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COCONUT CULTIVATION IN INDIAN PENINSULAR STATES: ANALYZING PRODUCTION TRENDS, PRICE FLUCTUATIONS, AND ECONOMIC CHALLENGES

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ABSTRACT

Favourable natural factor endowments for coconut cultivation are concentrated in the Southern Peninsular Plateau of India, with four major states - Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu accounting for 89% of the total area and 91% of the total production. The purpose of this study is to analyze the growth and instability in coconut production, examine the components driving production changes, and assess the relative efficiency of area and yield across these states. Secondary data from reliable sources covering the period 2000-2020 was used for the analysis, employing appropriate statistical tools. The findings reveal that, over the last decade (2011-2020), the growth rate of coconut production has declined, except in Kerala. Both area and yield have shown negative trends in Andhra Pradesh, Karnataka (yield rate alone), and Tamil Nadu. Despite this, these states exhibit lower instability indices in terms of area and yield. The major contributors to changes in production are attributed to yield effects, particularly in Andhra Pradesh, Karnataka, and Kerala. This indicates that improvements in yield play a crucial role in driving production growth in these regions, highlighting the need for strategies focused on yield enhancement to sustain coconut production in the future.

Key words: Growth, Instability, Decomposition, Relative efficiency, Wage-price relationship and Minimum Support Price

India boasts abundant natural endowments, with its agro-climatic conditions, soil fertility, topography, and geographical structure providing an ideal environment for the cultivation of a wide range of crops, including coconut. According to the International Coconut Community, India is the third-largest producer of coconut in the world, with approximately 2,199 thousand hectares of land devoted to coconut cultivation in 2022. The Philippines ranks first, with 3,647 thousand hectares, followed by Indonesia, which covers 3,374 thousand hectares during the same period. In terms of production and yield, India holds the top position globally (CACP Reports, 2022). The Southern Peninsular Plateau, comprising the four states of Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu, accounts for 89% of India's total coconut area and 91% of the national production. These states benefit from favourable agro-climatic conditions, including a tropical climate, fertile soil, and coastal belts, which contribute to optimal coconut production.

India, despite being the largest producer of coconut and a leading exporter of copra globally, has experienced a significant decline in coconut production over the last decade (2011-2020), raising concerns about the sustainability of the coconut economy. Meanwhile, India has increasingly turned to the importation of palm oil, a widely used edible oil in food products, detergents, and cosmetics. To address the gap between demand and supply of edible oils, palm oil has been imported from countries like Indonesia, Malaysia, Thailand, and Singapore, initially as a substitute for other oils and later distributed through the public distribution system (PDS) to ensure affordability for the broader population. As a result, palm oil has become a major competitive alternative to domestic oils like coconut oil. Currently, India is the world's leading importer of palm oil, surpassing all other nations in its imports. The import of palm oil has surged dramatically, while India's share of the global coconut oil market remains relatively small. In addition to the growing importation of palm oil, the decline in copra prices has further exacerbated the challenges faced by the coconut economy, requiring urgent policy intervention. In 2022, India imported palm oil worth $11.1 billion. Julie (2020) noted that these palm oils, though imported at higher prices, are subsidized and distributed through the PDS to benefit marginalized communities.

Concerns about the emergence of palm oil imports as a major competitor in the domestic market have been raised for over two decades. The CACP reports from 2003 highlighted the need to 'insulate the coconut economy from the current situation', emphasizing the importance of delinking coconut prices from global

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edible oil markets to stabilize domestic prices. Despite these early warnings, the situation has worsened, with India now emerging as the world's largest importer of palm oil. This has led to significant price competition for domestic oils like coconut, resulting in price instability. The fluctuating prices of copra have become a major concern for coconut growers, as noted in the Price Policy for Copra (CACP, 2022). In light of these challenges, the present study aims to examine various aspects of the coconut economy in India. It focuses on the growth trends in coconut production, the instability index, the effects of area and yield, and the relative efficiencies of the major coconut-producing states- Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu. The study also explores the relationship between copra prices and wage rates, as well as the price disparity between wholesale and minimum support prices in the Indian Peninsular Plateau.

