



Growth and Variability in Major Fruit Spice Cultivation and Export from India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Spices export constitutes an important share in the agricultural export of India, standing at number one position for the export of several spices including chillies, cardamom, cumin etc. In the same context an analysis was carried out in the present study to analyse the growth rate of area, production, yield as well as the export quantity and value of spices from India during the period between 2018 to 2022. The analytical tools used for the study included average annual growth rate and coefficient of variation. The findings revealed that among the considered fruit spices pepper had the highest area under cultivation while Chillies had the highest production. The growth rate analysis revealed that chillies had the highest growth in area, while small cardamom had the highest growth rate in production and yield over the last five years. Small cardamom also exhibited the highest growth in both export quantity and value, though its exports also showed the highest instability.

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1. INTRODUCTION

India, is widely known as “The Spice capital” of the world. The Indian spices are renowned for their exquisite taste, flavor and consistency worldwide. India is a leading producer as well as exporter of spices in the world. The search for Indian spices has begun long back in time, from the ancient trade routes of silk road to the voyages of European explorers, paving ways and laying the foundation for a blooming global spice trade. The term spices refer to those natural plant or vegetable or their mixtures either in whole form or in grounded form which are used for adding their aroma, flavour, savoriness and for seasoning of the food [1]. India is the largest producer of spices globally. It is also the largest consumer and exporter of spices in the world. During the year 2021-22, India produced 10.87 million tonnes of spices. The major spice producing states of India are Madhya Pradesh, Rajasthan, Gujarat, Andhra Pradesh, Telangana, Karnataka, Maharashtra, Assam, Orissa, Uttar Pradesh, West Bengal, Tamil Nadu and Kerala. India undertakes commercial cultivation on 27 spices and it produces 75 spices out of 109 listed by ISO (International Standards Organizations) [2]. Among the various spices, chilli, cumin, turmeric, ginger and coriander account for 76 per cent of total spice production in India. As India enjoys a surplus in agricultural exports, the revenue generated from these exports can be utilized to import capital goods. This, in turn, can foster increased investment, leading to advancements in technology and subsequent improvements in productivity and efficiency. For developing agrarian economies such as India, the growth of exports is predominantly driven by the exports of spices [2,3,4]. During the year 2020-21, India exported spices worth value of 4 billion US\$, highest of all time export, despite the COVID pandemic. The export of spices from India increased with an annual growth rate of 8.54% in volume terms and 14.03% in value terms between the period 2018-19 to 2022-23. Among all the spices, Chilly is the highest exported spice which is mainly exported to Bangladesh, China, USA etc. As of the year 2022-23, India exported spices and spice products to 180 countries in the world. The top export destinations for Indian spices include China, USA, Thailand, Bangladesh, Indonesia, Germany, the UAE, Sri Lanka and Malaysia which account for 70 per cent of total export from India. Given the importance attached to spices

in India’s export basket and crop cultivation, this study was focused on finding the growth and variability in area, production, yield and export of major fruit spices in India [5-9]. The rest of the paper is organized into methodology section which detailed the data and analytical tools used, results and discussion section provided the results of the study along with discussion on it and conclusion section summarized the findings along with important policy implications derived from the results of the study.

2. METHODOLOGY

The study was based on secondary data for which the data on area production, yield of major spices was collected from Spices board of India. The data on export quantity and value of spices was collected from DGCIS website. The study was conducted for a period from 2018-19 to 2022-23. The major spices included in the study were pepper, small and large cardamom and chilies. The growth rate of area, production and yield of spices in the major states were calculated using average annual growth rate and the growth rate of export quantity and value of spices from India to major destinations was also calculated.

2.1 Analytical tools

- 1. Average Annual Growth Rate-** Growth rate of area, production and yield of major fruit spices as well as the export quantity and value of spices was calculated by using the AAGR. This method of calculation of growth rate is robust to outliers in the data and provides consistent results. The following formula was used for calculating the growth rate-

$$AAGR = \frac{1}{T} \sum_{t=2}^T \left(\frac{X_t}{X_{t-1}} - 1 \right) \times 100$$

- 2. Coefficient of variation-** The variation in the export quantity was calculated by using the following formula

$$CV = \frac{STANDARD\ DEVIATION}{MEAN} \times 100$$

3. RESULTS AND DISCUSSION

The area under the major fruit spices remained relatively constant throughout the period with

minor fluctuations except for pepper. The area under pepper was the highest among all other spices considered and it increased over the years reaching its peak during 2020-21 with 309.34 thousand hectares following which it observed slight decline in area. The data on area under spices is present in Fig. 1. and production of spices is present in Fig. 2. Among the considered spices, chillies showed the highest production throughout the period with highest production during year 2020-21. The pepper production followed an increasing trend while the production of chillies and small cardamom showed slight fluctuations in production over the period. The production of large cardamom remained relatively stable over the years.

