



## Competitiveness in spice export trade from India: A review

L Thomas\* & P C Sanil

ICAR-Indian Institute of Spices Research, Kozhikode-673 012, Kerala.

\*E-mail: [lijo.iari@gmail.com](mailto:lijo.iari@gmail.com)

Received 17 June 2019; Revised 11 July 2019; Accepted 15 July 2019

---

### Abstract

Spices are one of the most traded agricultural commodities across the globe. India, as the world's leading producer and exporter of spices is a significant stakeholder in spices export trade. The paper reviews the studies conducted on the spices export sector with special focus on India and the policy issues applicable to this sector. The review focuses on the history, trade competitiveness and issues related to regional trade agreements, trade barriers and food safety in the export trade of spices. Research gaps on issues like linkages between economic development and spice export are identified. The review concludes with suggestions for promoting growth and development of the spice export sector in India.

**Keywords:** Spices, export, trade, competitiveness

---

### Introduction

Trade is considered one of the most important engines for economic development at the global level (Riedel 1984; Wilson *et al.* 2005). Spices have a long history of being one of the most highly traded commodities across the globe. Food and agricultural trade forms the vital functional link between the global trade network and developing economies (Jaffee 2005) and many Asian countries have leveraged trade for fuelling economic growth (Kenichi 2003; Bernhofen & Brown 2005). Spices form an important component of trade, which has influenced the course of economic, social and political development across the globe. Developing countries including India are a dominant source

of supply for world spice trade (Jaffee 2005). Though the importance of spices and its trade as an agent shaping the history of economies has diminished in recent years, they played a significant role in determining the course of economic interaction between nations (Pollmer 2000). Trading of spices across complex trade routes and networks, established over centuries, played a critical role in the exchange of ideas between the east and the west.

India is the leading producer and exporter of spices in the world. Some commodities like black pepper among others, have driven the trade policies since time immemorial (DeWaal & Brito 2005). The fortunes of spice trade have significant implications for the export performance of

agricultural sector in the country. In value terms, the share of spices in total agricultural exports was 8.4% during 2017-18 and global spice exports were valued at 4.69 billion US Dollars during 2016 (ITC 2018).

Though the general welfare gains from free trade has been well established (Baldwin 1992; Redding 1999; Holmes *et al.* 2014), the specific issues related to commodity sectors like spices have not been exhaustively studied. The theory of comparative advantage, which forms the cornerstone of the theoretical foundation for welfare gains, does not offer detailed understanding of the underlying variables influencing trade. Hence, a comprehensive review of the work done with direct implications to spices export trade is needed to develop a better understanding of the various facets of economic factors influencing the relative strengths, efficiency and competitiveness of spice export trade. This is especially relevant when the traditional networks of spice trade, established over the centuries are undergoing transformation due to increase in demand coupled with stringent quality measures (Box 1989).

### Outline and scope

Though trade encompasses both export and imports, we place our focus on export trade of spices since they are a significant component in India's agricultural exports. Spices stands fourth in terms of export value among agricultural exports from India. After a brief overview of the historical context and importance of spice export trade, an outline of the policy environment for spice export is detailed followed by a brief examination of trade agreements and its effect on spice exports. Major studies on trade competitiveness in the spices sector, either as individual commodities or as a commodity group are presented after this. Studies on trade efficiency and market power in global spice trade is also examined as a part of this section along with a description of the tools for measuring trade competitiveness. The barriers to trade are of special significance to spice exports and this forms the following section which reviews the attempts to study the trade barriers in spices, both using tariff and non-tariff measures. Though concerns about food safety are often used

as non-tariff barrier to agricultural trade in general (Henderson & Lorder 2001) and spice trade in particular (Henson & Jaffee 2007), we treat it as a separate issue and review trade issues and research work undertaken in the spices sector focusing on food safety. Based on the review of the research work on trade economy aspects of spices, the research gaps are identified. The last part concludes with suggestions for improvement in the spice export trade sector in the country.

### History of spice trade

The history of spices as a traded commodity has been examined through several means including textual and archaeological evidences. However, a consensus on the earliest trade contacts through which spices produced from South Asian region reached Mediterranean and European regions remains elusive. Though strong archaeological and textual evidence exist with regard to spice trade between South Asia and early Greek and Roman Empires, the earliest period such spice trade could have occurred was during 11<sup>th</sup>-12<sup>th</sup> century BCE or even earlier (Gilboa & Namdar 2015). Spices were one of the most important constituents of trade from the Indian subcontinent to various parts of the Roman Empire during the 1<sup>st</sup> to 3<sup>rd</sup> Century CE (Galli 2017), which encompasses most of the present-day European economies. Though the use of spices in rituals, perfumery and medicines were prevalent even before the medieval period, some spices like black pepper gained prominence across both Middle East and Europe (Van der Veen & Morales 2015).

Ever since spices rose to prominence in the European region, they have been given an aura of mysticism and remained a favourite symbol to denote an elite status in the society due to its shortage and high cost of acquisition (Keay 2006). The European interest in spice trade was further fuelled by the excessive control over the spice trade maintained by Arab traders and later by the Ottoman empire, resulting in high price of this commodity. The unfamiliarity of the land-based trade routes extending across the deserts separating the Asian continent from Europe was also one of the major reasons for the quest for a new trade route over sea to the East.

Spices were traded through a complex network spanning the oceans and land routes and were the focus commodity of trade for several centuries. The name 'spice route' denoting the trade routes arises from this fact. Among the major traded spices during the 1<sup>st</sup> to 3<sup>rd</sup> century CE, cinnamon, ginger, cassia, cardamom and several unspecified spices are mentioned in the ancient nautical handbook *Periplus Maris Erythraei* (Galli 2017). The discovery of direct sea routes brought in vast changes in the social, political and cultural linkages between the Indian subcontinent and the rest of the world. Trade in commodities like black pepper, clove, nutmeg, etc., originating from the East Indies including Indian subcontinent, flourished during the 16<sup>th</sup> century and the trade volumes increased progressively (Halikowski 2015). The wave of traders from major economies of the 16<sup>th</sup> and 17<sup>th</sup> centuries, with an eye on the lucrative spice trade brought in a colonial culture and introduced early capitalism in the Malabar coast (Kalidasan 2015), drastically changing the course of Indian history. Though the relative value declined in the 18<sup>th</sup> and 19<sup>th</sup> centuries, spices continued to be one of the most traded commodities in the global trade. The competitive challenges in spices trade have increased in the recent years with multiple sources of supply for bulk spices.

