

RESEARCH PAPER

Price Behaviour of Tapioca in Tamil Nadu and Kerala: An Economic Analysis

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Received: 10-08-2025

Revised: 08-11-2025

Accepted: 29-11-2025

ABSTRACT

The present study explores the variations in prices of Tapioca in major producing states i.e., Tamil Nadu and Kerala using monthly wholesale prices of Tapioca over a period of twelve years from 2011-12 to 2022-23. The trend analysis shows a significant rise in Tapioca prices in Tamil Nadu and Kerala coupled with substantial variations during the study period. Using the percentage centred twelve-month moving average method, the seasonal pattern in prices of Tapioca was analysed. In Tamil Nadu, the highest and lowest seasonal indices for prices were observed during the months of January and November respectively with notable intra-year variations. Whereas, in Kerala the highest and lowest seasonal price indices were recorded during months of April and December respectively. A three-year price cycles and high random variations were found in both states during the study period.

HIGHLIGHTS

- The seasonal price patterns of Tapioca in both states show significant fluctuations over the year.
- The intra year price variations in Tapioca are higher in Tamil Nadu than Kerala.

Keywords: Tapioca price behaviour, Seasonal index, Cyclical variation, and Random fluctuation

Tapioca is a carbohydrate rich tuber crop predominantly grown in southern part of India. The crop has high starch content and typically consumed after cooking or processing. It also has notable industrial applications such as the production of starch, alcohol and glucose. Also, processed products like chips, sago, and vermicelli made of Tapioca are widely consumed in the country. In India, Tapioca is mainly grown in Tamil Nadu, Kerala, Andhra Pradesh, Nagaland, Meghalaya, and Assam. The total cropped area under Tapioca in India was 1.68 lakh ha with a production of 6.073 million tonnes during the year 2023 (Agricultural Statistics at a Glance, 2023). Tamil Nadu stands first in both area (49.91 per cent) and production (57.41 per cent) followed by Kerala and Andhra Pradesh (National Horticulture Board, 2023-24).

The area under Tapioca cultivation has been decreasing over the years in Tamil Nadu and Kerala,

and the low-price realisation for tubers had made majority of farmers reluctant to continue Tapioca farming. The perishability of Tapioca significantly amplifies the difficulties posed by fluctuations in prices, since the tubers need to be harvested and sold or processed within a short period in order to minimize post-harvest losses, leaving farmers with limited choices to store or delay sales for better prices. This sense of urgency forces farmers to accept prevailing market rates, especially during periods of low demand or surplus, limiting their bargaining power and profitability (Baishya *et al.* 2025). Therefore, a study that provides insight into the trend in price movements, the underlying

How to cite this article: Shireesha, C. and Prabakar, C. (2025). Price Behaviour of Tapioca in Tamil Nadu and Kerala: An Economic Analysis. *Econ. Aff.*, 70(04): 393-397.

Source of Support: None; **Conflict of Interest:** None



causes, and strategies to mitigate the effect of such instability would be extremely helpful. With this backdrop, the present study aims to decompose Tapioca prices and to estimate the seasonal price indices in the selected states.

MATERIALS AND METHODS

Data

The data on monthly wholesale prices of Tapioca was collected from the various editions of the Agricultural prices in India, Agmarknet portal, and Hand book of statistics published by the Directorate of Economics and Statistics, Tamil Nadu, and Kerala. The time series data subjected to analysis pertained to the period from 2011-12 to 2022-23.

Tools for Analysis

Price Behaviour

The data on prices were decomposed to different components *viz.*, trend, seasonal, cyclical and random components to examine the seasonal price index (Devi *et al.* 2016 and Makama, 2016). The multiplicative decomposition model was used to analyse the time series data as given below:

$$P_t = T_t * S_t * C_t * E_t \quad \dots(1)$$

Where, P_t = Time series data on Tapioca prices (in ₹ per Quintal), T_t = Trend component at time 't', S_t = Seasonal variations at time 't', C_t = Cyclical movements at time 't', E_t = Irregular/Random variations at time 't'.