The data present in Table 1 shows the growth rate of area, production and yield of major fruit spices in the major producing states between 2018-19 to 2022-23. The major pepper growing states in India include Karnataka, Kerala and Tamil Nadu. The highest growth rate in area for pepper was observed for Karnataka with 6.12 per

cent while Kerala observed negative growth rate in area with -0.09. The total area under pepper increased with a growth rate of 3.80 per cent, production increased with 8.19 per cent while the yield increased with 4.93 per cent. Among the considered states only Tamil Nadu showed negative growth rate in terms of both production and yield with -6.85 and -8.08 per cent. Karnataka showed the highest growth rate for area, production and yield of pepper among all states.

For small cardamom in Karnataka area remained nearly constant during the last five years with negligible growth rate and for production and yield it observed growth rate of 5.78 per cent. Among these states Tamil Nadu showed the highest growth rate in production and yield of small cardamom with a growth rate of 59.16 per cent and 44.03 per cent respectively. The overall area under small cardamom in India increased with negligible rate of 0.47 per cent, while the production and yield increased with a growth rate of 23.93 and 23.79 per cent respectively.

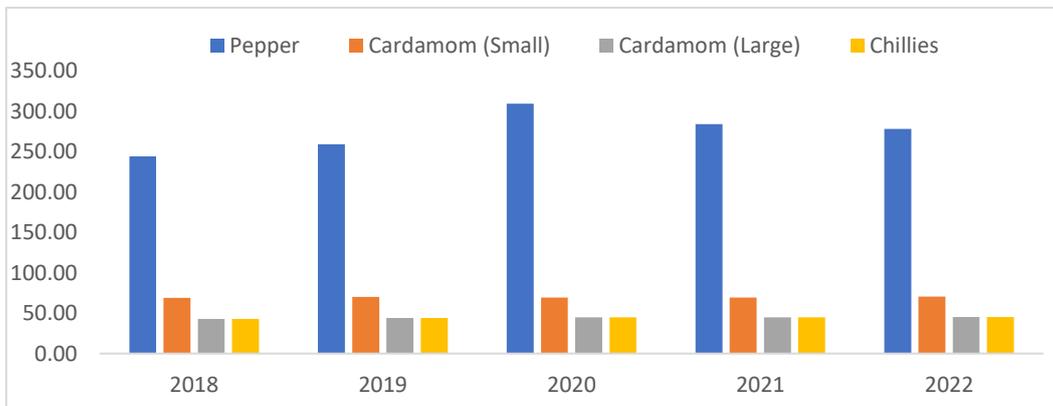


Fig. 1. Area under spices during 2018-19-19 to 2022-23-23

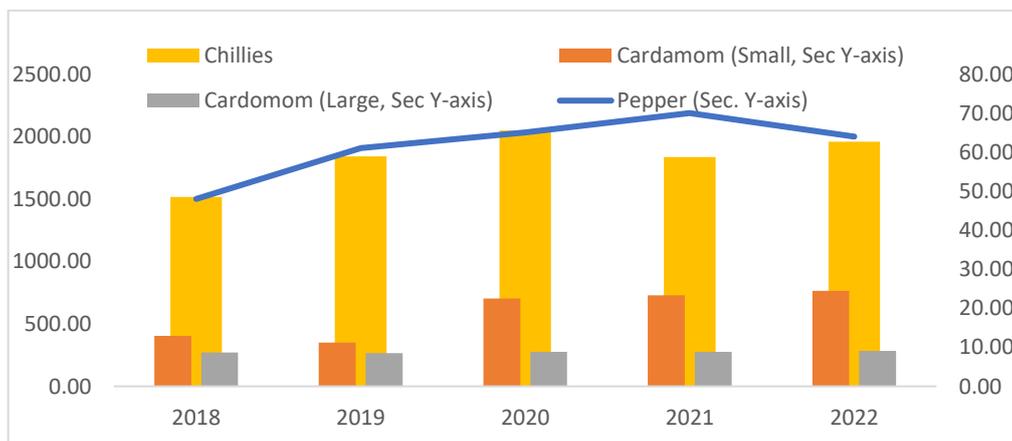


Fig. 2. Production under spices during 2018-19 to 2022-23

For large cardamom, Arunachal Pradesh showed the highest increase in area and production with 4.78 and 3.18 per cent however it showed decline in yield with annual growth rate of -1.45 per cent. Sikkim and West Bengal showed no change in area and minimal growth rate in production as well as yield. Nagaland showed moderate increase in area and production of large cardamom with 1.33 and 1.71 per cent. Overall, the growth of large cardamom in India was positive in terms of area (1.47 %) and production (1.17 %) while it was negative in yield (-0.28 %).