### **Policy backdrop for spice export trade**

Trade policies adopted by the government play an important role in shaping the export sector of any commodity. Historically, India had a trade surplus for centuries through export of spices, handicrafts, textiles, etc. and no official restrictions on imports or exports were maintained (ICAI 2008). Though the Government of India Act 1935 gave exclusive legislative power to regulate trade, it was not used in practice. The Import and Export (Control) Act, was enacted in 1947 which guided export policies until 1992 when the Foreign Trade (Development and Regulation) Act was passed. The trade policy in general was generally considered to be inward looking until 1980's and these policies were based on the fear that liberalized trade in agricultural commodities like spices could lead to a secular deterioration in terms of trade (RBI 2003). Since the period of economic reforms in 1991, foreign trade policies starting from the Exim Policy 1992-

97 have explicitly tried to promote exports by rationalizing export procedures and documentation while liberalizing imports. These policies had direct impact on agricultural commodities in general and spices in particular. Though there are apprehensions that the global trade liberalization policies could restrict domestic income growth (Patnaik 1996), trade policies have continued to support generation of exportable surplus and dismantling of trade barriers. With the formation of WTO, India was obliged to reduce or discard several protective trade policies. Spices are considered as sensitive products, the imports of which are monitored so that appropriate tariff measures can be taken in case of import surges. This is indicative of the domestic trade protection offered to this sector.

The spices sector also benefitted from general schemes and programmes intended for export promotion in the agricultural sector as a whole. The concept of agri-export zone was introduced in EXIM policy 1997-2001 with the primary objective of boosting agricultural exports. Some of the agri-export zones were specifically designated for spice crops like ginger, turmeric, chillies and seed spices (APEDA 2015). A comprehensive approach to incentivize spice exports is seen under the *Vishesh Krishi Upaj Yojana* (VKUY) (Special Agricultural Produce Scheme) introduced in the Foreign Trade Policy 2004-2009, under which spice exporters could get duty credit equivalent to 5% of the free on-board value (FOB value) of exports. However, the scheme excluded black pepper, chillies and cardamom (DGFT 2005). In 2006-07, VKUY was renamed as *Vishesh Krishi and Gram Udyog Yojana* (VKGUY) (Special Village and Agriculture Industry Scheme). In the Foreign Trade Policy 2009-14, spices were excluded from the ambit of VKGUY and placed under the Focus Products Scheme (FPS) where the incentive of duty credit was only 2% for spice exporters as against 5% under the VKGUY. The current Foreign Trade Policy (2015-2020) has sought to merge several export promotion schemes like FPS, Focus Market Scheme, VKGUY etc. into a single scheme namely, Merchandise Export Scheme from India (MEIS). Exported spice commodities are eligible for incentive duty credit under this scheme (GoI, 2015).

Apart from enabling policy stance, institutional support has also been provided for promoting export of spices. The Spices Export Promotion Council was established in 1960 with this explicit objective. Later Spices Board was established as a commodity board in 1987 by merging Spices Export Promotion Council and Cardamom Board. Several schemes for supporting spice exporters are operated by the Board (Spices Board 2019). The spice parks, established by Spices Board, providing advanced infrastructure facilities for quality improvement, grading, packing, warehousing etc. is one such scheme, with an objective of enhancing the quality and safety of spices from India (Chawla 2016). At the policy level, trade facilitation and infrastructure are often taken in the general sense and only partly address the specific issues related to the reduction of risks and transaction costs in the context of agricultural exports. The invisible infrastructural facilitation such as easy documentation, customs procedures, and fair regulatory regimes specific to the export commodities are required to enhance trade from developing countries (Kumar 2011).

#### *Trade Agreements*

While several factors like foreign direct investment, movement of exchange rates and domestic demand affect the export performance (Sharma 2003), trade agreements among nations are gaining significance in determining the quantum of trade and the gains from trade. Apart from being a signatory of the multilateral World Trade Agreement, India has also effected regional trade agreements which has shaped the spice exports from the country. The major regional trade agreements include Free Trade Agreement with Association of South East Asian Nations (ASEAN) for trade in goods and South Asia Free Trade Agreement (SAFTA) which are of particular importance because the member countries in the agreement are major producers and market competitors for several spice commodities. The multilateral trade agreements with significant implications for spice exports is presented in Table 1. Apart from these multilateral trade agreements, there are also bilateral trade agreements for spice exports. Among them bilateral agreements with Sri Lanka, Malaysia, Singapore and Japan are important.

The nature and extent of benefits to the agricultural export sector from trade agreements are subject to debate. While the net benefits of trade liberalization in agriculture through multilateral trade agreements are suggested to be positive (FAO 2003), there have been some counter arguments also. Francis (2011) states that India's relative share in global exports of labour-intensive and natural resource-based commodities like spices have declined during the first decade of the 21<sup>st</sup> century as a result of liberalized trade agreements. The study by Jeromi (2007) argues that in the absence of safety nets trade liberalization could lead to economic decline of export oriented agricultural sector in developing countries. Bellmann *et al.* (2010) also concluded that poorer developing countries could be the worst affected from global economic slowdown. The analysis of the impact of regional trade agreements usually traces the movements in terms of trade of various sectors.