Trend Component

To ascertain the price trend, the ordinary least square method was employed which involves estimating the coefficients a and b in linear functional form as follows

$$P_t = a + bT_t + U_t \quad \dots(2)$$

Where, P_t = Tapioca price during the period 't', T_t = Serial number assigned to the t^{th} month, a = Intercept, b = Regression coefficient, U_t = error term. The trend in prices for the selected states were computed and compared.

Seasonal Variation

To analyse seasonal price indices, a twelve-month moving average method was employed, which estimates the seasonal changes in prices (Vasudev, 2015 and Kumar *et al.* 2023). The procedure involved in calculating seasonal indices comprises the following steps,

1. First, a series of twelve-month moving totals were generated.
2. A series of twelve-month moving averages were calculated by dividing twelve months moving totals by 12.
3. The averages of paired two consecutive twelve-month moving averages were calculated. Then, simple averages of these paired totals were worked out by dividing them by two. In this process, corresponding moving averages were not available for the first six and last six months.
4. Each original value was subsequently expressed as a percentage of its corresponding centred moving average. The percentage of the moving average reflects indices of seasonal and irregular components combined.
5. To remove the irregular component, these percentages of the moving averages were arranged into monthly patterns.
6. Then, the average index for each month was calculated and adjusted so that their sum equalled 1200.
7. This adjustment was achieved by calculating a correction factor (k) using the formula as follows:

$$k = \frac{1200}{S}$$

Where, S = the sum of the average indices for 12 months. The average for each month was multiplied by this correction factor.

Finally, the seasonal indices obtained through this procedure were plotted to explain their variation throughout the year.

Cyclical Variations

The cyclical component was calculated using multiplicative decomposition model, by dividing the moving average with estimated trend values.

Irregular variations

The irregular component in the prices was calculated through moving average method using multiplicative decomposition model, by dividing the observed price with the corresponding moving average.

Intra-year Price Variations

The extent of seasonal price variation in Tapioca was worked out by using the following three measures of intra-year price variations (Acharya and Agarwal, 1994).

(i) Co-efficient of Intra-year Price Rise (IPR):

$$IPR = \frac{HSPI - LSPI}{LSPI} \times 100$$

Where,

HSPI = Highest seasonal price index, and LSPI = Lowest seasonal price index.

(ii) Co-efficient of Average Seasonal Price Variation (ASPV):

$$ASPV = \frac{HSPI - LSPI}{\left[\frac{HSPI + LSPI}{2} \right]} \times 100$$

Where,

HSPI = Highest seasonal price index, LSPI = Lowest seasonal price index

(iii) Co-efficient of Variation (CV):

$$CV = \frac{\sigma}{\bar{X}} * 100$$

Where,

σ = Standard deviation of seasonal price indices, \bar{X} = Arithmetic mean of seasonal price indices. Since the mean of seasonal indices is 100, the coefficient of variation corresponds to the magnitude of standard deviation.

RESULTS AND DISCUSSION

Trend Analysis on Tapioca prices for Tamil Nadu and Kerala

The trend analysis on Tapioca prices is presented in Fig. 1. The results revealed that, prices in Tamil

Nadu showed a notable price fluctuation with a steady increasing trend at an annual compound growth rate of 0.25 per cent. It could be observed from the figure that, Tapioca prices had a decline during 2015 (₹ 540 per quintal). This was due to the surplus production owing to favourable rainfall and less demand from North Indian traders as they opted for both food and industrial-grade starch imports from Vietnam and Thailand. A significant rise in prices was observed in 2023 (₹ 1,433 per quintal), as a result of various reasons such as insect attacks and low production. The mismatches between supply and demand are more frequently attributed for Tapioca price variations in the state.

Whereas in Kerala there was an increase in price trend over the years with an annual compound growth rate of 3.87 per cent. The 'Subhiksha Keralam' program in 2021 led to mass production which was followed by a subsequent price drop (₹ 1,241 per quintal) due to oversupply. However, a sharp rise in prices (₹ 3,635 per quintal) was observed in 2022 as many farmers chose not to cultivate tapioca in the following year, leading to a supply shortage and subsequent market fluctuations making a significant rebound from previous year low prices.

