



## **Analysing the performance of small cardamom during pre and post WTO regime**

Arya Gopan & Abin T Mathews  
*University College, Thiruvananthapuram, Kerala*  
*\*E-mail-aaryagopan@gmail.com*

Received 24 May 2024; Revised 01 December 2024; Accepted 27 December 2024

---

### **Abstract**

Indian agricultural trade has undergone significant changes during the last three decades, especially during the WTO regime. The small cardamom, which is regarded as the queen of spices, was one of the Indian spices that witnessed several setbacks during the WTO regime. In this context, the present study analyses the performance of variables like area, production, productivity, prices (domestic and international prices), exports, and imports of small cardamom in terms of growth rate, instability, and structural stability during the pre- and post-WTO periods. Unlike the area under small cardamom cultivation, the production and productivity of small cardamom increased during the post-WTO period. Consequent upon the new liberalised trade regime under the WTO, the CAGR of exports and imports has increased during the post-WTO. Prices of small cardamom have been showing a decreasing trend since the 1980s. While the competitiveness of small cardamom declined, some of the major export destinations of Indian small cardamom remained the same, especially in the Middle East. Due to the unique quality of the Indian small cardamom, its demand has always been high in the international market, despite higher prices than in its competitors, like Guatemala. The higher cost of production, high domestic demand, and qualitative restrictions by importing countries have slackened the trade performance of Indian small cardamom, these can be overcome through promotion of sustainable farming practices and crop-specific plans and policies for enhancing crop production efficiency.

**Keywords:** Small cardamom, growth, instability, comparative advantage, prices, trade

---

## Introduction

India's history of spices trade can be traced back to the pre-colonial period, when traders across the world travelled to India to trade for spices. India is one of the major producer and exporter of spices such as cardamom, chilli, ginger, pepper, and turmeric ("spice catalogue," n.d.). Small cardamom is popularly known as the "Queen of Spices" and enjoys a supreme position in the global spice market. India's small cardamom enjoys a natural comparative advantage in production and trade owing to the unique agro-climatic conditions and superior quality of produce over other major small cardamom-producing countries. However, during the post-WTO period, the world's cardamom economy has undergone substantial changes in the value of production, volume, direction, and source of cardamom trade. Any policy change that affects the production environment and trade of this crop may impact the livelihood of its producers and traders. The majority of the small cardamom producers in the country are marginal and small farmers (Ravindran *et al.*, 2024). The production of cash crops like small cardamom has the potential to improve farmers' livelihoods and the rural economy with its potential positive linkages and spillover effects. Therefore, market performance and trade competitiveness are vital in shaping the lives of all stakeholders, especially the primary producers of the particular crop's economy and decisions regarding future resource allocation (Thomas *et al.*, 2019). Therefore, it is imperative to analyse the impact of trade policy changes during the 1990s on the trade

performance of small cardamom producers in India. This study analyses the impact of WTO trade policies on the area, production, productivity, prices, and trade of small cardamom in India.

## Materials and methods

In the present study, secondary data from various publications of Spices Board of India, Malhotra *et al.* (2021) and the websites of World Bank and World Integrated Trade Solution were used. The period between 1983–84 and 1994–95 was considered the pre-WTO period. The Period Between 1995–96 and 2021–22 was regarded as the post-WTO period. Smoothing of data was done by taking triennium averages prior to analysis. The Compound Annual Growth Rate (CAGR), Cuddy Della Valle Index (CDVI), Chow test, Revealed Comparative Advantage (RCA) indices, and export shares of small cardamom for major trading partners were estimated in this study.

### Compound Annual Growth Rate (CAGR)

The CAGR of area, production, productivity, export and import of small cardamom was calculated using an exponential function. Where,

$$Y = ab^t e^{u_t} \quad (1)$$

Y= annual average value of variables

a = intercept

b = Regression coefficient

$u_t$  = Disturbance term

t = Time variable

By transforming the equation (1) to log-linear form

$$\text{Log } Y = \text{log } a + t \text{ log } b + u_t \quad (2)$$

The ordinary least square (OLS) estimation method is used to estimate equation (2)

The CAGR is calculated as:  $\text{CAGR} = (b-1) \times 100$

The significance of the estimated CAGR was tested using a t-statistic.

