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RESEARCH ARTICLE

# Spicing up the major markets of turmeric in India

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## Abstract

As the leading global producer and consumer of turmeric, India has several major markets, including Erode, Nizamabad, Duggirala, and Sangli. Turmeric prices have exhibited cyclical patterns and fluctuations, significantly impacting farmers' incomes. Analyzing the trend, seasonal, and cyclical aspects of turmeric prices can aid in forecasting peak and low periods, thereby minimizing cultivation risks. Data spanning 14 years (2010-2023) was gathered from key markets to examine price behaviour, including the Erode Regulated Market in Tamil Nadu, Nizamabad in Telangana, and Sangli in Maharashtra. Researchers applied a regression model to analyze price trends, while seasonal indices were used to identify seasonality. The Bry-Boschan algorithm, implemented through MATLAB software, was used to determine price cycles. The study revealed an upward price trend across all major Indian turmeric markets over the years and identified cyclical behaviour, with cycles lasting 2-4 yrs. Notably, the duration of price slumps exceeded that of booms. By anticipating these cycles, farmers make informed decisions regarding sowing and selling, potentially reducing risks associated with turmeric cultivation. Implementing a Minimum Support Price could help offset rising labour costs and falling prices, encouraging farmers to continue turmeric cultivation. Additionally, adopting a pricing system based on curcumin content for Tamil Nadu turmeric could yield better prices.

## Keywords

price cycle; price trend; seasonal index; turmeric

## Introduction

Turmeric (*Curcuma longa*), also known as Indian saffron, is one of the oldest commercially traded spices, holding significant cultural and economic importance in India. The principal active ingredient in turmeric, curcumin, serves as a colouring agent and possesses a wide array of medicinal properties (e.g., anti-inflammatory) (1). People consume turmeric in various forms, including whole, powdered, as oleoresin, and as an oil (2). This spice includes numerous varieties, including types like Alleppey finger, Nizamabad, Erode local, BSR-1, and PTS-10, which are exported to other countries (3). Globally, India stands as the leading producer and consumer of turmeric, accounting for approximately 80 % of the world's turmeric production (4). The primary turmeric-producing regions in India include Telangana, Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Orissa, and West Bengal,

with key markets in Erode, Nizamabad, Duggirala, and Sangli. According to the Agriculture Market Information System (AGMARKNET), turmeric prices have exhibited cyclical patterns and variability over time. In 2014, the average price was ₹ 10700 per quintal. However, subsequent years saw a decline, with prices dropping to ₹ 7600 per quintal in 2017 and further to ₹ 6700 per quintal in 2018. Currently, the Erode market reports a price of ₹ 12500 per quintal. Turmeric shows higher volatility than other major spices such as black pepper or cardamom, impacting farmers' profitability. In Tamil Nadu, turmeric growers often store their harvest in anticipation of price increases, although this strategy typically results in lower prices for stored turmeric than newly harvested crops. Challenges faced by the turmeric growers were a declining trend in cultivation, low export demand, delayed monsoon resulting in late arrivals, and reduced prices for farmers (Fig. 1.) (1).