In context of chillies, the area production and yield increased during the last five years with annual growth rate of 5.78, 7.25 and 4.56 per cent. In terms of area Telangana showed the highest annual growth rate of 20 per cent followed by Andhra Pradesh (9.84 %) and Madhya Pradesh (9.80 %). Andhra Pradesh showed the highest annual growth rate in production and yield with 15.56 and 10.80 per cent. Karnataka showed negative annual growth rate in both area and production with -0.26 and -1.14 per cent.

3.1 Export Scenario of Major Spices From India

The data in Table 2 presents the export quantity of major fruit spices from India during the period

2018-19-19 to 2020-21. India exported the highest quantity of spices during the year 2020-21 with a volume of 1758.99 thousand tonnes. Chillies were the most exported spices from India throughout the period with highest share in total spices export. The share of chillies export increased from 42.58 in 2018-19 to 36.94 per cent in 2020-21 which was the highest share. Pepper was the next best exported spice from India after chillies. Small cardamom showed fluctuating trend in export from India during the study period from 2.85 thousand tonnes to 10.57 thousand tonnes during the year 2021-22 which was the highest export of small cardamom. Its percentage share also increased over the period with slight decrease during 2022-23 with 0.52 from 0.69 per cent. Among all the spices considered large cardamom had the lowest share in total export and its percentage share remained nearly constant during the period.

The data present in Table 3 presents the annual growth rate and instability in export quantity and value from India during the last five years between 2018-19 to 2022-23. The highest annual growth rate in the export quantity and value of pepper was observed in United Arab Emirates with 94.91 and 65.32 per cent respectively. Among the major export destinations of pepper only United Kingdom showed negative annual growth rate for both export quantity and value. United Arab Emirates showed highest variability

Table 1. Annual growth rate of Area, Production and Yield of major fruit spices in major producing states of India during period 2018-19-19 to 2022-23

S.no.	Spices	States	Area	Production	Yield
1.	Peppers	Karnataka	06.12	15.87	10.27
		Kerala	-00.09	05.78	06.05
		Tamil Nadu	02.70	-06.85	-08.08
		Total	03.80	08.19	04.93
2.	Cardamom (Small)	Karnataka	00.00	05.78	05.78
		Kerala	00.94	24.78	24.28
		Tamil Nadu	00.72	59.16	44.03
		Total	00.47	23.93	23.79
3.	Cardamom (Large)	Sikkim	00.00	0.64	00.64
		West Bengal	00.00	0.19	00.19
		Arunachal Pradesh	04.78	03.18	-01.45
		Nagaland	01.33	01.71	00.38
		Total	01.47	01.17	-00.28
4.	Chillies	Andhra Pradesh	09.84	15.56	10.80
		Telangana	20.00	11.76	-02.61
		Madhya Pradesh	09.80	12.19	01.48
		Karnataka	-00.26	-01.14	07.87
		Orissa	01.22	07.12	05.98
		Total	05.78	07.25	04.56

Table 2. Export quantity of spices from India between 2018-19 to 2022-23

Spices	Unit: 000*tonnes				
	2018-19	2019-20	2020-21	2021-22	2022-23
Chillies	468.50 (42.58)	496.00 (41.05)	649.82 (36.94)	557.14 (36.40)	516.18 (36.76)
Pepper	13.54 (1.23)	17.00 (1.41)	19.98 (1.14)	21.86 (1.43)	17.96 (1.28)
Cardamom (Small)	02.85 (0.26)	01.85 (0.15)	06.49 (0.37)	10.57 (0.69)	07.35 (0.52)
Cardamom (Large)	0.86 (0.08)	01.31 (0.11)	01.22 (0.07)	01.98 (0.13)	01.88 (0.13)
Total	1100.25 (100.00)	1208.40 (100.00)	1758.99 (100.00)	1530.66 (100.00)	1404.36 (100.00)

(Figures in parenthesis represent share in total export)

Table 3. Annual growth rate and instability of export quantity and value of major fruit spices from India to major destinations during period 2018-19 to 2022-23