The Global Trade Analysis Project model (GTAP) was employed in studies by Ahmed (2010) and Sikdar & Nag (2011) to analyse the welfare and trade impact Indo ASEAN agreement for trade in goods on the agricultural sector. Both the studies conclude that there will be welfare gains for both India and ASEAN, but they also point out that terms of trade for India will decline arising from allocative inefficiency. The comprehensive analysis of SAFTA indicate that all the member countries stand to gain substantially in terms of trade growth and economic growth (Ahmed *et al.* 2010). The gravity model, a standard analytical tool to estimate trade flows between countries (based on factors such as countries' income, proximity and trade agreements) has been used in analysing multilateral trade agreements like SAFTA (Baroncelli 2007), GSTP (Masahiro 2005) and ASEAN-India FTA (Veeramani & Saini 2010). All these studies, while affirming the benefits from the trade agreement, also flag potential issues like the need for domestic institutional reforms and infrastructural development to reap full benefits from these agreements. Harilal (2009 & 2014) contends that the tropical commodities like spices could also become more vulnerable to price fluctuations and the share of producers in the value chain could be adversely affected with the implementation of ASEAN-India free trade

**Table 1.** Multilateral trade agreements with significant impact on spice exports

Name	Member countries	Nature of trade agreement
Asia Pacific Trade Agreement (APTA)	Bangladesh, China, Republic of Korea, Sri Lanka, India	PTA
India ASEAN Trade in Goods Agreement	Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, India	FTA
Global System of Trade Preferences (GSTP)	Algeria, Argentina, Bangladesh, Benin, Bolivia, Brazil, Cameroon, Chile, Colombia, Cuba, Democratic People's Republic of Korea, Ecuador, Egypt, Ghana, Guinea, Guyana, Indonesia, Iran, Iraq, Libya, Malaysia, Mexico, Morocco, Mozambique, Myanmar, Nicaragua, Nigeria, Pakistan, Peru, Philippines, Republic of Korea, Romania, Singapore, Sri Lanka, Sudan, Thailand, Trinidad and Tobago, Tunisia, Tanzania, Venezuela, Viet Nam, Yugoslavia, Zimbabwe, India	PTA
South Asia Free Trade Agreement (SAFTA)	Pakistan, Nepal, Sri Lanka, Bangladesh, Bhutan, Maldives, India	FTA

PTA =Preferential Trade Agreement; FTA=Free Trade Agreement

Source: Department of Commerce, Government of India

agreement. A similar conclusion was put forth earlier by Harilal & Joseph (1999) in their analysis of India-Sri Lanka Free Trade Agreement. The study also highlights the role of factors beyond the control of primary producers of commodities like the relative value of currency and rates of inflation which can determine the gains from such regional trade agreements.

### **Competitiveness and market power in spice trade**

The concept of competitiveness has been defined as a measure of a country's advantage or disadvantage in selling its products in the international markets (OECD 2014). Typically, export competitiveness is linked to or measured in terms of export growth, shares of export markets etc. competitiveness in spice trade also can be assessed in a similar manner. The colonial

control of spice trade starting from the 16<sup>th</sup> century meant that the producers of spices in the East Indies and South Asia could not garner a significant share of the profits from the trade. Driven partly by the competition among the colonial powers for spices, the availability of spices increased through increased production and spread of the crops in non-traditional areas (Pickersgill 2017). Spice exports from India continued unabated during 17<sup>th</sup> and 18<sup>th</sup> centuries mainly through British East India Company, United East Indies Company and French East India Company (Robins 2012) and later under the British rule from 1857 till independence in 1947. Spices export trade from India has witnessed substantial growth in terms of volume and value in recent decades. One of the first attempts on a detailed analysis of the export parameters and potential of spice crops

was by the Spices Enquiry Committee constituted by the Indian Council of Agricultural Research in 1951. The committee, which submitted its report in 1953 studied four major export earning spice crops namely, black pepper, ginger, turmeric and cardamom, along with cashew nut and lemon grass oil (ICAR 1953). The report highlighted the trends in the export quantity and earning from these crops during the two decades leading up to 1950's and pointed out the importance of these spices as foreign exchange earners. The report also indicated the potential forces of competition and their implications for exports in these commodities. The volume of spice exports from India crossed 1lakh tonnes for the first time during the late 1970's. From that point, the volume doubled in a short span of two and a half decades. At present India exports more than 1million tonnes of spices valued at 2.8 billion USD (Spices Board 2019). The share of spice exports in India's agricultural exports have also increased consistently during the last four decades (Table 2).

One of the major debates in India regarding competitiveness in spice exports relate to the impact of trade liberalization policies implemented in the Indian economy. This is of importance in spices where the country had a comparative advantage in the decades prior to trade liberalization. The impact of trade liberalization on Indian agricultural exports have been examined by several researchers (Chand 2004; Chand & Bajar 2012, Harilal & Dhanya 2015; Ghosh 2017) and most of the

studies indicated a better integration of Indian agriculture with the global trade. The impact of trade liberalization on spices exports has also been examined in detail. Shinoj & Mathur (2008), using revealed comparative advantage approach, concluded that India has been able to retain its competitiveness in spice exports in the Asian context. Predominantly tropical commodities like spices suffer from typical commodity problems, such as short-run instability in prices and long-term deterioration of the terms of trade which is also related to the nature of demand and supply. The demand for primary commodities does not grow as fast as income does and if supply is not adjusted accordingly, the prices and terms of trade would decline for the producing centres of these primary commodities (Harilal & Dhanya 2015). Upward mobility along the commodity value chain is suggested as a remedy to solve this situation which could be appropriate for commodities like spices. Though most of the impact studies looked at the aggregate spice sector, individual commodity level studies have also been attempted. The study on the impact of globalization on turmeric trade from India by Angles *et al.* (2011) is one such study. Ghosh (2017) reported that spices have increased their share in agricultural exports in the post reforms period. The impact of globalization and trade liberalization measures ultimately affected the competitiveness of spices exports.

