suggests that Karnataka has consistently added approximately 4,469 hectares of mulberry cultivation annually since 2015, reflecting sustained farmer confidence and the effective implementation of government-led sericulture expansion programmes across new districts.

Raw Silk Production Analysis (The Growth Trend): The trendline equation for raw silk production is $y = 256.4x + 9851.3$, with an R^2 value of 0.63, indicating a moderate level of reliability and a positive long-term growth trend. The slope suggests that raw silk production in Karnataka has increased at an average rate of approximately 256 MTs per year during the study period. However, the relatively lower R^2 value reflects the inherent volatility of biological production systems, which are highly sensitive to climatic and socio-economic disturbances.

Raw Silk Yield Analysis (The Efficiency Trend): The trendline equation for raw silk yield is $y = -2.2x + 116.1$, with an R^2 value of 0.63, indicating a moderate negative correlation between time and productivity. The negative slope of -2.2 is a critical indicator, suggesting that the average raw silk yield has declined by approximately 2.2 kg per hectare per year over the study period.

Testing Hypothesis

H0: There is no significant linear relationship between the area under cultivation and production in Karnataka.

H1: There is a significant linear relationship between the area under cultivation and production in Karnataka.

Table-3 Statistical Summary

S. No	Statistic	Value	Interpretation
1	Correlation Coefficient (r)	0.8319	Strong Positive Correlation
2	Coefficient of Determination (R^2)	0.6921	69.2% of production change is explained by area.
3	P-Value	0.0054	Statistically Significant ($p < 0.01$)
4	Mean Mulberry Area (Ha)	102,864	Average acreage over 9 years
5	Mean Production (MTs)	10,936	Average annual raw silk output
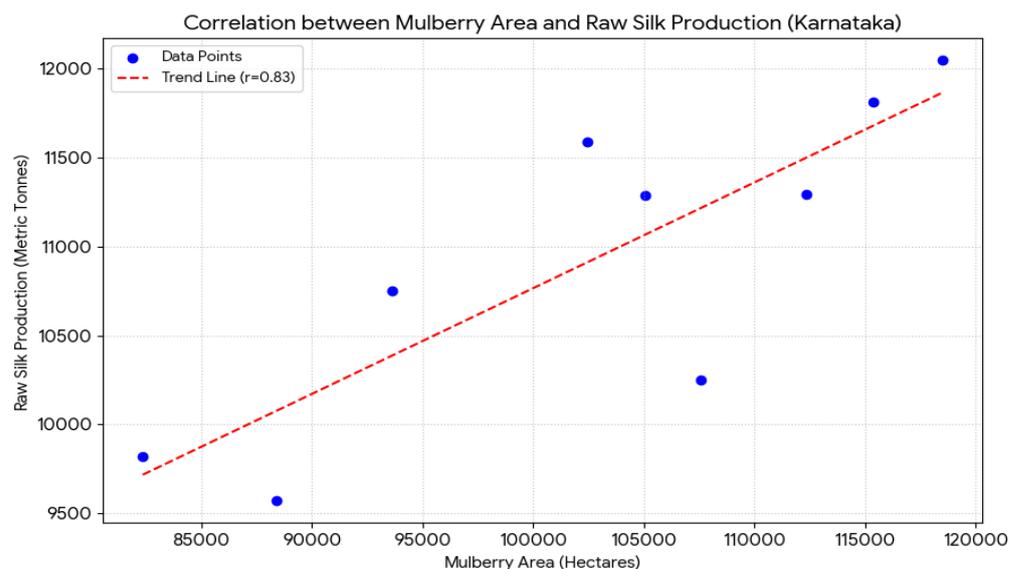
Correlation between Mulberry Area and Raw Silk Production (Karnataka)

The correlation coefficient of 0.8319 indicates a very strong relationship. As the government and farmers increase the area under mulberry cultivation, the production of raw silk follows a significant upward trajectory. The correlation of 0.83 indicates a very strong link between the land under cultivation and the final silk output. With a P-value of 0.0054, the result is highly significant. This means there is less than a 1% probability that this relationship is due to random chance. We can confidently reject the null hypothesis that there is no relationship. While the correlation is high, it is not a perfect 1.0. This is because approximately 30% of the variation in production is influenced by factors other than land area, such as Climate Variations, rainfall, technological shifts, and management practices. The analysis confirms a significant linear relationship. Expansion of the mulberry area remains the most reliable predictor and driver of silk production growth in Karnataka.

Conclusion

In Karnataka, sericulture sector continues to grow in both production and support systems and remains central to India's silk output. Strategic government investment, rising cocoons prices, improved technologies, and broader cultivation areas help propel the sector forward though pest pressures, cost challenges, and localized declines require ongoing attention to sustain and expand growth. Overall, Karnataka continues to maintain its position as the leading state in mulberry silk production in India**,** with sustained growth driven by both area expansion and productivity improvement. However, challenges such as pest management, input costs, and market fluctuations remain important factors that require attention to ensure long-term sustainability and higher returns for sericulture farmers.

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