MATERIALS AND METHODS

This study is based on secondary data collected from official sources over two decades, from 2000-2001 to 2020-2021. The data sources include the Coconut Development Board (CDB), a statutory body established under the Ministry of Agriculture and Farmers Welfare, Government of India, as well as the Price Policy for Copra published by the Commission for Agricultural Costs and Prices (CACP) for varying years. The study focuses on four Southern states, Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu, since these states account for 89% of the total coconut acreage and 91% of the total production in India. The key variables analyzed in this study include area, production, productivity, wage rates, minimum support prices, and wholesale prices. Appropriate statistical tools have been employed to draw inferences. Specifically, exponential growth rates, regression analysis, the Cuddy Della Valley Index (CDVI), decomposition analysis, and single input-output data envelopment analysis have been used to derive the results. The study compares two periods: Period I (2001-2010) and Period II (2011-2020). To estimate the growth rate of coconut production, the exponential growth rate model was used, with Microsoft Excel employed for pictorial representation. This method displays the trend line of coconut production, providing a visual indication of the production trends over time. The exponential growth rate is calculated using the formula: $Y = a.e^{bx}$ and $Y_t = c^*(1 + r)$, where Y_t represents the production at time t, and r is the growth rate. This approach is widely used in agricultural research to estimate growth trends. Additionally, compound growth rates (CGR) for area and yield were computed using a semi-log linear regression model. The model involved taking the log values of the data points (area or yield as the dependent variable) and time periods (t_1, t_2, t_3, ..., t_n as independent variables), applying regression to compute the coefficients, and using the anti-logarithms of the coefficients to calculate the CGR in percentage terms. Instability in production can affect price stability, farmers' incomes, and introduce higher risks in farm production (Chand and Raju, 2009). To assess instability, the Cuddy Della Valley Index (CDVI) instability model, developed by Cuddy and Della (1978), was used. This model accommodates the effect of trends in measuring degrees of instability in the data. Many empirical studies (e.g., Rana and Kumar, 2022; Gandhimathy, 2022; Deb and Soumitra, 2015; Deb *et al.*, 1999; Singh and Byerlee, 1990) have employed this method. Other methods for measuring agricultural instability include Hazell's instability model, Coppock's instability index, and the coefficient of variation, but the CDVI method has been widely adopted due to its robustness in providing measurable criteria. The instability index is categorized into three levels: low instability (between 0 and 15), medium instability (greater than 15 but less than 30), and high instability (greater than 30). The CDVI formula is given as: CDVI = CV (%) x , where CV is the coefficient of variation, calculated as the standard deviation divided by the mean, multiplied by 100, and r^2 is the adjusted coefficient of determination.

The major components contributing to changes in coconut production are area, yield, and their interactions. To analyze these changes, decomposition analysis was performed using de-trended values, applying the formula $z_t = a + b_t + e_t$. The changes in production can be attributed to yield effects, area effects, or interaction effects. Decomposition analysis helps to identify and quantify the specific causes of production changes. The formula for decomposition is: $\Delta P = A_0(Y_n - Y_0) + Y_0(A_1 - A_0) + \Delta A * \Delta P$, where $A_0(Y_n - Y_0)$ represents the yield effects, $Y_0(A_1 - A_0)$ captures the area effects, and $\Delta A * \Delta P$ accounts for the interaction effects between area and yield. In addition to decomposition analysis, the study employs Data Envelopment Analysis (DEA) to measure relative efficiency in terms of area and yield. The DEA method was applied to assess the relative efficiency of area and yield across the four major coconut-producing states. Furthermore, the study explores the relationship between wage rates and prices over the period from 2011 to 2022, with a focus on estimating price variations between wholesale prices and minimum support prices (MSP). To quantify the price differences between the wholesale price and the MSP, the following formula was used: Price difference = (a - b) / (a + b) ÷ 2 x 100, where 'a' refers to the wholesale price and 'b' refers to the minimum support price. Microsoft Excel was used to compute these differences and draw inferences based on the data.

RESULTS AND DISCUSSION

Growth of production

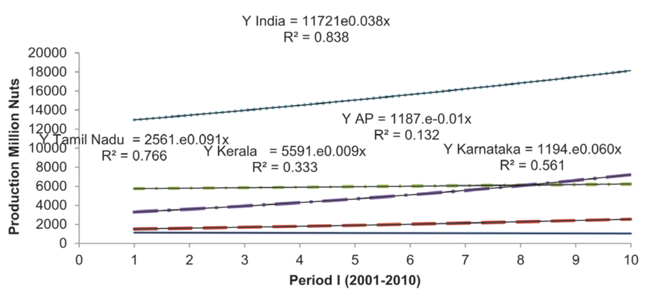
The production of coconut in the four major states has a significant impact on India's total coconut production. Among these major coconut-growing states, Tamil Nadu exhibited the highest growth rate of production, followed by Karnataka, Kerala, and Andhra Pradesh. At the national level, the growth rate of coconut production increased by 3.8 percent from 2000-01 to 2009-2010. During the same period, however, Andhra Pradesh experienced a negative growth rate of -1 percent, while Karnataka grew at 6 percent, Kerala at 0.9 percent, and Tamil Nadu at 9.1 percent. With the exception of Andhra Pradesh, all other states demonstrated positive growth rates in Period I. Fig. 1 below illustrates the trends in the annual growth rates of coconut production across the Indian Peninsular states. The vertical axis represents the production in million nuts, while the horizontal axis shows the time period under review.

