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COMPARATIVE TREND ANALYSIS AND FORECASTING OF COCONUT PRODUCTION IN KERALA AND KARNATAKA: EMERGING REGIONAL DYNAMICS IN INDIA'S COCONUT ECONOMY

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ABSTRACT

Coconut, frequently esteemed as the "Tree of Life," holds a crucial socio-economic and cultural significance in India's agricultural framework, especially in Kerala and Karnataka. This study conducts a comparative analysis of coconut production patterns in two main producing states from 2016–17 to 2023–24, employing statistical forecasting via linear trend analysis to project output till 2029–30. The results indicate a troubling decrease in Kerala's output trajectory, linked to structural issues, including aged plantations, climate susceptibility, and stagnating technological advancement. Karnataka exhibits a slow recovery and an upward trajectory, indicating adaptive agricultural practices and effective policy initiatives. The study incorporates a comprehensive evaluation of existing literature, empirical data analysis, and predictive models to emphasise evolving regional trends in coconut production. Karnataka is expected to exceed Kerala in coconut production by 2029–30. These observations emphasise Kerala's need to rejuvenate its coconut industry via focused replantation, innovation, and policies centred on farmers, while Karnataka's experience illustrates the transformative capacity of sustainable agricultural practices. The report advocates for targeted initiatives to enhance the resilience and competitiveness of India's coconut economy in a globalised context.

KEYWORDS: *Coconut Production, Trend Analysis, Forecasting, Regional Agricultural Dynamics*

INTRODUCTION

The coconut (Cocos nucifera), considered the "Tree of Life" or "Kalpavriksha," possesses significant cultural, economic, and agricultural value in tropical areas. Coconut, indigenous to the Malesia biogeographical region encompassing Southeast Asia, Indonesia, and the Pacific Islands, is deeply integrated into India's religious, social, and economic framework. Archaeological and historical documentation underscores its enduring existence, referencing Sanskrit texts, epics such as the Mahabharata and Ramayana, and early Tamil Sangam literature. The coconut palm possesses utility in every aspect, serving purposes in food, medicine, coir, fuel, and construction materials, thereby establishing it as one of the most diverse and sustainable crops.

India is among the foremost global producers of coconut, with extensive production concentrated in the southern states. Kerala is intrinsically linked to coconut production because its name originates from "Kera," which translates to coconut. The state's agricultural economy relies significantly on coconut cultivation, impacting the livelihoods of millions. Coconut production in Kerala is integral to its culture and cuisine, with applications including coconut oil, copra, coir, and tender coconut water. Despite obstacles in recent decades, including diminishing productivity, price instability, and climate concerns, Kerala remains integral to India's coconut sector, bolstered by its traditional agricultural practices and cultural veneration for the palm.

LITERATURE REVIEW

Lathika, M., & Ajith Kumar, C. E. (2005) studied growth trends in the area, production, and productivity of coconuts in India. Coconuts in India have a recorded history of around three thousand years and are recognised as a smallholder's crop. Approximately 10 million individuals in the nation are involved in coconut production, processing, marketing, and trade-related industries. It is the most abundant source of edible vegetable oil, yielding 65 per cent of the kernel weight, and contributes around 6 per cent to India's edible oil supply. This crop is the sole representative of lauric oil varieties produced domestically, accounting for approximately 75 per cent of the country's lauric oil supply. This study analyses the growth trends in coconut cultivation area, production, and productivity during the last fifty years. It examines the performance of several States in coconut production and the comparative influence of the area and yields in elucidating the observed production trends.