Price instability at the international level has the potential to affect the trade patterns and benefits from trade along the value chain with rising

**Table 2.** Trend in share of spice exports in total agricultural exports (nominal value)

Year	Export value (Rs Crore)		Share of spices in total agricultural exports (%)
	Spices	Agriculture & allied products	
1980-81	11	2057	0.5
1990-91	239	6317	3.8
2000-01	1619	28,582	5.7
2010-11	8043	111,393	7.2
2016-17	19,111	226,775	8.1

Source: Economic Survey, 2017-18, Ministry of Finance, Government of India

prices affecting importing countries and the falling prices adversely affecting producers and exporting countries (Bale & Lutz 1979). Though higher magnitude of international price instability continues to be major argument against trade liberalization in agriculture, the study by Sekhar (2003) finds no evidence for significant differences in price volatility at domestic and international markets. However, even though the variability in world prices has been almost entirely transmitted to developing countries in the dollar value of their export unit values, it has not been fully transmitted to average producer prices since real exchange rates, domestic marketing arrangements and government interventions buffered price movements in the interest of producers in many developing countries (Hazell *et al.* 1990).

#### *Tools for measuring competitiveness*

The use of Revealed Comparative Advantage (RCA) as an instrument for analysis of the relative trade competitiveness of individual spice commodities and spices as an aggregate has been resorted to by several researchers. The RCA, which is developed and modelled on the basic tenets of David Ricardo's theory of comparative advantage, assumes that the countries will specialize on those commodities where it has a comparative advantage and export those commodities at a relatively lower cost (Balassa 1965).

RCA is usually expressed as

$$RCA = \frac{(X_{ij}/X_{ik})}{(X_{nj}/X_{nk})}$$

Where,  $X_{ij}$ =Exports of country 'i' of commodity 'j';  $X_{ik}$ =Exports of country 'i' of a set of commodities 'k';  $X_{nj}$ =Exports of a set of countries 'n' of commodities 'j' and  $X_{nk}$ =Exports of a set of countries 'n' of a set of commodities 'k'

Among the several factors which can influence RCA economic factors, trade structure, world demand scenario and trade specialization can be of immediate significance (Shinoj & Mathur 2008). The Variations of RCA like Revealed Symmetric Comparative Advantage (RSCA) has also been similarly employed. The study by

Jambor *et al.* (2018) measured stability of comparative advantage of individual countries in spice trade treating spices as an aggregate commodity. They found evidence of a general weakening in comparative advantage enjoyed by several countries. The RCA has been found to vary depending on the level of aggregation (Batra & Khan 2005), which calls for exercising caution while using this measure. The Lafay index (Lafay 1992) addresses some of the shortcomings of the RCA technique by incorporating import flows in the analysis. The index is employed in Indian trade competitiveness analysis by Alessandrini *et al.* (2007).

Another economic tool frequently employed in the analysis of trade performance is the Nominal Protection Coefficient (NPC). The NPC is usually expressed as the ratio between domestic price of the commodity of interest to its external reference price (Gulati *et al.* 2013), which could cost insurance freight price (CIF price) in case of exportable commodities like spices (the external reference price would be free on board when the commodity is an import substitute). In general, both RCA and the NPC have been used extensively across studies to measure the trends in trade competitiveness. While the NPC stresses on the price factor, RCA is an over measure of the export performance resulting from several underlying factors. A selection of studies on export competitiveness of Indian spices undertaken since the turn of this century is given in Table 3. Apart from RCA and NPC, other tools like the movements in export unit values (EUV) (Nagoor 2010), trade intensity index (Subhash 2016) and producer price ratios (Suresh & Mathur 2016) have also been used in analysis of spice trade competitiveness. An econometric approach using a modified production function was used for studying export competitiveness of Indian spices in the pre- liberalization and post-liberalization period by Sunil & Nair (2018).

#### **Determinants of trade competitiveness**

Efforts of producing regions and economies to remain competitive in spice trade is as old as the history of spice trade itself. While the consuming economies searched for cheaper sources and lower transactions cost, the producing regions were able to retain their trade advantage through

**Table 3.** Recent research on trade competitiveness in spices

Sl No	Authors	Commodities studied	Methodology
1	Batra & Khan 2005	Spice exports from India (Aggregated and disaggregated levels)	RCA
2	Shinoj & Mathur 2008	Spices (aggregate)	RCA
3	Burange & Chaddha 2008	Spices	RCA
4	Nagoor 2010	Black pepper, cardamom	RCAExport Unit Value
5	Rajur & Patil 2013	Chilli	NPC
6	Lakra <i>et al.</i> 2014	Spices	RSCA
7	Idris <i>et al.</i> 2015	Spices	RCA
8	Karthick <i>et al.</i> 2015	Ginger	NPC
9	Soumya <i>et al.</i> 2015	Cumin	NPC
10	Suresh & Mathur 2016	Spices	RCAProducer prices
11	Jagadambe 2016	Spices	RCA Index Trade Intensity Index
12	Jambor <i>et al.</i> 2018	Spice traded from multiple countries	RCA
13	Meena <i>et al.</i> 2018	Seed spices	Export Growth Rate
14	Sunil & Nair 2018	Spices	Econometric model
15	Kaur Arvinder 2018	General trade	Factor analysis and composite index

a virtual monopoly on supply and control over market and trade information. Understanding the determinants of trade competitiveness in the globalized economy is critical for spice trade from India. Several studies have attempted to analyse the factors that lead to sustainable trade competitiveness in spice commodities. The market power enjoyed by an entity, as determined by the ability to influence market parameters, can determine the nature of agricultural trade and the effectiveness of public policies aimed at influencing the market (Karp & Perloff 2002). The market power enjoyed by countries in specific commodities arising from the nature of concentrated production of the commodity was one of the major sources of trade competitiveness in spices in the earlier decades. Thus India, which was the major and most often the only significant, source of global supply of black pepper, cardamom and turmeric enjoyed a trade

competitiveness leveraged on its status as the major producer and supplier of these commodities (ICAR 1953). This enabled the country to emerge as a price setter without being challenged by other competing sources. Gilbert (1996) argues that most of the attempts at cartelization (by the major producing countries) in several agricultural commodities including, nutmeg and black pepper failed to attain its objectives. Cartelization as a means for artificial protection of trade advantage through exercising market power for a group of producing countries had limited scope in spice commodities.