In Period II, Andhra Pradesh, Karnataka, and Tamil Nadu all experienced negative growth rates of -2 percent, -2 percent, and -3 percent, respectively. In contrast, Kerala was the only state to show an increase in production, with a growth rate of 3.1 percent. The decline in production rates in these states contributed to an overall decrease in India's total coconut production growth rate, which dropped to -1 percent for the period. Fig. 2 illustrates the growth rates of coconut production during Period II.

When comparing the two time periods, Tamil Nadu experienced a significant shift in its growth rate, falling from +9.1 percent in Period I to -3 percent in Period II, resulting in a notable reduction in cumulative production. Karnataka also saw a decline, with its growth rate dropping from 6 percent in Period I to -2 percent in Period II, leading to an overall reduction of 8 percent in production across both periods. Andhra Pradesh, which had a negative growth rate of -1 percent in Period I, saw a further decline to -2 percent in Period II. In contrast, Kerala was the only state to demonstrate positive growth, increasing its production from 0.9 percent in Period I to 3.1 percent in Period II. As a result, Kerala's production growth helped offset the declines seen in the other states, preventing an even more pronounced reduction in national production. The decline in coconut production can be attributed to two primary factors. First, coconut palms are increasingly vulnerable to insects-pests, and diseases, which negatively affect their growth and yield (CACP, 2022). Second, the growing import of palm oils has created price distortions in the domestic market, affecting the demand for coconut oil. These price distortions, along with the declining production trends, have had a detrimental impact on coconut production, leading to reduced profitability for coconut farmers and further contributing to the overall decline in production.

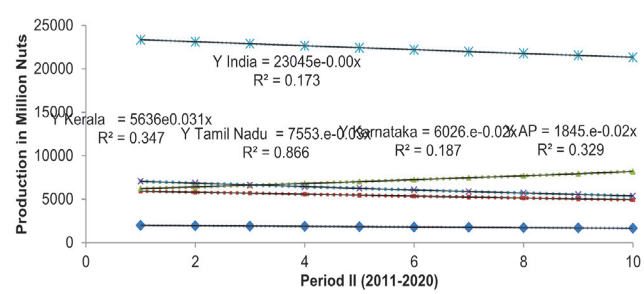
Subsidy on palm oils

During the second period, both the central and state governments provided subsidies of up to Rs 15 per kg on imported palm oil, with Tamil Nadu and Andhra Pradesh offering an additional subsidy of Rs 18.2 per kg. This substantial subsidy on palm oil has significantly eroded the demand for coconut oil, leading to a decline in coconut oil prices and, consequently, a reduction in copra prices. These price distortions have not only affected the profitability of coconut oil production but have also influenced the area under coconut cultivation. In addition to price-related challenges, coconut production is also hindered by the spread of pests and plant diseases, which have become increasingly prevalent. Coconut farmers often struggle with inadequate agronomical practices and poor management strategies, exacerbating the problem. In light of these challenges, the Commission for Agricultural Costs and Prices (CACP) in 2023 recommended the adoption of an integrated pest and disease management approach. Furthermore, the CACP emphasized the need to encourage farmers to diversify their farming systems, such as promoting inter-cropping, to improve the resilience of coconut cultivation and enhance the overall sustainability of the industry.



Source: Author's own computation

Fig. 1. Growth of coconut production (from 2001 to 2010)



Source: Author's own computation

Fig. 2. Growth of coconut production (from 2011 to 2020)

Growth and instability of area and yield

The measurement of growth and instability is crucial in agricultural research, and this study analyzes the area and yield of coconut over two distinct time periods. In Period I, Tamil Nadu recorded the highest growth rate in area at 1.78 percent, followed by Karnataka with a growth rate of 1.60 percent. However, Andhra Pradesh and Kerala experienced negative growth rates in terms of area during the same period. In Period II, the trend shifted, with Tamil Nadu and Andhra Pradesh experiencing a decline in acreage at -1.03 percent and -2.16 percent, respectively. On the other hand, Karnataka and Kerala showed positive growth rates in area, with Karnataka achieving a growth rate of 2.66 percent and Kerala's area growth standing at a modest 0.07 percent. These trends are summarized in Table 1, which presents the detailed results of area growth across the selected states for the two periods.