### Cuddy Della Valle Index (CDVI)

The CDVI measures the variability in time series data. CDVI is estimated as follows:

$$\text{CDVI} = \text{CV} * \sqrt{1 - \text{ADR}^2}$$

Where, CV is coefficient of variation,  $\text{ADR}^2$  is the adjusted coefficient of determination. The value of CVDI between 0 and 15, between 15 and 30, and greater than 30 indicates low, medium and high instability, respectively.

### Chow test

Structural stability test using the Chow test was employed to analyse the changes in variables such as area, production, productivity, and export during the pre and post-WTO periods, (Gujarati & Porter, 2009)

$$F = \frac{(RSS_R - RSS_{UR})/K}{(RSS_{UR}/(N_1 + N_2 - 2k))}$$

Where,  $RSS_{UR} = RSS_1 + RSS_2$

$RSS_1$  = Residual sum squares (for 1983 – 84 to 1994 – 95)

$RSS_2$  = Residual sum squares (for 1995 – 96 to 2021 – 22)

$RSS_{UR}$  = Residual sum squares (for 1983 – 84 to 2021 – 22)

$K=2, N_1=12, N_2=27$

The null hypothesis, "there is no structural change between two periods," is tested against the alternative hypothesis, "there is a structural change between two periods".

### Revealed Comparative Advantage (RCA)

RCA Indices are used to find the extent of comparative advantage Indian small cardamom enjoys by comparing India's small cardamom trade with the world average.

$$RCA = \frac{E_i/CE}{W_i/WE}$$

$E_i$  = export of  $i^{\text{th}}$  commodity from the country

$CE$  = the aggregate export of the country

$W_i$  = total world export of  $i^{\text{th}}$  commodity

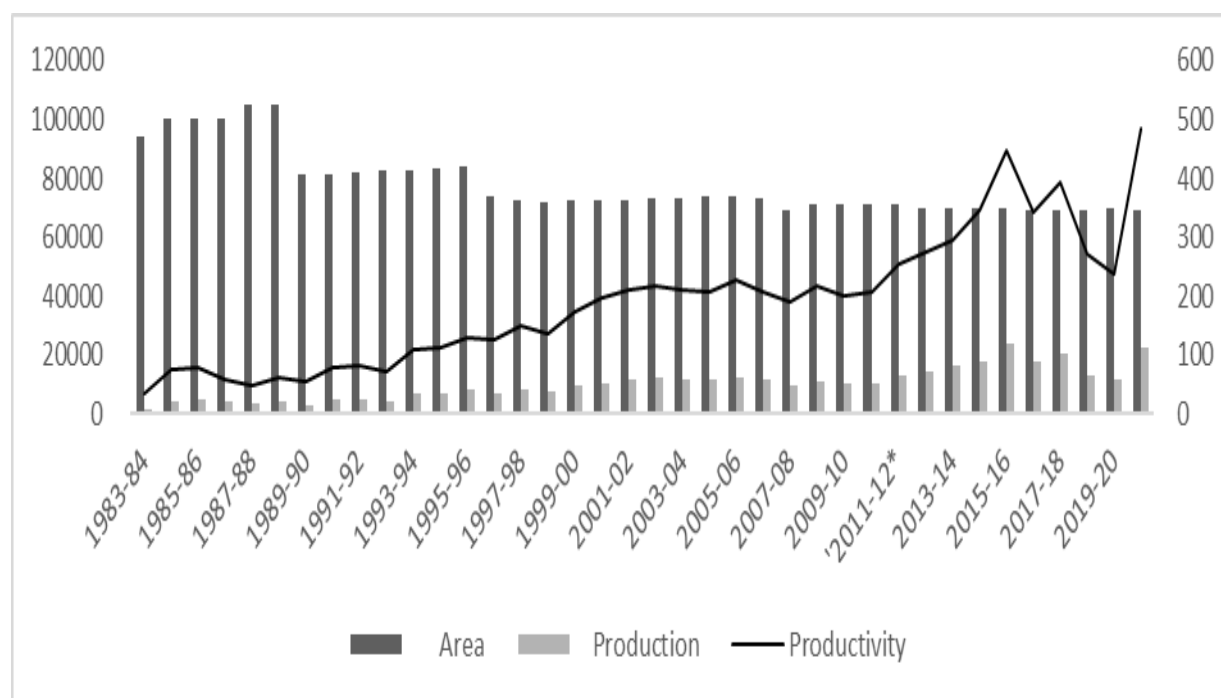
$WE$  = aggregate world exports during the period.