Cost of production and productivity levels of the commodity can significantly influence competitiveness of a country (Harilal & Joseph 1999). Technological progress in production economy, as expressed through enhancement in yield levels and robust growth in Total Factor



Productivity (TFP) can raise the export competitiveness of agricultural commodities including spices (Suresh & Mathur 2016). The government can also influence the level of trade competitiveness indirectly through its policy interventions in currency exchange rates (Bautista & Valdes 1993). One such indirect route espoused is through the exchange rate policies. The exchange rate affects the export competitiveness both directly and indirectly (Schiff & Valdes 2002). This means that a currency devaluation could boost, at least in the short run, the exchange prospects of spice commodities. This indirect influence is especially strong in developing countries, where the share of agricultural exports is significant.

Price competitiveness is established as one of the key prerequisites for trade competitiveness in horticultural commodities including spices (Sengupta & Roy 2011) while they also hint at the significant influence of non-price factors in determining overall trade competitiveness. The producer prices of several agricultural commodities in India has remained competitive even after the period of liberalization (Suresh & Mathur 2016). Though India has raised its output and productivity in several spices, the growth in export volumes has not mirrored this growth. However, Jambor *et al.* (2018) concluded that productivity enhancements in land and labour inputs could positively influence competitive advantage in spice export trade. The high expenditure elasticity of spices (Joshi & Kumar 2016) could mean that the rising per capita income could lead to more domestic demand for spices leading to a reduction in exportable surplus.

The export trade stability and trade direction in spices sector has also received considerable attention among economists. Stability in exports can contribute to export competitiveness. Export trade stability is also important for the exporting countries to implement long-term policy interventions in the export sector. Joshi *et al.* (2015) using the Markov chain approach analysed the stability of Indian spice exports and found that the level of spice export stability was highly variable across export destinations. A similar study for Indian turmeric had been done by Naik & Hosamani (2013) which suggested the

use of the results from Markov chain analysis for targeting stable export destinations for strengthening export profile. The Markov Chain model seems to be the economic model of choice for the analysis of export stability of agricultural commodities like spices (Kumar & Muraleedharan (2007); Angles *et al.* 2011; Sivasankari & Rajesh (2014); Joshi *et al.* 2015). The trade competitiveness of spices, like other agricultural commodities, can be sustainable only if continuous efforts are made in technology upgradation, production efficiency enhancement and sustenance of cost advantages.

The sources of supply for spices have diversified over the decades and India faces stiff competition from other countries for marketing its produce. The emergence of alternate sources of global supply of spices has implications for competitiveness of Indian spice exports. The changes in global export sources of selected spices for the five-year period ending 1990 and 2016 is given in Table 4.

For spices like black pepper and ginger, India's share in quantity exported from top five export sources has declined whereas it has increased for seed spices group of anise, fennel and coriander. India has also been able to enhance its position in the commodity group consisting of nutmeg, mace and cardamoms. The changes in export sources also indicate the sources of export competition for each commodity.

Volatility of farm harvest, domestic and export prices have been found to move together in spices like black pepper (Hema *et al.* 2007) and this indicates that domestic price volatility could affect export competitiveness also. The domestic price volatility has also been found to affect the volatility of export in commodities like onion (Paul *et al.* 2015) indicating that the competitiveness of a country could be significantly affected by domestic price volatility. The availability of sufficient exportable surplus is a pre-requisite for spice export trade. The efficiency and productivity of the domestic spice production system influences the creation of an exportable surplus. There is significant yield gap in several spice crops at the national level and it was found to account for a production deficit of about 50,000 tonnes of black pepper during 2013-

**Table 4.** Changes in global supply of selected spice commodities

Spice	1986-1990		2012-2016	
	Country	Quantity (tonnes)	Country	Quantity (tonnes)
Pepper	India	38,709	Vietnam	136,841
	Indonesia	38,490	Indonesia	51,285
	Singapore	29,201	Brazil	32,624
	Brazil	26,046	India	30,784
	Malaysia	20,633	Singapore	16,217
	India's share	25.3%	India's share	11.5%
Ginger	Singapore	14,389	China	409,926
	China	12,391	Netherlands	36,668
	India	7504	Thailand	31,998
	Thailand	6645	India	31,132
	Indonesia	6638	Nepal	30,305
	India's share	15.8%	India's share	5.8%
Anise,	Egypt	13,407	India	184,313
Fennel,	Iran	13,387	Syria	28,835
Coriander	Morocco	10,725	Bulgaria	21,805
	Turkey	9402	Russian Federation	21,573
	India	970	Egypt	14,140
	India's share	2.0%	India's share	68.1%
Nutmeg,	Guatemala	10,371	Guatemala	32,814
Mace and	Indonesia	6801	Indonesia	21,400
Cardamoms	Singapore	5055	India	10,134
	Grenada	2330	Nepal	4072
	India	1481	UAE	3546
	India's share	5.7%	India's share	14.1%

Source: FAOSTAT

14 (IISR 2015). The gap between achievable yield and realized yield in seed spices is also considerable (Lal 2018). The high level of yield gap in spices is a latent potential for the Indian spices sector since domestic availability and exportable surplus can be enhanced through focused efforts for effective technology dissemination.

### Barriers to spice trade

Trade barriers are considered as increasingly important in determining the extent of global agricultural trade (Roberts *et al.* 1999). Quality and safety standards are gaining importance in determining the export competitiveness of agricultural commodities since 1990's (Aquila & Caccamisi 2007). Spices being one of the most traded agricultural commodities, understanding trade barriers in international trade could offer better insights on the policies for enhancing global trade share. Trade standards and trade regulations are two aspects which are gaining importance due to their potential use as a trade barrier. The inappropriate use of both trade standards and trade regulations (a document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions) can lead to increased trade inefficiency. Trade standards are defined as "a document approved by a recognised body that provides, for common and repeated use, rules, guidelines or characteristics for goods or services, or related processes and production methods" (UNECE 1998). In the context of the globalized trade, both non-tariff measures and non-tariff barriers are important. Though used interchangeably, there is a subtle difference between the two terms. Non-tariff measures are permissible under WTO to achieve specific and legitimate objectives. A non-tariff measure becomes a non-tariff barrier when it is used to impede trade rather than to achieve a specific legitimate objective.