When comparing the growth rates of coconut cultivation between Periods I and II, significant changes can be observed across the four major states. In Tamil Nadu, the growth rate of area under coconut cultivation decreased from 1.78 percent in Period I to -1.03 percent in Period II. Similarly, Andhra Pradesh experienced a decline in area growth, with the rate changing from -0.11 percent to -2.16 percent between the two periods. In contrast, Karnataka saw an increase in its acreage from 1.60 percent to 2.66 percent, while Kerala's area growth improved marginally, shifting from -2.11 percent to 0.07 percent. In terms of yield growth rates, Tamil Nadu exhibited the lowest growth among the four states, with a significant drop from 7.63 percent in Period I to -3.06 percent in Period II. Similarly, Karnataka's yield rates also declined, from 4.53 percent in Period I to -4.51 percent in Period II. In Andhra Pradesh, however, the yield growth improved slightly, increasing from -1.26 percent to -0.37 percent. Kerala maintained stable yield rates, with no significant change, remaining at 3.1 percent across both periods.

The Cuddy Della Valley Index (CDVI) analysis indicates that instability in both area and yield of coconut across the four major producing states is not a significant concern. The instability indices for both time periods were found to be relatively low, with values under 15, suggesting that fluctuations in area and yield are not driving the decline in production. However, Karnataka's yield instability did show a moderate level of instability, with an index value of 17 percent, indicating some volatility in yield. Despite this, the overall stability in area and yield in the other states suggests that factors other than instability in production metrics are likely contributing to the lower coconut production.

Decomposition analysis

The decomposition analysis, which measures the components of changes in coconut production, reveals that yield effects have a greater influence on production changes compared to area effects, with the exception of Tamil Nadu in Period II. The interaction effects, which reflect the combined influence of area and yield changes, were found to be relatively minor in driving production variations. This indicates that, for most states, improvements or declines in yield play a more significant role in determining overall coconut production than changes in the area under cultivation.

Table 2 presents the results of the decomposition analysis, highlighting that yield effects are the most significant factor contributing to variations in coconut production. Improving yield rates is crucial, and technological advancements play a vital role in achieving this goal. However, small and marginal farmers often face financial constraints that prevent

Table 1. Growth and instability of area and yield

	AP		Karnataka		Kerala		TN	
Description	Area (Period I & II)							
	I	II	I	II	I	II	I	II
CGR	-0.11	-2.16** (-2.26)	1.60*** (12.83)	2.66*** (4.20)	-2.11*** (-8.34)	0.07	1.78*** (12.45)	-1.03 (-1.50)
CV (%)	1.10	10.96	4.93	9.95	6.75	5.73	5.41	3.04
CDVI	1.12	10.95	1.12	5.88	2.30	6.07	1.27	3.01
Period I & II	Yield (Period I & II)							
CGR	-1.26	-0.37	4.53** (2.43)	-4.51** (-2.39)	3.12*** (8.16)	3.13** (2.74)	7.63*** (4.23)	-3.06*** (-7.96)
CV (%)	11.76	6.07	20.67	20.84	9.93	13.20	24.65	10.01
CDVI	11.80	5.99	16.64	16.88	3.44	10.07	14.54	3.55

Source: Author's own computation
Figures in parentheses indicate t statistic values
** significant at $p \le 0.05$; ***significant at $p \le 0.00$

Table 2. Changes in the production of coconut

States	Area Effects $Y_0(A_1-A_0)$	Yield Effects $A_0(Y_n-Y_0)$	Interaction Effects $\Delta A*\Delta P$
		Period I	
AP	-15.17	114.06	1.11
KA	23.19	78.26	-1.45
Kerala	-186.94	342.05	-55.16
TN	5.59	95.42	-1.01
		Period II	
AP	-124.47	233.24	-8.76
KA	24.08	76.35	-0.43
Kerala	-3.51	103.54	-0.02
TN	140.34	-37.73	-2.61

Source: Author's own computation

them from accessing costly machinery and technology. To address this, collective action through cooperative producer societies can be instrumental in supporting these farmers by providing resources and facilitating access to advanced farming techniques. The Technology Mission on Coconut, introduced in 2001-02, aims to provide financial assistance for coconut processing units, which can help improve value-added products and promote overall growth in the sector. Additionally, the promotion of high-yielding coconut varieties, as well as the Replanting and Rejuvenation of Gardens Scheme, should specifically target small and marginalized farmers to enhance productivity. Coconut-based integrated farming systems also offer an effective strategy for maximizing resource utilization, benefiting both farmers and the environment. The 'Friends of Coconut Tree' programme, launched by the Coconut Development Board (CDB 2022), focuses on training young farmers in pest and disease management, which is essential for maintaining healthy coconut crop. Kerala's production growth from 0.9 percent to 3.1 percent in the study period can be attributed to the strong yield effects in the state.