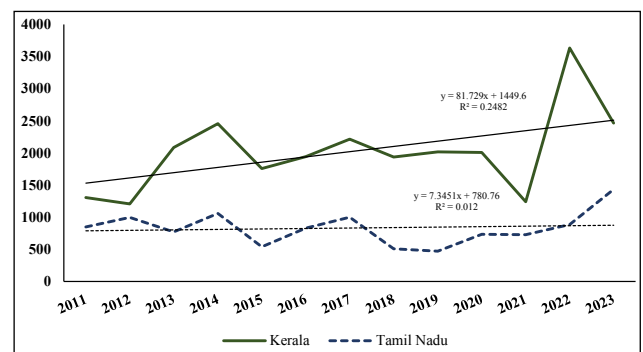


Fig. 1: Trend in Prices of Tapioca in Tamil Nadu and Kerala

Seasonal Price Index of Tapioca in Tamil Nadu and Kerala

The price of agricultural produces varies periodically due to the mismatch between year-round consumption and crop production. The estimated seasonal indices for monthly wholesale prices of Tapioca in Tamil Nadu and Kerala are presented in the Table 1 and Fig. 2. It could be observed that, there was a wide fluctuation in Tapioca prices in Tamil Nadu. The price index

peaked in the months of January (111.36) and July (103.90) and reached the trough during months of November (92.74) and December (92.82). In Tamil Nadu, availability of tuber is highest during the winter months (November and December), during this months market arrivals were maximum with highest starch content in tubers leading to lowest seasonal price. However, the peak price index in January was primarily because it follows the major harvest period, when supply begins to decline.

In Kerala, the month of April (104.63) is generally characterised by a peak in Tapioca prices. The results were in consonance with Graffam *et al.* (2012), as production of quality starch requires dry summer days, leading to high demand from starch industries in Tamil Nadu during this period. Due to this, Tapioca prices peaked during the months of March and April. However, the prices show downward movement from May (100.34) when the market arrivals were maximum. The months of August (102.34) and September (102.65) witness a rise in prices due to lean market arrivals.

Table 1: Seasonal Price Index of Tapioca in Tamil Nadu and Kerala

Sl. No.	Month	Tamil Nadu	Kerala
1	January	111.36	101.32
2	February	93.52	93.98
3	March	101.52	96.81
4	April	100.90	104.63
5	May	97.08	100.34
6	June	101.75	100.70
7	July	103.90	97.47
8	August	96.76	102.34
9	September	98.19	102.65
10	October	99.07	98.01
11	November	92.74	99.09
12	December	92.82	93.55

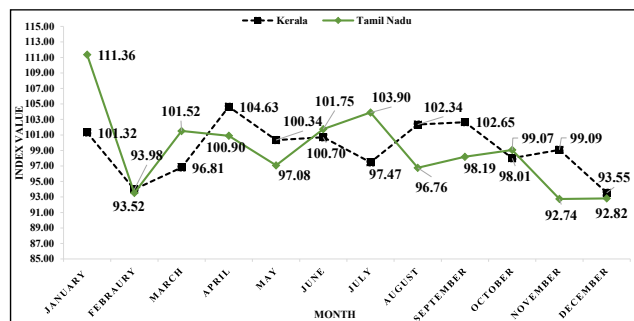


Fig. 2: Seasonal Price Index of Tapioca in Tamil Nadu and Kerala

Intra-year Price Variations of Tapioca in Tamil Nadu and Kerala

The results of intra-year price variations are presented in Table 2, which were calculated using three methods *viz.*, Intra year price rise, Average seasonal price variation, and Co-efficient of variation. The Co-efficient of intra-year price rise for Tapioca in Tamil Nadu and Kerala were 20.07 per cent and 11.85 per cent respectively. The Co-efficient of average seasonal price variation for Tapioca was 18.24 per cent and 11.18 per cent for Tamil Nadu and Kerala. The Co-efficient of variation was found to be 5.35 per cent in Tamil Nadu and 3.45 per cent in Kerala. Tapioca is a staple food in Kerala and hence a consistent procurement happens for culinary purposes, accounting for less variations compared to Tamil Nadu. Whereas, in Tamil Nadu Tapioca is cultivated mainly for starch and sago industries with prices highly influenced by industrial demand and middlemen, resulting in greater variations. The difference between peak and trough prices observed in Tamil Nadu and Kerala were 18.62 and 11.08 respectively.