Though the tariff levels have eased during the last two decades, agricultural commodities continue to be more susceptible to trade barriers (Bown & Crowley 2016). The non-tariff measures have been proliferating and the lack of transparency associated with their use poses new challenges as they act as non-tariff barriers

(Hooker & Caswell 1999). Several studies analysing of the level of tariffs and their effect on agricultural commodities including spices trade mainly use classical analytical techniques as seen in Gulati & Sharma (1994), Rao (2001) and Gulati (2002). Non-tariff barriers also play an increasingly important role in agricultural trade and in commodities like spices. These barriers can significantly affect trade variables and create trade frictions between nations (Disdier & Tongeren 2010). The non-tariff barriers take various forms like import licensing, rules of origin, sanitary and phytosanitary rules, import quotas, technical barriers, etc. The study by Disdier *et al.* (2008) indicated that the imposition of non-tariff barriers significantly reduced the volume of agricultural exports from developing countries to OECD countries. Hooker & Caswell (1999) studied the role of SPS measures in restricting trade flows between countries. Similar to agricultural commodities, the major non-tariff barrier to trade in spices include technical barriers to trade (TBT) and sanitary and phytosanitary measures (SPS) (Henson & Loader 2001). Packaging, and labelling requirements along with SPS rules, though classified as non-protectionist policies (Deardorff 2012), significantly affected spice trade from India. Studies by Muthupandi *et al.* (2018) and Rajur & Patil (2013) on trade barriers in chilli exports identified the lack of uniformity in food safety standards among the importing countries. This coupled with issues related to pesticide residues created significant barrier for trade in the commodity. The SPS measures and most of the labelling and packaging requirements have food safety as their justification. Research on food safety aspects in spice trade requires a separate analysis in this context. The export rejections have always remained a significant issue associated with spices exports from India. This is more important in case of exports to European Union, which has one of the most stringent terms of regulations on imported products (Jaffee & Henson 2005).

### *Food safety issues in spice trade*

Though spices are consumed in small quantities, they are used in a wide range of food products and therefore constitute a unique segment within the food sector (Székács *et al.* 2018). The usage of

spices and herbs by consumers is increasing, because these products are appreciated as completely natural ingredients, rather than artificial additives. The rise in exports of agricultural commodities from India and the increasing consumer awareness at the domestic level and across the globe has acted as important drivers for increased attention to food safety in India (Umali Deininger & Sur 2007). The spice trade network is one of the most complex among the agricultural-food trade networks and has several features, which makes it substantially vulnerable (Lakner *et al.* 2018). The rapidly growing trade volume also means that the mechanisms for direct oversight by the importing countries could be compromised and the consumers could be at risk (Buzby & Roberts 2010). Idris *et al.* (2015) undertook a detailed study on the impact of food safety standards imposed by USA and the European Union on horticultural exports from India including spices and found that spices were among the commodities most affected due to non-compliance with required food safety parameters. However, a study by Kumar & Muraleedharan (2007) finds little evidence for SPS standards adversely affecting India's export trade of black pepper and capsicum to OECD countries. They suggested that the global demand supply scenario is the dominant factor determining trade volume. Henson *et al.* (1999) finds that there is lack of unity among the major producing countries with respect to SPS standards and by creating a consensus among these countries, some of the constraints related to SPS measures could be addressed. The developed countries have also progressively raised the bar for food safety and quality which are very difficult to attain for most of the developing countries leading to their exclusion from the export markets (Wilson & Otsuki 2003).

The sanitary and food safety parameters and border clearance issues are the most common hindrances for spices exported from India to EU. A detailed analysis of export rejections of spices and herbs from other countries to EU and United States for the period 2002 to 2008 (Henson & Olale 2011) is illustrative of the magnitude of the problem faced by India. The average rejections were 38.9 for EU whereas it was 194.9 for the US. The rejection rate (Number of rejections per

million USD) was 0.208 for EU and 1.666 for US for the period 2006-08. According to the study, in terms of unit rejection rate also, India fared poorly among developing countries. Kumar (2016) analysed the pattern of notifications issued on Indian spice exports by export destinations in European Union based on the data from the Rapid Alert System for Food and Feed (RASFF). He identifies a gradual increase in the number of notifications over 2001 to 2014 with an average of 28 notifications per year during the first 7 years and 53 notifications per year during 2008-14. Apart from increased monitoring of the agricultural imports, the increased vulnerability of spices and herbs to contamination has led to interventions like "Securing the spices and herbs commodity chains in Europe against deliberate, accidental or natural biological and chemical contamination" (SPICED) to address the challenges of food safety (European Commission 2013).

Based on a study on the export value chain in Indian black pepper Aarathi *et al.* (2018) contend that dissemination of knowledge on Good Agricultural Practices (GAP) among the primary producers holds the key to meet the food safety challenges along the value chain. There are evidences of imposition of trade restrictions under the guise of health concerns (Peterson *et al.* 1988). The safety of spices also can be compromised due to economically motivated adulteration along the complex supply chains (Galvin-King *et al.* 2018) which necessitates deployment of quick detection methods for adulteration. A comprehensive review of the cost of compliance and coping strategies necessitated by stringent product standards in high value food products like spices was done by Jaffee (2005). This study identified the lack of harmonization of international standards (which added cost for exporters) as one of the major hurdles for Indian spice exports. Spices Board has taken up the issue of the permissible average daily intake of certain chemicals and chemical compounds in spice commodities before the Pesticide Residue Committee of Codex Alimentarius Commission. The argument calls for differential treatment of spices in matters of food safety since spices constitute a very miniscule proportion of the servings of food and hence the Maximum Residue Limits (MRLs) fixed

for directly consumed agricultural products cannot be applied to spices (Das 2008). In short, it is important to examine the legitimate objective behind standards applied on India's spice exports and analyse the risk of non-fulfilment. Such risks should commensurate with the effort involved to meet the standard as well as the compliance costs (Mehta *et al.* 2003).