### Results and discussion

The trends in area, production, and productivity of small cardamom are illustrated in Fig. 1. It can be seen from Table 1 that the area under small cardamom cultivation has been declining since the 1980s. The decline in the area under cultivation of small cardamom during the last few decades can be attributed to the deterioration of cardamom hills, increased felling of trees, and crop shifting due to increased cost of production, volatility in prices, problems associated with marketing small cardamom, *etc.* (Varghese, 2004). However, the production of small cardamom

grew at a rate of 5 percent between 1983-84 and 2021-22. During the pre- and post-WTO periods, the production of small cardamom has grown positively at the rates of 5.1 percent and 3.9 percent, respectively. It can be observed that the CAGR of production of small cardamom during the post-WTO period is less than in the pre-WTO period. Factors like the increase in cost of cultivation, unremunerative prices, and unfavourable climatic conditions like summer drought (North East Monsoon drought (NEM) 2016), monsoon flood and strong wind, have adversely affected production of the crop during post-WTO period. The productivity of small cardamom remained robust during the post WTO period due to usage of high yielding variety and scientific management of crop (Nair, 2006).

The instability index for area, production, and productivity concerning small cardamom, estimated using the Cuddy Della Valle Index (CVDI), is given in Table 1. The area under small cardamom cultivation was highly stable with CVDI values of 7.93 and 2.92 during the pre and post-WTO periods, respectively. It can be observed that the CVDI value of small cardamom production experienced medium stability during the pre-and post-WTO periods. The productivity of small cardamom also experienced medium stability with CVDI values of 23.97 and 22.18 during the pre and post-WTO periods, respectively. The small cardamom acreage experienced low instability while the production and productivity experienced medium instability between 1983-84 and 2021-22.



Source: Spices Board

**Fig. 1.** Area, production and productivity of small cardamom in India

**Table 1.** Growth and instability in area, production & yield of cardamom in India

Period		Area	Production	Productivity
1983-84 to 1994-95	CAGR	-2.8*	5.1*	4.6*
	Instability	7.93	22.32	23.97
1995-96 to 2021-22	CAGR	-0.4*	3.9*	4.5*
	Instability	2.29	22.65	22.18
Overall period	CAGR	-0.9*	5*	5.7*
	Instability	13.95	24.18	24.43

Source: Spices Board, Note: \*Significant at 5 percent

### Testing structural breaks in variables influencing supply of small cardamom

The Chow test was used to identify the structural breaks in area, production, productivity, prices (international and domestic prices) and export of small cardamom. 1995 was used as a structural break point to check whether the advent of WTO has impacted the area, production productivity, prices and export of small cardamom in India. The results of the Chow

test (Table 2) were found to be statistically significant for trends in the area, production, productivity, prices and export of small cardamom in India. This implies to the occurrence of a structural break in 1995 when WTO came into force. In other words, a statistically significant difference exists in the growth rate of area, production, productivity, prices and export of small cardamom in India during the pre and post-WTO period.

**Table 2.** Results of Chow test for structural breaks

Variable	Chow test (F-value)	F(K, (N <sub>1</sub> +N <sub>2</sub> -2K) at 5 % significance	Decision
Area	13.72*	3.276	Reject the null hypothesis
Production	6.79*	3.276	Reject the null hypothesis
Productivity	6.38*	3.276	Reject the null hypothesis
Export	5.51*	3.276	Reject the null hypothesis
Domestic price	179.15	3.276	Reject the null hypothesis
International price	27.68	3.276	Reject the null hypothesis