S.no.	Spices	Destination Country	Export Quantity	Export Value	CV (%)
1.	Pepper	United States America	13.50	13.00	27.76
		United Kingdom	-04.56	-04.00	12.89
		Canada	15.44	09.25	32.86
		Sweden	08.85	12.45	19.44
		United Arab Emirates	94.91	65.32	83.28
		Total	08.66	7.21	17.44
2.	Cardamom (Small)	United Arab Emirates	37.22	20.68	55.47
		Saudi Arabia	1137.80	3376.02	88.04
		Kuwait	26.84	01.65	40.77
		United States America	47.16	42.97	47.55
		Total	62.01	105.19	60.70
3.	Cardamom (Large)	United Arab Emirates	153.69	279.49	87.11
		United Kingdom	-01.40	0.45	29.82
		United States America	03.79	08.69	23.43
		Canada	235.74	179.57	57.48
		Total	25.72	25.30	32.52
		4.	Chillies	China	26.09
Sri Lanka	-04.97			14.79	8.03
Bangladesh	52.22			43.59	63.18
United States America	04.56			17.14	21.14
Thailand	-03.03			17.33	14.63
Total	03.82			19.07	13.13

in export quantity also with coefficient of variation of 83.28 per cent. The overall export of pepper from India increased with a rate of 8.66 and 7.21 per cent and variability of 17.44 per cent. Export of small cardamom from India increased with an annual growth rate of 62.01 per cent in terms of quantity and 105.19 per cent in terms of value. The export of small cardamom from India to Saudi Arabia showed the highest annual growth rate in terms of both quantity and value with value of 1137.80 and 3376.02 per cent. While the export to Kuwait showed the lowest annual growth rate among all the countries with 26.84

per cent in export quantity and 1.65 per cent in export value. The Middle East countries such as Saudi Arabia, UAE and countries like USA are the major cardamom consuming countries in the world [10]. Export to Saudi Arabia showed the highest variability with a value of 88.04 per cent while the overall export from India observed a variability of 60.70 per cent. For large cardamom the export from India increased during the last five years with an annual growth rate of 25.72 and 25.30 per cent. Among the various countries Canada showed the highest annual growth rate in export quantity with 235.74 per cent and

United Arab Emirates showed the highest annual growth rate in export value of large cardamom with 279.49 per cent. The export quantity of large cardamom from India declined to United Kingdom with negative annual growth rate of -1.40 per cent and minimal growth in export value of 0.45 per cent per annum. Export of large cardamom observed the highest variability for United Arab Emirates during the last five years with coefficient of variation of 87.11 per cent. As per the spices board, during the fiscal year 2022-23, India witnessed a remarkable surge in the value of chili exports, reaching an impressive amount of over ₹10,444 crore. China emerged as a significant buyer, purchasing more than 1.57 lakh tonnes of Indian chili valued at over ₹3,408 crore, contributing to nearly one-third of the total export value. Chili stands as the dominant spice in India's export portfolio, constituting nearly one-third of the overall value of shipments, which amounted to ₹31,761 crore (Kulkarni & Kurmanath, 2023). The data in Table 2 showed that export of chillies from India increased in terms of quantity and value both with a growth rate 3.82 per cent and 19.07 per cent. Among various countries Bangladesh showed highest increase in export of chillies with growth rate of 52.22 and 43.59 per cent for export quantity and value. China and Bangladesh are the largest buyers of chilli from India. Sri Lanka and Thailand showed decline in export of chillies with negative growth rate of -4.97 and -3.03 per cent, although they showed positive growth rate for export value with 14.79 and 17.33 per cent. The highest variability in the export of chillies was observed for Bangladesh with 63.18 per cent.

4. CONCLUSION

From the ongoing analysis it can be concluded that the area under pepper was highest among considered fruit spices which observed an increasing trend during the period. In terms of production chillies showed highest production following an increasing trend while the area under other spices remained nearly constant. The findings of growth rate showed that the highest growth of area was observed for chillies with growth rate of 5.78 per cent while the highest increase in production and yield of spices during the last five years was shown by small cardamom with a growth rate of 23.93 and 23.79 per cent respectively. Among the various spices the highest increase in export quantity and value both was observed for small cardamom with a growth rate of 62.01 and 105.19 per cent respectively. The export of small cardamom also

showed highest instability in the export with CV value of 60.70 per cent.

5. POLICY IMPLICATIONS

- Policies aimed at enhancement in the production of spices in states where they showed highest growth rates should be implemented through targeted support, extension services, improved farming practices and infrastructure support.
- Efforts should be made to strengthen the export infrastructure and logistics to capitalize on the high growth rate in pepper exports, particularly to emerging markets like the United Arab Emirates, Saudi Arabia.
- Efforts should be made to analyse the reason for nearly zero or negligible increase in growth rate for some spices in particular states like Kerala, Karnataka, West Bengal and Sikkim.
- Further efforts should be made to investigate the reasons for the decline in spice exports to traditional markets and implement measures to regain market share.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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