The growth of trade in organic spices can also be understood in the backdrop of concern for food safety since it is one of the factors (along with inter alia higher income, urbanization and perceptions regarding quality) which has influenced the demand for organic products (Regmi 2001). There is a growing global demand for organic spices with an annual growth rate of about 20% and the price premiums have been observed to be between 10-30% (Parthasarathy *et al.* 2008). This is another area where spice trade, where higher value realization is possible along the trade value chain.

The role infrastructural facilities gain significance amid increasing concerns of food safety. Detailed

audits of physical facilities in the country along the procurement, handling, processing, and packing processes need to be undertaken for ensuring food safety. With regard to trade with the USA the suppliers of spices are asked to address a set of food security concerns including access to factories and laboratories and preventive measures against product tampering and tracking to ensure safety of the food materials like spices (Jaffee 2005). The development of state of the art processing and handling facilities for spices can enhance the capability of the country to address the food safety concerns while enhancing its reputation as a source of safe spices.

### Research gaps and future directions

Indian spices have created a niche for itself through its historical allure and attributed quality parameters. Spice export trade has been subjected to considerable analysis for its growth, trade direction and competitiveness. However, some of the focus on these areas of spice trade analysis have come at the cost of scanty information with respect to the developmental

**Table 5.** Information gaps in research on spice trade

Research gap	Area of application and utility
Information on the specific impact pathways and quantification of spice trade expansion to producer welfare	<ul style="list-style-type: none"> <li>● Spice sectoral development policy</li> </ul>
Linkage between domestic productivity gains and export competitiveness	<ul style="list-style-type: none"> <li>● Research investment prioritization</li> <li>● Regional crop planning</li> </ul>
Returns to investment in crop specific export promotion schemes for spice crops	<ul style="list-style-type: none"> <li>● Crop specific policy design for export promotion</li> </ul>
Optimizing spice export portfolio for sustainable growth in spice exports	<ul style="list-style-type: none"> <li>● Export facilitation</li> <li>● Export portfolio planning</li> </ul>
In-depth analysis of underlying factor influencing RCA in spices export	<ul style="list-style-type: none"> <li>● Targeted development programmes for enhancing competitiveness</li> </ul>
Role of Total Factor Productivity (TFP) in changes in export competitiveness and exportable surplus	<ul style="list-style-type: none"> <li>● Study impact of technology investments</li> </ul>
Factors underlying demand fluctuations in export destinations	<ul style="list-style-type: none"> <li>● Export capacity planning</li> <li>● Trade intelligence analysis</li> </ul>
Movement of terms of trade in spice exports with various regions/economies	<ul style="list-style-type: none"> <li>● To understand the relative competitiveness of spices for policy planning</li> </ul>

linkages of the spice export sector with the general economy. The spices export sector in the country has developed by leveraging the demand rather than any detailed planned approach. The increased forces of competition and nature of the emerging regulatory scenario across the major export destination economies necessitate astute planning in the developmental process in spices export sector. The portfolio approach for Indian spices export using mean variance optimization (Rao 2013) indicates a step in this direction. We have identified some of the key missing themes in the research narrations focusing on spices. Table 5 summarizes the identified gaps in information with respect to Indian spice export trade and the utility of such information.

Spice export trade constitutes an important segment of the Indian agricultural exports, but there are significant gaps in information either in case of individual crops or the spice export sector. The identified gaps need to be addressed by researchers to ensure better planning and inclusive development of the sector.

Spice crops are treated as crops with an export orientation even though the domestic market consumes nearly 90% of the total spices production in the country. With increasing evidence that regions within the country which diversified into export-oriented crops fared much better in terms of agricultural development (Pingali *et al.* 2019), spice export trade is of significance for agricultural development in the country. Research on spice export trade has mostly concentrated on analysing the past performance of the sector or individual crops within the sector, and a few of them offered an analysis of the underlying factors. The issues covering barriers to spice trade and food safety concerns regarding spices have also been examined in substantial detail at the global level. The urgent need for coordination of production effort with demands of the global value chains, while remaining cost competitive through reductions in transaction and organizational cost (Sengupta & Roy 2011; Pingali *et al.* 2019) is perceptible across the studies. The efforts for bringing in transformational change in spices trade through policy interventions should make conscious efforts to avoid market distortions. Apart from addressing the challenges arising

from regional and multilateral trade agreements, the sectoral policies should address *inter alia*, investment facilitation in technology development for post-harvest technologies, promotion of good agricultural practices in primary production, sustainable cost effectiveness across products, trade portfolio planning at the macro level, efforts for harmonization of trade standards across destinations and development of actionable trade intelligence services.

## References

- Aarathi L R, Kumar S, Negi D S & Singh D R 2012 Prevailing standards and dimensions governing Sanitary and Phyto-Sanitary compliance in Indian black pepper supply chain. *Agric. Econ. Res. Rev.* 25: 69–78.
- Agriculture & Processed Foods Export Development Agency (APEDA) 2015 Agri Export Zones of India, Agriculture & Processed Foods Export Development Agency, New Delhi. <http://apeda.gov.in/apedawebsite/index.html>.
- Ahmed S 2010 India-ASEAN trade agreement: A sectoral analysis. *SSRN Electronic J.* <http://dx.doi.org/10.2139/ssrn.1698849>.
- Ahmed S, Kelegama S & Ghani E (Eds.) 2010 Promoting Economic Cooperation in South Asia: Beyond SAFTA. Sage Publications, New Delhi. 434pp.
- Alessandrini M, Fattouh B & Scaramozzino P 2007 The changing pattern of foreign trade specialization in Indian manufacturing. *Oxf. Rev. Econ. Policy* 23: 270–291.
- Angles S, Sundar A & Chinnadurai M 2011 Impact of globalization on production and export of Turmeric in India – An economic analysis. *Agric. Econ. Res. Rev.* 24: 301–308.
- Aquila D C & Caccamisi D 2007 Accessing Market Opportunities: Quality and Safety Standards. In: Deep Ford J R, Dell’C Aquila & Conforti Piero (Eds.) *Agricultural Trade Policy and Food Security in the Caribbean* (pp.263–288). Food and Agriculture Organization, Rome.
- Balassa B 1965 Trade liberalisation and revealed comparative advantage. *Manchester Sch. Econ. Soc. Stud.* 33: 99–123.
- Baldwin R E 1992 Measurable dynamic gains from trade. *J. Polit. Econ.* 100: 162–174.