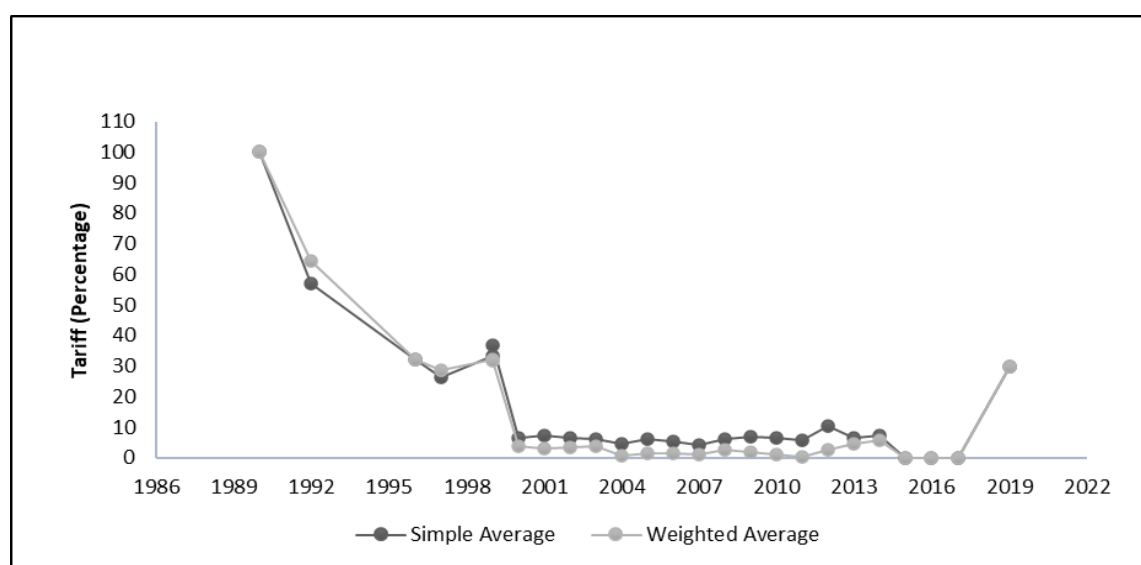
Source: Author's estimation

### Impact on small cardamom prices and trade

The advent of the WTO has led to reducing or removing various quantitative and qualitative restrictions on imports and exports, simplified trade measures, and minimised government interventions in domestic markets. The import tariff on small cardamom was reduced from 100 per cent in 1990 to 32 per cent in 1995 (Fig. 2). The simple average import tariff and weighted average import tariff on small cardamom, which was kept as high as an average of 47.64 and 48.17 during the 1990s, have substantially reduced to an average of 6.68 and 3.54, respectively, during the next two decades. Reducing the import tariff on small cardamom paved the way for imports of small cardamom to India. India has been the major exporter of small cardamom since ancient times. The import of small cardamom to India was negligible until 1995. From an import level of 26 metric tonnes in 1995, India now imports an average of 822

metric tonnes of cardamom yearly. Thus, the low import tariff facilitated the import of small cardamom from its competing countries, like Guatemala, Indonesia, *etc.*

The import of small cardamom has been robust since 1995, with a CAGR of 18.2 per cent (Table 3). This influx results from the policy of duty-free imports of spices allowed under the Advance Authorization Scheme for value addition and re-export. According to various news reports, the Guatemalan cardamom that is coming to India's neighbouring countries like Nepal, Bhutan, Bangladesh, *etc.*, reaches India through unauthorized channels. Such practices have been impacting the price of indigenous produce, causing a disastrous impact on domestic producers in the country. Other factors like high domestic demand, the higher cost of cardamom production, and relatively low prices prevailing in certain countries have also contributed to small cardamom imports.



Source: World Bank, <https://wits.worldbank.org>

**Fig 2.** Import tariff of small cardamom in India

It has to be noted that the import of small cardamom experienced several ups and downs post-WTO. This is evident from the estimated CVDI value of 98.34, showing that the imports of small cardamom to India experienced high instability during the post-WTO period. The high instability of small cardamom import is associated with its high dependence on climatic conditions, shade, and integrated plant management. The domestic demand for small cardamom is high in India (USAID 2011). Traders resort large quantity of imported small cardamom during the low production seasons to satisfy high domestic demand and reduce imports when the domestic production is high, this trend contributes to the high instability of small cardamom import.