Relative efficiency

The analysis of average production *vis-à-vis* average area for the two time periods helps in assessing the relative efficiency of area and yield across the four major coconut-producing states. The results for Period I provide a clear depiction of how efficiently the area is being utilized in each state. In this analysis, the rays on the graph that are closer to the vertical axis represent the states with higher efficiency, while those nearer to the horizontal axis indicate states with lower efficiency. The concave curve on the graph represents average values, reflecting the overall performance of the states in terms of both area and production. States whose points are closer to the origin represent those with the least average area and production, while states that are further from the origin exhibit the highest averages in terms of coconut production. The pictorial representation of area efficiency for the four selected states is shown in Fig. 3, which clearly highlights the relative efficiency of each state in terms of area utilization for coconut production.

In Fig. 3, the horizontal axis represents the average area under coconut cultivation, while the vertical axis shows the average production during the period from 2001 to 2010. The graph indicates that Tamil Nadu holds a relatively better position in terms of area efficiency, followed by Andhra Pradesh, Kerala, and Karnataka. From the graph, it is evident that Andhra Pradesh exhibits the least average production, with its point being closest to the origin on the concave curve. This suggests that the state has relatively lower efficiency in terms of both area and production. On the other hand, Kerala stands out with a higher level of average production but is relatively less efficient in terms of area utilization. This indicates that although Kerala is able to produce a large quantity of coconut, it does so on a smaller or less optimized area compared to states like Tamil Nadu. Tamil Nadu, with its extensive

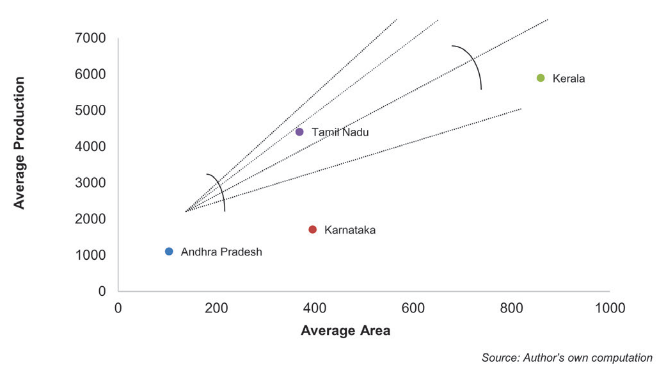


Fig. 3. Area efficiency (Period I)

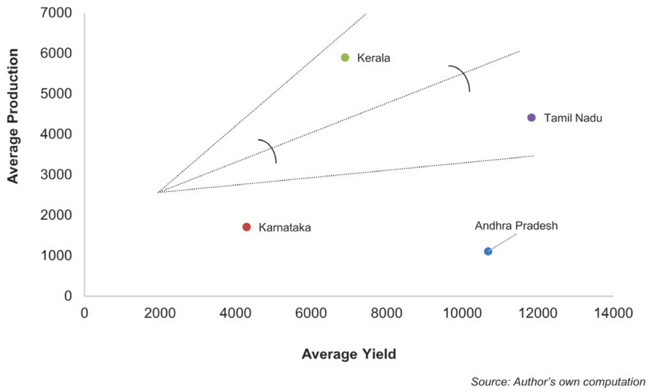


Fig. 4. Yield efficiency (Period I)

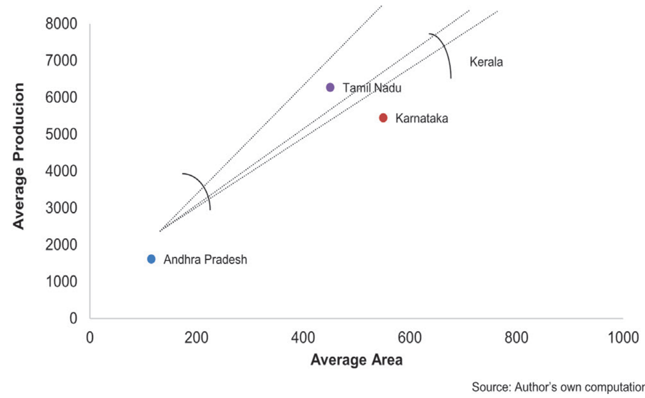


Fig. 5. Area efficiency (Period II)

area under cultivation, has a clear advantage in terms of economies of scale, enabling the state to maximize coconut production. The larger cultivated area helps Tamil Nadu achieve higher productivity and efficiency, reinforcing its strong position in the coconut industry during this period.