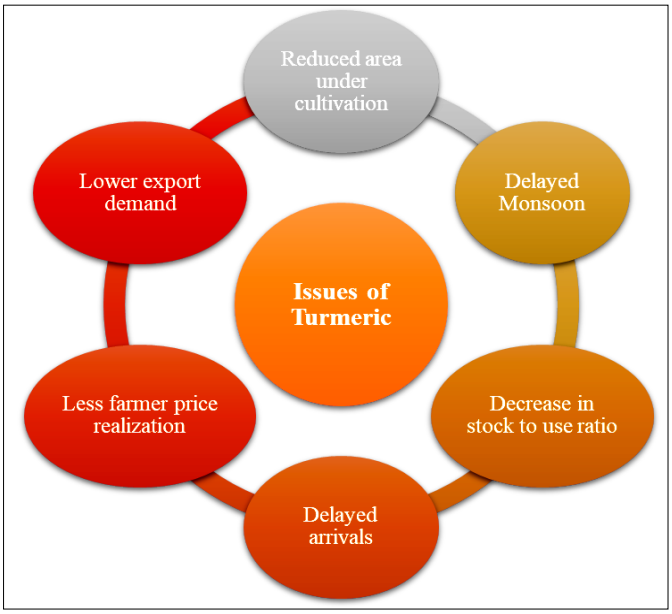


**Fig. 1.** Current issues of turmeric in India (adapted from Turmeric seasonal report, Eventell Global, 2024).

The three primary turmeric trading hubs in India are Nizamabad, Sangli, and Erode, which are the key markets. Analyzing turmeric price patterns in terms of trends, seasonality, and cycles can aid in predicting peak and low periods, thereby reducing risks associated with crop cultivation (5). A price cycle includes a period of increase followed by a subsequent decrease (6). To assess the extent of commodity price fluctuations and the percentage change in price (amplitude), it is essential to identify phases of economic expansion and contraction (7).

Trends and cycles are two essential features of a commodity price series. A natural cycle combines a slump with a boom, a trough-peak-trough cycle, or a boom with a slump, otherwise known as a peak-trough-peak cycle. During commodity price booms, faster growth occurs towards the end of the boom (8). Fig. 2. depicts the turmeric price cycle (9). The present study aims to examine turmeric prices in terms of trends, seasonality and cycles across three major Indian markets and suggests measures to protect the farmers from price fluctuations. Such measures can enhance income stability for turmeric farmers and potentially for the entire spice sector, promoting agricultural resilience and profitability.

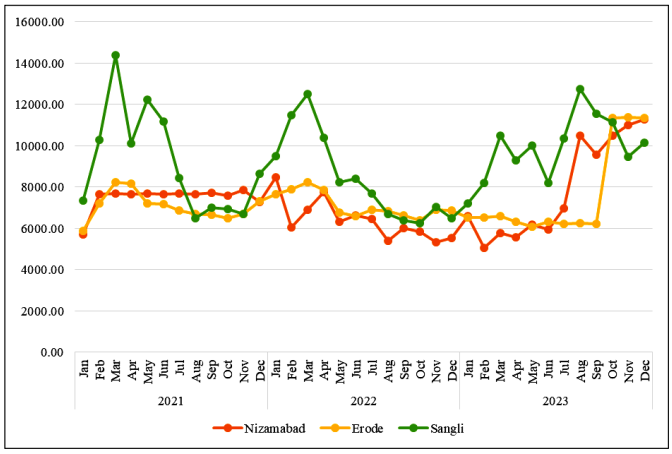


**Fig. 2.** Turmeric prices across major markets in India (2010-2023) (adapted from Agmarknet 2024).

## Materials and Methods

Turmeric price data over 14 years (2010-2023) was collected from the Erode Regulated Market in Tamil Nadu, the Nizamabad market in Telangana and the Sangli market in Maharashtra to study price behaviour. The data underwent two base-year revisions. A slicing technique was applied to standardize the data to a typical base year (10). The trend in turmeric prices was analyzed using a regression model. Seasonal index was used to identify the seasonality in the price series. The presence of price cycles was analyzed using the Bry-Boschan algorithm in MATLAB software. The codes were used to characterize food prices in India and run the Bry-Boschan algorithm (10).

### Compound annual growth rate analysis

The trend in turmeric prices across the main Indian markets was examined using the compound annual growth rate. An exponential growth function estimated the growth rate represented by the following Equation 1.:

$$Y_t = a\, b_t U_t \qquad \text{.....(Eqn.1)}$$

Where, $Y_t$ = Growth rate, a = Intercept, b = Regression coefficient, t = year, which takes values 1, 2… n, $U_t$= error term in years' t'.

The equation (1) will be transformed into log-linear and written as:

$$\log Y_t = \log a + t \log b + \log U_t \quad \text{(Estimated by OLS)} \qquad \text{.....(Eqn.2)}$$

The compound growth rate (g) equation is,

$$g = (b\text{-}1) \times 100 \qquad \text{.....(Eqn.3)}$$

Where, g = Estimated compound growth rate per annum in percentage, b = Antilog of log b.