India has been a significant exporter of small cardamom since time immemorial. Table 3 shows that the export of small cardamom decelerated during the pre-WTO period, while the same has grown at 18.9 per cent during the post-WTO period. The CAGR between 1983-84 to 2021-22 is 11.3 per cent, which is less than the growth of imports during the same period; it shows that since the 1980s, the import performance of small cardamom outpaced its export growth. Since the 1980s, India has started losing its supremacy in the global cardamom market due to the emergence of cheap exporting countries like Guatemala (Indhushree & Kuruvila, 2019). As a result export of small cardamom become highly unstable since 1980s. Decreasing trends in exports India's export along with the emergence of new small cardamom exporting countries caused a decrease in India's share in global cardamom exports, from 48.5 per cent in

1989-90 to 8.7 per cent and 16.5 per cent during 2017-18 and 2021-22.

The CAGR of the domestic and international prices of small cardamom during the pre- and post-WTO periods is also presented in Table 3. Like export, the CAGR of the domestic and international price of small cardamom registered a significant negative growth of -8.3 and -3.4 percent during the pre-WTO period. Even though the CAGR of prices of small cardamom registered a meagre positive growth during the post-WTO period, an overall trend shows that the prices of small cardamom have been decelerating since the 1980s. The crop, which was valued the same as gold, has been losing its sheen for the last three decades owing to increased supply and competition among exporting countries.

#### **Revealed Comparative Advantage (RCA) of small cardamom**

The ability of a country to face challenges from the international market depends mainly on its export competitiveness. A comparative advantage in trade for a country arises from structural factors like endowments, factor prices, and technological advancement. The short-term fluctuations in structural factors or any changes in market conditions lead to inconsistent variations in the value of the RCA index. The revealed comparative advantage of small cardamom from 1990 to 2021 is presented in Table 4. RCA index greater than one indicates the extent of a country's trade competitiveness in the international market. It is evident from Table 4 that the competitiveness of Indian small cardamom has been deteriorating

during the post-WTO period. The value of the RCA index, which was 80.42 in 1990, decreased to 16.82 in 1995. The competitiveness of small cardamom was high in the year 2000, with an RCA value of

41.21. Since then, the value of RCA declined persistently. This trend shows that India, once a monopoly in the small cardamom trade, has been losing its upper hand on the international

**Table 3.** Trends in small cardamom prices and trade

Period		Export	Import	Domestic price	International price
1983-84 to 1995-96	CAGR	-5.5*	-	-8.3*	-3.4*
	Instability	110.26	-	36.88	30.4
1995-96 to 2021-22	CAGR	18.9*	18.2*	.1*	.4*
	Instability	55.01	98.34	42.37	19.47
Overall period	CAGR	11.3*	18.2*	-3.4*	-2.3*
	Instability	87	98.34	56	42

\* Significant at 5 percent level of significance, Source: Computed using data from Spices Board

**Table 4.** Revealed Comparative Advantage (RCA) of small cardamom

Year	RCA
1990	80.42
1995	16.82
2000	41.21
2005	7.52
2010	5.36
2015	9.56
2019	4.92
2021	4.3

Source: World Bank, <https://wits.worldbank.org>, Note: Author's Estimation.

#### Export destinations of small cardamom from India

There have been considerable changes in the export destination of Indian small cardamom during the last three decades. From Table 5, it can be seen that the export destination of Indian small cardamom has changed every decade since 1991. The export share of Japan, which was the third largest export destination of small cardamom during TE 1991, has declined drastically in the subsequent decades. Similarly, Pakistan the second largest export destination of Indian small cardamom during TE 1991 with an export share of 25.38 percent, declined significantly to 21.29 percent and 12.80 percent during TE 2001 and



TE 2011 respectively. Saudi Arabia and UAE consistently imported higher share of Indian small cardamom during the last three decades. India exported 21.29 percent and 12.80 percent of its small cardamom to Pakistan during the period TE 2001 and TE 2011. Changes in the geo-political situation, the emergence of new sources of export, the availability of low-priced small cardamom from countries like Guatemala, *etc.* have contributed to the changes in the export

destination of small cardamom in India. However, over the last four decades, a few countries, such as the UAE, the United States, Pakistan, Kuwait, the United Kingdom, and Saudi Arabia, have consistently ranked among the top ten export destinations for Indian cardamom exports. We can conclude that Indian premium quality cardamom has always been the preferred variety in the Middle East.