Narmadha N et al. (2022) studied and analysed the coconut sector's growth performance and volatility within the Indian setting. India, the largest producer of coconuts (22.96 billion nuts), has Kerala, Tamil Nadu, Karnataka, and Andhra Pradesh as the primary states for extensive coconut cultivation and production. These states represent over 90 per cent of national production and contribute approximately 89 per cent of the total acreage designated for coconut cultivation. Data on the area, production, and yield of coconut were obtained from the Coconut Development Board, utilising secondary data from 1985-86 to 2020-21. The study period was segmented into pre-TMC (1985-86 to 2000-01) and post-TMC (2001-02 to 2020-21). The research analyses growth patterns through the compound growth rate, assesses instability using Coppock's instability index, and explores the influence of area and yield on production through decomposition analysis. The findings indicated that the growth in area, production, and productivity for key states in India was positive and statistically significant during Period II (post-TMC period) compared to Period I (pre-TMC period), except the area in Kerala, which decreased by -1.23%. Tamil Nadu and Karnataka exhibited significant coconut production and productivity variability throughout Period II. Decomposition analysis indicates that the area and yield effects significantly influence the overall variation in coconut production across the studied states. However, the area effect in Kerala is detrimental, indicating that the increase in coconut agriculture is essentially minimal for other crops in the state. Therefore, increased focus must be directed towards states to attract and incentivise numerous new farmers to engage in coconut production by utilising current technology, high-quality inputs, marketing strategies, and loan facilities under TMC, with the cooperation of the government, CBD, and stakeholders.

Macro and micro issues are causing unprecedented crises in the Indian coconut sector. Priority study areas include low input usage efficiency and various biotic and abiotic stressors that limit agricultural productivity. Given the skilled workforce shortage, mechanisation is also important. Strengthening value addition is crucial to address low profitability in the sector. After the WTA and ASEAN Treaty regimes, plantation economies were integrated globally, leading to intense competition among producing nations. This study analyses crucial aspects of the coconut economy using proper economic methodologies. The topics covered include trade, global competitiveness, production economics, price analysis, regulatory barriers, and marketing concerns. India is a minor participant in the export market for coconut value-added products with little market share. Since the Coconut Development Board (CDB) was elevated to Export Promotion Council (EPC), the Indian export sector has experienced rapid expansion. The Indian coconut business boasts significant domestic demand, excellent productivity, and robust research and technology delivery channels. Although good, there is a lack of concentrated attempts to exploit potential linkages to improve production and marketing efficiency and enter high-value global chains. A sustainable coconut economy requires integrated growth of farming, industry, and a steady market.

Kumar et al. (2008) researched about Simulating coconut growth. Perennial crop simulation modelling can provide plantation managers with a wealth of information. The InfoCrop-coconut model was developed and applied to coconut (Cocos nucifera L.) growing in tropical and subtropical regions. The general crop model InfoCrop simulates tropical and subtropical annual crops. The InfoCrop-coconut model was calibrated and verified using data from published studies of several physiological, agronomical, and nutritional experiments done in India between 1978 and 2005. Different coconut varietals and water and nutrient regimens were used. From 4 to 6 years, flowering time, leaf production (8-15 leaves/year), and nut yield (3000-27,000 nuts/ha) varied. The genetic coefficients for calibration and validation were derived during 1995–2005 field trials. Statistics were used to evaluate model efficiency and validation. Modelled phenological development, total dry mass and partitioning, and nut yield were comparable to observed values, with a 15% inaccuracy in some circumstances.

Preethi, V. P. et al. (2018) Coconut farming is crucial to Kerala's agrarian economy and sociocultural fabric. It has a significant impact on cropping areas and state agricultural income. This article examines the relative importance of coconut in Kerala's plantation economy by reviewing national and state coconut acreage, output, and productivity developments from 1980 to 2015. Coconut area, production, and productivity increased in India. Kerala's coconut area and output did not rise like India's. However, production increased throughout the same era. Coconut acreage, production, and productivity in India and Kerala were predicted to rise compoundly over the period.

OBJECTIVES

- To analyse the trends in coconut production volume efficiency in Kerala.
- To conduct a comparative analysis of coconut production volume between Kerala and Karnataka.