In Fig. 4, the horizontal axis represents the average yield rates, while the vertical axis shows the average production during the period from 2001 to 2010. The graph reveals that Kerala occupies the relatively better position in terms of yield rate, followed by Karnataka, Tamil Nadu, and Andhra Pradesh. Kerala stands out with the highest yield rates, reflecting the state's effective use of advanced cultivation technologies and intensive farming practices, which significantly contribute to increased coconut production. This indicates that Kerala has a strong potential for yield efficiency, allowing it to maximize output despite potential limitations in area. Karnataka, on the other hand, exhibits the least average yield rates, which suggests that there is a need for improvement in farming practices and technology adoption to enhance productivity. Tamil Nadu records the highest mean production, which could be due to its large cultivated area, even though its yield rates are not as high as Kerala's.

In Fig. 5, which presents the relative area efficiency during the second period (2011-2020), it is evident that Tamil Nadu maintained a relatively better position in terms of area efficiency, followed by Andhra Pradesh, Karnataka, and Kerala. The graph reveals that Andhra Pradesh has the least average production, as indicated by its position closer to the origin on the concave curve. In contrast, Kerala recorded the highest average production, with its point positioned farthest from the origin, suggesting that the state has higher area efficiency and better overall production compared to the other states. This indicates that despite potential limitations in area under cultivation, Kerala has been able to achieve significant production through optimized land use and efficient farming practices. The concave curve in the graph highlights the relative efficiency of the states, with states further away from the origin indicating higher levels of production efficiency in relation to the area cultivated.

In Fig. 6, which illustrates the relative yield efficiency of coconut during the second period (2011-2020), Kerala stands out as the most yield-efficient state compared to the other selected states. The figure shows that Kerala has consistently maintained high yield rates, indicating its effective use of land and advanced farming techniques. On the other hand, Andhra Pradesh emerges as the least yield-efficient state, with its position on the concave curve being closest to the origin. This suggests that the state struggles to achieve high yields relative to the area under coconut cultivation, possibly due to issues like suboptimal farming practices or less favourable agro-climatic conditions compared to other states. Overall, Kerala's superior yield efficiency is indicative of its advanced agricultural practices and focus on maximizing production from available land, while Andhra Pradesh faces challenges that hinder its yield performance.

Among the four selected states, Tamil Nadu has consistently maintained a relatively better position in terms of area efficiency, despite experiencing a decline in its compound growth rate of area from 1.78 percent in Period I to -1.03 percent in Period II. This indicates

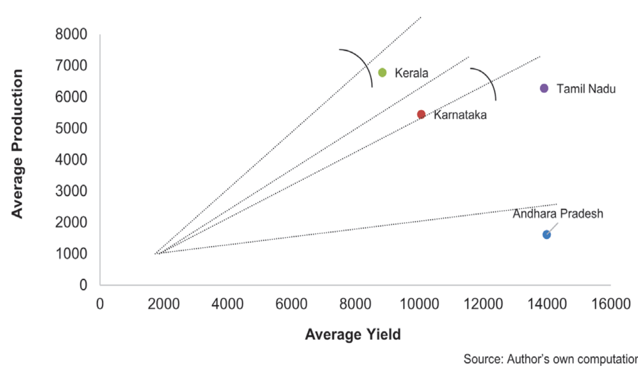


Fig. 6. Yield efficiency (Period II)

that although Tamil Nadu's coconut area growth slowed in the second period, the state still managed to achieve higher efficiency in utilizing its available land for coconut cultivation. On the other hand, Kerala stands out for its consistent yield efficiency in both time periods. Kerala has been successful in maintaining high yield levels, reflecting the state's effective use of advanced farming techniques, high-yielding coconut varieties, and its focus on intensive cultivation practices. Kerala's success in achieving superior yield efficiency can also be attributed to the active involvement of producers' cooperative societies, which play a crucial role in disseminating knowledge about modern farming technologies, pest and disease management, and the availability of high-yielding coconut seeds. These cooperative societies have contributed to raising awareness among farmers, ensuring better practices in pest control and disease management, which have positively impacted the state's coconut yield. By supporting farmers with essential information and resources, these societies have helped improve the overall productivity of Kerala's coconut sector.