### Construction of seasonal index

A Seasonal Index reflects how a specific period differs from the annual average. Each time frame's price is shown as a percentage of the season's mean, with values potentially equal to, above, or below 100. Most such indices use 100 percent as the base value. For instance, a 95 value for a particular period would indicate that its price was 5 percent lower than that year's 12-month seasonal average price. The study examines the relative price movements within the season (11) and seasonal indices in price and arrivals of wheat in major Karnataka markets (12).

### Cyclical analysis-Bry-Boschan algorithm

Bry-Boschan (BB) algorithms detect turning points in time series data and provide peak and trough dates. A cycle is completed by alternating trough and peak. The time between a peak to trough, or trough and peak, is termed a phase; two phases form a complete cycle. Not every change is considered to identify a turning point (peak or trough); instead, a local maximum or minimum is chosen based on a criterion that a certain number of subsequent points follow the same pattern.

The time spent in each state and amplitude (percentage change in each phase) can be calculated from the identified dates. The BB algorithm was employed to detect the presence and length of cycles. It was also used to determine the duration and magnitude of price cycles (6), although no consistent shape in commodity price cycles could be found. The algorithm was applied to identify price cycles in selected commodities, revealing asymmetry in the duration of booms and slumps and demonstrating that price cycles lack a consistent shape (10).

### Statistical analysis

The collected data was analyzed using statistical software like SPSS MATLAB, and the results are presented below.

## Results and Discussion

### Turmeric price trends across markets

The calculated regression equation indicated an upward trend in turmeric prices over time across all three markets examined. Table 1 displays these trends. From 2010 to 2023, the Erode, Nizamabad, and Sangli markets experienced annual price increases of approximately 7.3 %, 7.8 %, and 7.2 %, respectively. These findings align with Andaleeb's 2012 study, which noted a positive trend in spice prices over the years, contradicting the theory of declining food prices for turmeric.

**Table 1.** Trend in turmeric prices across markets (2010–2023

| S. No | Markets | CAGR (%) |
|---|---|---|
| 1. | Erode | 7.3** |
| 2. | Nizamabad | 7.8*** |
| 3. | Sangli | 7.2** |

***Significant at 1 % level, **-Significant at 5 % level.

### Seasonal price patterns

Seasonal analysis revealed distinct price patterns across markets. Erode's prices peaked from November to March and were lowest from April to July. Nizamabad experienced peak prices from October to December and lowest prices from January to July. Sangli's turmeric prices were highest from January to May and lowest from June to December. Table 2 illustrates these variations.

**Table 2.** Seasonal indices in turmeric price across markets (2010-2023)

| Months | Erode | Nizamabad | Sangli |
|---|---|---|---|
| January | 102.9 | 110.0 | 97.6 |
| February | 102.2 | 113.9 | 97.9 |
| March | 101.4 | 112.1 | 95.8 |
| April | 98.2 | 106.0 | 94.7 |
| May | 97.4 | 102.0 | 99.5 |
| June | 96.4 | 93.7 | 98.1 |
| July | 99.6 | 93.4 | 99.9 |
| August | 100.0 | 91.1 | 100.5 |
| September | 99.0 | 92.0 | 99.2 |
| October | 100.4 | 92.8 | 103.5 |
| November | 101.4 | 94.8 | 106.7 |
| December | 101.2 | 97.3 | 106.3 |

Source: Authors calculation (SPSS).

The seasonal price patterns observed in the Erode and Sangli markets were similar, suggesting that the crop's production and market dynamics in these regions may be comparable. However, Nizamabad exhibited different seasonal trends. The Duggirala and Nizamabad turmeric prices fluctuated more than Erode and Sangli. Erode market saw peak prices in January to March and October to December. In contrast, Nizamabad's peak prices occurred from January to May, while Sangli's were from October to December. Peak prices coincided with fresh arrivals in Erode and Nizamabad but with the lean arrival period in Sangli. Research indicates that turmeric prices in Kadapa, Duggirala, Nizamabad, and Erode influence Sangli market prices, though Sangli does not influence the other (13).