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DATA ANALYSIS

Table 1 Coconut Production in Kerala

Year	Production (Million nuts)
2016-17	7,448.65
2017-18	8,452.05
2018-19	7,683.55
2019-20	6,980.30
2020-21	6,942.60
2021-22	5,522.66
2022-23	5,628.42
2023-24	5,522.71

Source: Ministry of Agriculture and Farmers Welfare, Government of India

To forecast coconut production in Kerala for the year 2029–30 using the linear trend line method. The trend line is assumed to be of the form Y = a + bX, where Y is the forecasted production, X is the coded time (year), a is the Y-intercept, and b is the slope.
Step 1: Use the linear regression formula:
$Y = a + bX$
Step 2: Compute the necessary summations:
$\sum X = 36$
$\sum Y = 54180.94$
$\sum XY = 235816.86$
$\sum X^2 = 204$
$n = 8$
Step 3: Calculate the slope (b):
$b = [n(\sum XY) - (\sum X)(\sum Y)] / [n(\sum X^2) - (\sum X)^2]$
$b = [8 \times 235816.86 - 36 \times 54180.94] / [8 \times 204 - 36^2]$
$b = (1886534.88 - 1950513.84) / (1632 - 1296)$
$b = -63978.96 / 336 = -190.41$
Step 4: Calculate the intercept (a):
$a = (\sum Y - b\sum X) / n$
$a = (54180.94 + 6854.76) / 8 = 7629.46$
Step 5: Forecast for 2029–30 (X = 14):
$Y = 7629.46 + (-190.41 \times 14) = 7629.46 - 2665.74 = 4963.72$
The forecasted coconut production in Kerala for the year 2029–30 is approximately 4,963.72 million nuts. There is a clear downward trend in coconut production in Kerala, with an average annual decline of about 190 million nuts.

Table 1 Coconut Production in Karnataka

Year	Production (Million nuts)
2016-17	6,773.05
2017-18	6,273.79
2018-19	4,947.74
2019-20	4,300.69
2020-21	4,918.51
2021-22	5,177.63
2022-23	5,949.46
2023-24	6,151.00

Source: Ministry of Agriculture and Farmers Welfare, Government of India

To estimate the future coconut production in Karnataka, a linear trend model of the form $Y = a + bX$ was employed, where Y represents the coconut production in million nuts, X is the coded time variable (with base year 2016 coded as 0), a is the intercept, and b is the slope of the trend line.

The production data considered spanned the period from 2016–17 to 2023–24, with corresponding values (in million nuts) being: 6773.05, 6273.79, 4947.74, 4300.69, 4918.51, 5177.63, 5949.46, and 6151.00. These were coded sequentially as X = 0 through X = 7.

The regression coefficients were computed using the least squares method using this dataset. The required summations were as follows: number of observations (n) = 8, $\Sigma X = 28$, $\Sigma Y = 44491.87$, $\Sigma X^2 = 140$, and $\Sigma XY = 150178.16$. Applying the formulas, the slope was found to be $b = -55.58$ and the intercept $a = 5756.01$. This yields the trend equation:
Y=5756.01−55.58XY = 5756.01 - 55.58XY=5756.01−55.58X
To forecast production for the year 2029–30, the corresponding coded year is $X = 2029 - 2016 = 13$. Substituting into the equation, the predicted production is:

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Y=5756.01−(55.58×13)=5033.47 million nutsY = 5756.01 - (55.58 × 13) = 5033.47 \text{ million nuts}Y=5756.01−(55.58×13)=5033.47 million nuts

Hence, the projected coconut production in Karnataka for the year 2029–30 is approximately 5033.47 million nuts. The negative slope of the trend line indicates a gradual decline in production over the years. This trend may reflect structural issues in the coconut sector, such as declining productivity, adverse climatic conditions, or shifts in cropping patterns. These findings underscore the need for targeted policy interventions, technological improvements, and sustainable agricultural practices to reverse the declining trend and ensure the long-term viability of coconut cultivation in the state.