Price level and wage rate in copra (Milling copra and ball copra)

Human labour cost plays a crucial role in influencing the prices of agricultural products, and it is one of the significant variables affecting the coconut sector. The relationship between wage rates and the prices of coconut products, such as milling copra and ball copra, is particularly important as an increase in the wage rate generally leads to a rise in the production cost, which in turn impacts the price levels. Price volatility is a persistent issue for coconut growers, and it is largely driven by fluctuations in various factors, including wage rates. Since labour is a major input in coconut cultivation and processing, any changes in agricultural wage rates can directly affect the prices of coconut products. For instance, when the wage rates for agricultural labourers increase, it can lead to higher costs in harvesting, processing, and packaging of coconuts, thereby raising the prices of products like milling copra and ball copra.

To understand this relationship more comprehensively, mean values of the monthly wage rate of agricultural labourers per day have been analyzed over a period of one decade, from 2011-12 to 2020-21. The table 3 presents the regression results that show the relationship between milling copra price and ball copra price with respect to the wage levels of agricultural labourers. The regression analysis helps to quantify the impact of wage rate changes on the prices of these coconut products, offering valuable insights into how wage fluctuations might influence the coconut economy.

It is estimated that for every unit increase in the wage levels of agricultural labourers, the price of milling copra rises by 94.8 percent in Andhra Pradesh. In Karnataka, Kerala, and Tamil Nadu, the price increase due to a unit wage hike is 61.7 percent, 86.1 percent, and 67.9 percent, respectively. This indicates a strong influence of wage rates on milling copra prices, with Kerala showing the highest sensitivity to wage changes. Similarly, for ball copra, every unit increase in wage rates results in price increases of 92.5 percent in Andhra Pradesh, 60.2 percent in Karnataka, 83.9 percent in Kerala, and 66.2 percent in Tamil Nadu. The price impact is lower for ball copra compared to milling copra in all the states, suggesting that milling copra prices are more sensitive to wage fluctuations than ball copra prices. The wage rates for agricultural labourers in the Southern states have experienced substantial increases over the years. In Andhra Pradesh, the wage levels range from Rs. 142 to 420, marking an increase of 66.33 percent. In Karnataka, wages range from Rs. 98 to 393, reflecting a 75 percent increase. In Kerala, the range is Rs. 302 to 793, corresponding to an increase of 61.97 percent, while in Tamil Nadu, wages range from Rs. 155 to 575, with a 72.94 percent increase.

Table 3. Price and wage relationship in copra (2010-22)

Copra Milling & Ball	b Coeff.	Std. Err.	t Stat.	*P*-value	R^2	*F* Stat.	Significance
AP	0.948	0.091	10.36	0.000	0.907	107.34	0.000
Karnataka	0.617	0.122	5.055	0.000	0.699	25.551	0.000
Kerala	0.861	0.184	4.671	0.001	0.665	21.822	0.001
TN	0.679	0.122	5.544	0.000	0.736	30.737	0.000
AP	0.925	0.090	10.244	0.000	0.905	104.94	0.000
Karnataka	0.602	0.120	5.025	0.000	0.697	25.252	0.000
Kerala	0.839	0.180	4.651	0.001	0.663	216.37	0.001
TN	0.662	0.120	5.504	0.000	0.734	0.861	0.184

Source: Author's own computation

Table 4. Price disparity between whole sale price and minimum support price (2011-22)

Year	Milling Copra		Ball Copra	
	WMP	MSP	WMP	MSP
2010-2011	4215	5100	5280	5350
2016-2017	9835	6500	9396	6785
2020-2021	11788	10355	15870	10600
Average price (2011-2022)	8983.6	7093.6	10646.3	7377.5
Price Disparity	23.51%		36.27 %	

Source: Author's own computation

Note: Whole price index was taken from Arsikere Karntaka for balling copra and milling copra Kozhikode Kerala (CACP, 2023).

Price disparity between wholesale market price and minimum support price

For balling copra, the average price during this period was Rs. 8983.6, while the minimum support price (MSP) was Rs. 7093.6, indicating a price disparity of 126.64 percent. This suggests that the market prices for balling copra have been significantly higher than the MSP, which may have implications for the income stability of coconut farmers, particularly those who rely on the MSP as a price safety net. In the case of milling copra, the average price for the same decade was Rs. 10646.3, while the MSP stood at Rs. 73775.5. This represents a notable disparity, with the average market price of milling copra being Rs. 331.2 higher than the MSP. This difference in prices points to a discrepancy between the prices received by farmers in the open market and the MSP, which could reflect the challenges faced by farmers in accessing the MSP or the underpricing of copra at the government-specified support levels. The table 4 further illustrates the detailed price disparities between the wholesale market prices and the minimum support prices.