Table 2: Intra-year Price Variations of Tapioca in Tamil Nadu and Kerala

State	Highest seasonal index		Lowest seasonal Index		Magnitude of variation (%)		
	Month	Index	Month	Index	IPR	ASPV	CV
Tamil Nadu	Jan.	111.36	Nov.	92.74	20.07	18.24	5.35
Kerala	Apr.	104.63	Dec.	93.55	11.85	11.18	3.45

Cyclical and Irregular Price Movements of Tapioca in Tamil Nadu and Kerala

A cyclical price variation in Tamil Nadu and Kerala were analysed and presented in Fig. 3. It could be observed that, price cycles were visible in Tamil Nadu during three periods *viz.*, July 2011 to January 2014; July 2014 to July 2017; January 2018 to January 2020. In Kerala the prices of Tapioca showed prominent cyclical variations between July 2013 to January 2016. The duration of the price cycle was approximately three years with prices showing an upward movement in first year and attained the peak during the second year.

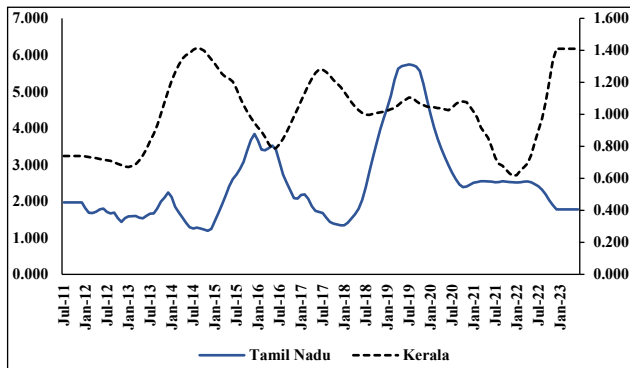


Fig. 3: Cyclical Variations in Tapioca Prices in Tamil Nadu and Kerala

The indices of irregular variations were calculated and plotted to capture the random effect (Fig. 4). It could be observed that, Tapioca prices in Tamil Nadu and Kerala experienced significant fluctuations over time. The calculated random variations in prices oscillated approximately at the mean value of 0.28 and 1.23 in Tamil Nadu and Kerala respectively, confirming that random factors occurred in the marketing of tapioca in Tamil Nadu and Kerala.

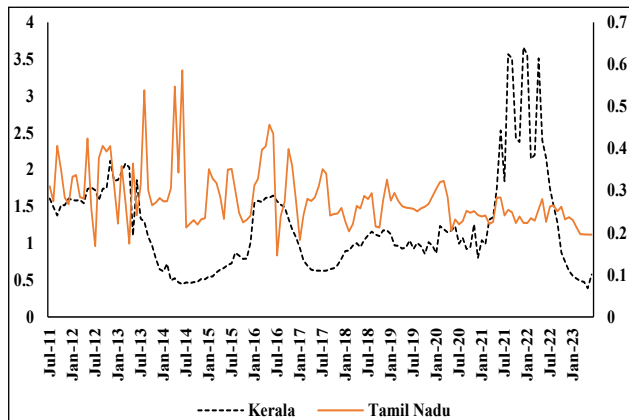


Fig. 4: Irregular Variations in Tapioca Prices in Tamil Nadu and Kerala

CONCLUSION

The prices of Tapioca show seasonal price patterns in both states. The highest seasonal price index was recorded in January for Tamil Nadu and in April for Kerala and the lowest seasonal price index was observed in November for Tamil Nadu and December for Kerala. A three-year cyclical pattern in prices was observed in both the states. The study also found that, Tamil Nadu exhibits higher intra year price variations than Kerala, which affects both the sago industries and farmers in the state.

In Tamil Nadu, Tapioca prices are heavily relying on fragmented units of tiny and unorganised sago industries which lack a stable procurement structure due to their small-scale operations. Therefore, efforts need to be taken up to promote unified activity model like Farmer Producer Organizations which enables farmers to gain better bargaining, input support, and protection from exploitation practices. In Kerala, Minimum Support Price (MSP) has been successfully implemented for Tapioca due to its strong Co-operative structures, government backed procurement agencies, and the role of tuber crop in food security. Therefore, implementing Minimum Support Price (MSP) in Tamil Nadu through a Co-operative based procurement mechanism may protect farmers income during low-price periods.

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