Table 3 Production in Kerala and Karnataka

Year	Production in Kerala (Million nuts)	Production in Karnataka (Million nuts)
2016-17	7,448.65	6,773.05
2017-18	8,452.05	6,273.79
2018-19	7,683.55	4,947.74
2019-20	6,980.30	4,300.69
2020-21	6,942.60	4,918.51
2021-22	5,522.66	5,177.63
2022-23	5,628.42	5,949.46
2023-24	5,522.71	6,151.00

Source: Ministry of Agriculture and Farmers Welfare, Government of India

The analysis of coconut production in Kerala and Karnataka from 2016-17 to 2023-24 indicates significant disparities in trends and performance. Historically, Kerala is a leading producer and has had a consistent fall, decreasing from 7,448.65 million nuts in 2016-17 to 5,522.71 million in 2023-24. Kerala's peak output occurred in 2017-18, totalling 8,452.05 million nuts, and the nadir was observed in 2023-24. Conversely, while initially lower, Karnataka's production exhibited a variable albeit predominantly upward trajectory. It decreased from 6,773.05 million nuts in 2016-17 to a minimum of 4,300.69 million nuts in 2019-20 but thereafter rebounded, attaining 6,151.00 million nuts in 2023-24. This indicates that while Kerala's production remains stagnant or declines—potentially due to ageing plantations, climatic constraints, or insufficient innovations—Karnataka seems to have implemented superior agricultural practices or received more support, resulting in a comeback. If these trends continue, Karnataka may soon exceed Kerala in total coconut production, indicating a shift in regional agricultural dynamics.

CONCLUSION

The analysis of coconut output trends in Kerala and Karnataka from 2016–17 to 2023–24 indicates a notable change in regional dynamics. Kerala, formerly the preeminent coconut-producing state, has witnessed a persistent decrease in production, reflecting structural issues such as ageing plantations, climate-related constraints, and inadequate technical adaptation. Despite an early decline, Karnataka had a robust recovery and upward trajectory in production, indicating enhanced resilience, superior agricultural practices, and efficient state-level initiatives. The projections for 2029–30 suggest that Karnataka is expected to marginally exceed Kerala in overall coconut production. These patterns underscore the pressing necessity for Kerala to rejuvenate its coconut sector via replanting projects, productivity improvements, and policy assistance. Karnataka's experience simultaneously highlights the potential benefits of deliberate investment in modern agriculture and sustainability. The results necessitate a region-specific, technology-oriented, and farmer-centric strategy to guarantee India's coconut industry's enduring sustainability and competitiveness.

REFERENCES

1. *Ahuja, S., Ahuja, S., & Ahuja, U. (2014). Coconut - History, Uses, and Folklore. Asian Agri-History. http://asianagrihistory.org/vol-18/coconut-18-3.pdf*
2. *Lathika, M., & Ajith Kumar, C. E. (2005). Growth trends in area, production and productivity of coconut in India. Indian Journal of Agricultural Economics, 60(4).*
3. *Narmadha, N., Karunakaran, K. R., Anjugam, M., Palanisamy, N. V., & Vasanthi, R. (2022). An economic analysis on Indian scenario of coconut production: Trends and prospects.*
4. *Jayasekhar, S., Chandran, K. P., Thamban, C., & Muralidharan, K. (2019). Coconut sector in India experiencing a new regime of trade and policy environment: A critical analysis. Journal of Plantation Crops, 47(1), 48-54.*
5. *Kumar, S. N., Bai, K. K., Rajagopal, V., & Aggarwal, P. K. (2008). Simulating coconut growth, development and yield with the InfoCrop-coconut model. Tree physiology, 28(7), 1049-1058.*
6. *Preethi, V. P., Thomas, K. J., & Kuruvila, A. (2018). Performance of coconut in India: A trend analysis. Journal of Tropical Agriculture, 56(2).*
7. *CDB - Statistics. (n.d.). Retrieved June 8, 2025, from https://coconutboard.gov.in/Statistics.aspx*