The price difference between wholesale market prices and minimum support prices (MSP) for copra has remained significant, with milling copra showing a difference of 23.51 percent and ball copra showing 36.27 percent from 2010-11 to 2021-22. These disparities indicate that the prices in the wholesale markets have consistently exceeded the MSP, leading to financial challenges for coconut farmers who are not receiving a fair price for their produce. In addition, this price gap influences the wages of agricultural labourers, as the wages in coconut farming are often linked to the prices of copra. To mitigate this issue, it is crucial that the minimum support prices (MSP) be increased, which would not only help coconut farmers but also have a positive impact on wage levels for agricultural labourers. An increase in MSP would provide a more stable and fair income for farmers and labourers, ultimately promoting better socio-economic conditions in the coconut farming sector. In parallel, India's palm oil imports have surged, with imports projected to jump by 16 percent in 2022/23, reaching a four-year high of 9.17 million tons (Reuters, 2023a,b). According to the OEC report, the import value of palm oil has grown substantially, from $2.13 billion to $8.72 billion. This rise in palm oil imports is a major challenge for the coconut oil industry, as palm oil, along with other edible oils like soybean oil, sunflower oil, and rapeseed oil, competes directly with coconut oil in both international and domestic markets. The fall in coconut prices, alongside the increased availability of substitute oils, has led to market volatility and has diminished India's position as a major exporter of coconut oil (George, 2013; Sathish, 2022; Gowda, 2023). For instance, in 2022, the minimum support price for milling copra was ₹10,335, and for ball copra, it was ₹10,600. However, the wholesale market prices for the same period were ₹11,798 for milling copra (14.1% higher than MSP) and ₹15,870 for ball copra (49.7% higher than MSP). These discrepancies highlight the persistent gap between MSP and market prices, suggesting that the current MSP system is inadequate for ensuring fair returns to coconut farmers. To address this issue, it is recommended that the MSP for copra be fixed on a quarterly basis. This approach would better reflect the seasonal fluctuations and market conditions, considering that coconut is a perennial crop with production occurring throughout the year. Adjusting the MSP quarterly would help close the gap between MSP and market prices, stabilizing incomes for coconut farmers and helping them cope with price volatility. Additionally, it would help reduce the impact of competition from imported palm oil and other edible oils, which have a significant influence on domestic prices.

CONCLUSION

In conclusion, to enhance the sustainability and growth of the coconut industry in India, it is imperative that financial resources be strategically redirected from the import of vegetable oils, palm kernel oil, and refined crude oil to support the growth of small-scale coconut processing industries. This shift would not only increase domestic production of coconut oil but also create much-needed employment opportunities, particularly in rural areas. Encouraging micro-level oil extraction firms and promoting the domestic production of coconut oil cakes would reduce reliance on imports and address issues like adulteration, which compromises product quality. An Integrated Coconut Farming System (ICFS) combining coconut cultivation with poultry and dairy farming can significantly improve farmers' profit margins, optimize resources, and enhance farm productivity. To ensure the long-term viability of the coconut sector, increasing minimum support prices (MSP) for coconut products would help mitigate the adverse effects of price volatility, providing a stable income for farmers and boosting wages in the sector.

Further, the development of value-added coconut products such as virgin coconut oils, desiccated coconuts, and coir mats presents a substantial opportunity for economic growth and job creation. The Coconut Palm Insurance Scheme should be more widely implemented to safeguard farmers against pest and disease-related yield losses, ensuring the long-term health of coconut palms. Additionally, the government should consider the cost-price parity index while setting MSP and make regular adjustments on a quarterly basis to protect coconut growers from market fluctuations.

Creating awareness about coconut products, promoting collectivization through cooperatives, and establishing programs to educate farmers about modern farming practices and pest control are essential for improving productivity and profitability. Moreover, public distribution systems should prioritize domestic coconut oil over imported oils, leveraging the health benefits of coconut oil to cater to marginalized communities and creating a favourable trade balance for India.

India has significant potential to increase its share in the global coconut market, but it must first strengthen domestic demand and ensure that coconut and its value-added products are accessible across the country. By boosting internal consumption, particularly through public distribution systems, and supporting coconut farmers with favourable pricing policies, India can stabilize the coconut economy, enhance livelihoods, and improve market competitiveness. Through a combination of policy reforms, technological advancements, and market interventions, India can secure the future of its coconut industry, benefiting both producers and consumers alike.

Conflicts of Interest

The author declares that she has no conflicts of interest.

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