**Table 5.** India's cardamom export destination

1991 TE		2001 TE		2011 TE		2021 TE	
Country	Share (%)	Country	Share (%)	Country	Share (%)	Country	Share (%)
USSR	27.99	Saudi Arabia	22.1	Saudi Arabia	48.22	UAE	33.45
Pakistan	25.38	Pakistan	21.29	Pakistan	12.80	Saudi Arabia	11.13
Japan	24.91	UAE	16.56	UAE	9.95	USA	7.72
Saudi Arabia	8.6	Japan	15.13	Kuwait	4.74	Kuwait	6.99
UAE	2.80	Kuwait	4.26	USA	3.99	Bangladesh	4.84
UK	2.8	UK	1.6	UK	3.78	Afghanistan	2.85
USA, PR, USVI	1.63	USA	1.5	Malaysia	1.81	Canada	2.79
France+Monaco	0.42	Germany	1.3	South Africa	1.41	UK	2.32
Greece	0.41	Bangladesh	1.15	Australia	1.40	Iran-Islam.R	2.26
Canada	0.37	Bahrain	1.12	Oman	1.28	Jordan	2.07

Source: World Bank, <https://wits.worldbank.org>

## Conclusion

The study analysed the performance of Indian small cardamom during the pre- and post-WTO regimes. It was observed that there was a negative growth rate in terms of area during the pre- and post-WTO period, while production and productivity

registered a positive growth rate between the years 1983-84 and 2021-22. The results show that the export and import of small cardamom registered robust growth during the post-WTO period. Along with export growth, the growth rate of international and domestic prices also registered a negative growth rate during the pre-WTO period,

while the prices recorded nominal positive growth during the post-WTO period. The reduction in the import tariff resulted in the huge import of small cardamom by India to meet its high domestic demand. An increase in the global production of small cardamom, a reduction in the import tariff, the emergence of new cardamom-producing countries, *etc.* resulted in the nominal growth of small cardamom prices in the international market despite increased global demand for cardamom. The export competitiveness of the small cardamom has been decelerating since 1990, and the export destination of the small cardamom changed significantly during the same period. Though the Middle East countries like UAE, Saudi Arabia, Kuwait, USA, and Pakistan remained stable markets during the post-WTO period. Indian small cardamom always had a consistent market, and it fetches high prices in the international market due to its superior quality. The higher cost of production, high domestic demand, and qualitative restrictions by importing countries slackened the trade performance of Indian small cardamom. Sustainable agricultural practices have to be promoted among the small cardamom farmers to produce high quality produce. Crop-specific plans and policies have to be deployed and implemented with the aim of tapping the potential of the domestic and international cardamom economy.

## References

- Gujarati D N & Porter D C 2009 Basic Econometrics. McGraw-Hill Irwin.
- Indhushree A & Kuruvila, A 2019 Performance of small cardamom export from India. *Journal of Tropical Agriculture* 57 (2): 122-131. <https://jtropag.kau.in/index.php/ojs2/article/view/803/517>.
- Malhotra SK, Homey Cherian, Babulal Meena, Manojkumar K and Sruthi Sreekumar (Eds.) 2021. *Spices Statistics at a Glance 2021*, Directorate of Arecanut and Spices Development, Calicut, Kerala
- Nair K P P 2006 The Agronomy and Economy of Cardamom (*Elettaria cardamomum* M.): The “Queen of Spices. *Advances in Agronomy* 91: 179–471
- Trade Statistics by Product (HS 6-digit). (n.d.). Retrieved December 22, 2021, from <https://wits.worldbank.org/trade/country-byhs6product.aspx?lang=en>.
- Thomas Lijo, Sanil P C & Rajeev P 2019 Trade competitiveness and export performance of Indian cardamom. *Journal of Spices and Aromatic Crops*, 28(1): 34–42. <https://doi.org/10.25081/josac.2019.v28.i1.5742>
- Ravindran P N, Sivaraman K, Devasahayam S & Nirmal Babu K (Eds.) 2024 *Handbook of Spices in India: 75 Years of Research and Development*. <https://doi.org/10.1007/978-981-19-3728-6>
- Varghese P K 2004 Trend Analysis in Area, Production, Productivity and Price Behaviour of Cardamom in Kerala. *Ind. J. Agri. Econ.* 59 (4): 798-807