### Price cycle analysis

The Bry-Boschan algorithm examined the cyclical patterns of turmeric prices in the Erode, Nizamabad, and Sangli markets (Table 3). Price data were adjusted for inflation using a deflator and linked to account for varying base years. Analysis of the Erode market's turmeric prices revealed three peak-to-peak cycles, averaging 34 months (2.83 yrs). During downturns, prices decreased by 167 percent, while in upswings, they doubled (110 %). The duration of downturns (slumps) exceeded that of upswings (boom). Prices took 15 months to move from peak to trough and 21 months from trough to peak. Commodities generally spend more time in slumps than booms (6). These cycles are unique to turmeric, as maize prices showed neither trend nor cyclical movements (14, 15).

In the Nizamabad market, two cycles were identified, with a mean length of 68 months (5.6 years). The time spent in troughs (43 months) surpassed that in peaks (23 months). During downturns, prices fell by 153 %, while in upswings, they rose by 69 %. The duration of troughs

**Table 3.** Results of price cycle analysis (2010-2023)

| S. No | Parameters | Erode | Nizamabad | Sangli |
|---|---|---|---|---|
| 1 | Number of peaks-to-peak cycles | 3 | 2 | 4 |
| 2 | Number of trough-to-trough cycles | 4 | 3 | 5 |
| 3 | Mean cycle duration in months | 34 | 68 | 37 |
| 4 | Standard deviation in months | 16 | 11 | 11 |
| 5 | Percentage change in price during slump (amplitude) | -167 | -153 | -108 |
| 6 | Percentage change in price during boom (amplitude) | 110 | 70 | 54 |
| 7 | Number of months spent-peak trough | 15 | 23 | 15 |
| 8 | Standard deviation of cycle length | 4 | 7 | 5 |
| 9 | Number of months spent trough–peak | 21 | 43 | 22 |
| 10 | Standard deviation of cycle length | 15 | 13 | 11 |

Source: Authors calculation (MATLAB).

exceeded that of peaks. Prices required 23 months to move from peak to trough and 43 months from trough to peak. This price difference is due to regional economic differences. The Sangli market displayed four cycles averaging 37 months each. Troughs (15 months) lasted longer than peaks (5 months). In downturns, prices declined by 108 percent, while upswings increased by 54 %. It took 15 months to transition from peak to slump and 22 months from slump to peak. These findings indicate the potential for predicting turmeric prices in significant production and market centres. Although the number of cycles varied across the three markets, they shared a typical pattern: slumps consistently lasted longer than booms. Additionally, price amplitudes were similar in all three markets.

## Conclusion

Over the years, major Indian turmeric markets have experienced an upward price trend due to its demand in domestic and foreign markets. Research has identified a cyclical pattern in Indian turmeric prices, with cycles lasting 2-4 years. The duration of price slumps exceeds that of price booms. To mitigate price risks, turmeric farmers should be informed about peak and slump prices. During slump phases, reducing turmeric acreage could help avoid losses. Increasing cold storage facilities would minimize storage-related losses. Forecasting these cycles can assist farmers in making informed decisions about sowing and selling, thereby reducing cultivation risks. Implementing a Minimum Support Price could help offset rising labour costs and falling prices, encouraging farmers to continue turmeric cultivation. These informed price decisions for the turmeric producers will protect them from price risks and help them to make better selling decisions. Adopting a pricing system based on curcumin content for Tamil Nadu turmeric could yield better prices. Temperature, precipitation, and the amount of carbon dioxide in the atmosphere all affected crop yields and prices. Furthermore, it was discovered that supply-side and demand-side factors influenced crop prices, whereas climate change did not affect demand factors. Blockchain technology helps to improve the supply chain efficiency of turmeric by producing the right product at the right quality at the right point of time.

## Authors' contributions

APS collected and analysed the data. VPN, KM and BM conceived of the study and participated in its design and coordination. MD and SKMS participated in the design of the study. APS and MD participated in design of the study and performed the statistical analysis. All authors read and approved the final manuscript.

## Compliance with ethical standards

**Conflict of interest**: Authors do not have any conflict of interests to declare.

**Ethical issues**: None

## References


1. Singh R, Feroze, SM, Kumar S. Production of turmeric in the hill region of India: a value chain analysis. Ind J Agric Econ. 2020;75 (4):359–74. https://doi.org/10.22004/ag.econ.345145
2. Sharma M, Singh R, Bahadur A, Sharma M M. Performance and trade competitiveness of Indian spices: a markov chain approach. Ind J Eco Dev. 2024;449–56. https://doi.org/10.35716/ijed-23468
3. Ashraf K, Ahmad A, Shah S A A, Mujeeb M. Genetic diversity in accessions of Indian Turmeric using rapid market. Int J Phar and Pharma Sci. 2017;9(10):288–91. https://doi.org/10.22159/ijpps.2017v9i10.18715
4. Rohini A, Murugananthi D. Production and Marketing of Turmeric in Tamil Nadu. Ind J Eco Dev. 2020;15(4):600–3. https://doi.org/10.5958/2322-0430.2019.00077.5
5. Murugananthi D, Ajjan N, Sivakumar SD, Mani K. Price behaviour and market integration in turmeric-Evidences from empirical analysis. Mad Agri J. 2014;101(1–3):74–8. https://doi.org/10.29321/maj.10.001155
6. Cashin P, Dermott C J, Scott A. Booms and slumps in world commodity prices. J Deve Econ. 2002;69:277296. https://doi.org/10.1016/S0304-3878(02)00062-7
7. Bloch H, Sapsford D. Innovation, real primary commodity prices and business cycles. long term economic development. Cen Re Appli Eco. 2013;175–89. https://doi.org/10.1007/978-3-642-35125-9_8
8. Stephen R. Commodity Price Changes Concentrated at the end of the cycle. 2014. University of Western Australia. UWA Business School. https://doi.org/10.3790/ccm.48.2.207%0A
9. Raveendran N, Aiyaswamy P K. An analysis of export growth and export prices of turmeric in India. Ind J Agrl Eco. 1982; 37:323–25. https://doi.org/10.22004/ag.econ.269818
10. Andaleeb R. Characterizing food prices in India [interent]. Mumbai:Indira Gandhi Institute of Development Research; 2012.

[cited 2024 Sept 18]. http://www.igidr.ac.in/pdf/publication/WP-2012-022.pdf

11. Nalini N, Saravanan D. A study on the problems faced by the farmers in cultivating and marketing of coconut with special reference to Tirupur and Coimbatore districts. Int J Multi Re. 2024;6(4):1–10. https://doi.org/10.36948/ijfmr.2024.v06i04.24898
12. Savitha M G, Kunnal L B. Price and pattern of market arrivals and prices of paddy in Sindhanur and Sirguppa markets of Karnataka. Int Re J Agri Eco Stat. 2016;7(2):143–8. https://doi.org/10.15740/has/irjaes/7.2/143-148
13. Dhivya R, Prahadeeswaran, M, Parimalaragan R, Thangamani C, Kavitha S. Commodity future trading and cointegration of turmeric markets in India. Asian J Agri Ext Eco Socio. 2023;41(9):190–9. https://doi.org/10.9734/ajaees/2023/v41i92031
14. Asmitaben C R, Singh, N. Behaviour of market arrivals and prices of cauliflower in selected markets of Gujarat. Int Re J Agrl Eco Stat. 2020;11(1):81–6. https://doi.org/10.15740/has/irjaes/11.1/81-86
15. Wang J, Chen Y, Wang X, Zheng X, Zhao J. Cycle phase identification and factors influencing the agricultural commodity price cycle in China: evidence from cereal prices. Agrl Agrl Sci Proc. 2010;1:439–48. https://doi.org/10.1016/j.aaspro.2010.09.055