- Bale M D & Lutz E 1979 The effects of trade intervention on international price instability. *Am. J. Agric. Econ.* 61: 512–516.
- Baroncelli E 2007 The peace dividend: SAFTA and Pakistan–India trade. In: Zareen Fatima Naqvi & Philip Schuler (Eds.) *The Challenges and Potential of Pakistan-India Trade* (pp.59–68). The World Bank, Washington DC.
- Batra A & Khan Z 2005 Revealed comparative advantage: An analysis for India and China. Working Paper 168, Indian Council for Research on International Economic Relations (ICRIER), New Delhi. pp.91.
- Bautista R M & Valdes A (Eds.) 1993 *The Bias Against Agriculture: Trade and Macroeconomic Policies in Developing Countries*. International Centre for Economic Growth and International Food Policy Research Institute, Washington DC. pp.339.
- Bellmann C, Biswas T & Chamay M 2010 Recent trends in world trade and international negotiations. *Int. Dev. Policy.* 1: 161–187.
- Bernhofen D M & Brown John C 2005 An empirical assessment of the comparative advantage gains from trade: Evidence from Japan. *Am. Econ. Rev.* 95 : 208–225.
- Bown C P & Crowley M A 2016 The empirical landscape of trade policy. In: Kyle Bagwell Staiger & Robert W (Eds.) *Handbook of Commercial Policy.* 1: 3–108.
- Box H 1989 Developments in the spices trade: A review. *Brit. Food J.* 91: 15–18.
- Burange L G & Chaddha S J 2008 India's revealed comparative advantage in merchandise trade. Working Paper UDE28/6/2008, University of Mumbai, Mumbai. pp.38.
- Buzby J C & Roberts D 2011 Food trade and food safety violations: What can we learn from import refusal data?. *Am. J. Agric. Econ.* 93: 560–565.
- Chand R & Bajar S 2012 Agricultural trade liberalization policies in India: Balancing producer and consumer interests. In: Banga R & Das A (Eds.) *Twenty Years of India's Liberalization: Experiences and Lessons* (pp.27–42). UNCTAD: Geneva.
- Chand R 2004 Impact of trade liberalization and related reforms on India's agricultural sector, rural food security, income and poverty. Paper presented at Global Development Network, Fifth Annual Conference, New Delhi. <http://agris.fao.org/agris-search/search.do?recordID=GB2013201182>
- Chawla S 2016 Supply chain issues in Indian spices export to USA. *Int. J. Mod. Sci. Engg. Technol.* 3: 6–12.
- Das K 2008 Coping with SPS Challenges in India: WTO and Beyond. *J. Int. Econ. Law.* 11: 971–1019.
- Deardorff A 2012 Easing the burden of non-tariff barriers. *Int. Trade Forum* 3: 26–27.
- DeWaal C S & Brito G R G 2005 Safe food international: A blue print for better global food safety. *Food Drug Law J.* 60: 398–405.
- Directorate General of Foreign Trade (DGFT) 2005 Public notice number 4(RE 2005)/2004-2009 dated 27 April 2005. Directorate General of Foreign Trade, New Delhi. <https://dgft.gov.in/>
- Disdier A C & Tongeren F V 2010 Non-tariff measures in agri-food trade: What do the data tell us? Evidence from a cluster analysis on OECD imports. *Appl. Econ. Perspect. Policy.* 32: 436–455.
- Disdier A C, Fontagné L & Mondher M 2008 The impact of regulations on agricultural trade: Evidence from the SPS and TBT Agreements. *Am. J. Agric. Econ.* 90: 336–350.
- European Commission 2013 Securing the spices and herbs commodity chains in Europe against deliberate, accidental or natural biological and chemical contamination. <http://spiced.linux17.webhome.at/the-project/>
- FAO (Food and Agriculture Organization) 2003 Trade reforms and food security: Conceptualizing the linkages. Commodities and Trade Division, Food and Agriculture Organization of The United Nations, Rome. pp.315.
- Francis S 2011 A Sectoral Impact Analysis of the ASEAN-India Free Trade Agreement. *Econ. Polit. Weekly* 46: 46–55.
- Galli M 2017 Beyond frontiers: Ancient Rome and the Eurasian trade networks. *J. Eurasian Stud.* 8: 3–9.
- Galvin-King P, Haughey S A & Elliott C T 2018 Herb and spice fraud; The drivers, challenges and detection. *Food Control* 88: 85–97.

- Ghosh M 2017 WTO, trade liberalization and Indian agriculture. In: Sharma S K & Bathla S (Eds.) *Indian Agriculture Under Multilateral and Regional Trade Agreement - Competitiveness and Food Security Concerns* (pp.19-43). Centre for WTO Studies, New Delhi and Bookwell, New Delhi.
- Gilbert C 1996 International commodity agreements: An obituary notice. *World Devel.* 24: 1-19.
- Gilboa A & Namdar D 2015 On the beginnings of South Asian spice trade with the Mediterranean region: A review. *Radiocarbon* 57: 265-283.
- GoI (Government of India) 2015 Foreign Trade Policy, 1<sup>st</sup> April 2015-31<sup>st</sup> March 2020, Mid Term Review, Ministry of Commerce and Industry, Government of India. pp.150. <http://dgftcom.nic.in/exim/2000/policy/ftp-plcontent0910.pdf>.
- Gulati A & Sharma A 1994 Agriculture under GATT: What it holds for India. *Econ. Polit. Weekly* 29: 1857-1863.
- Gulati A 2002 Indian Agriculture in a globalizing world. *Am. J. Agric. Econ.* 84: 754-761.
- Gulati A, Jain S & Hoda A 2013 Farm trade: Tapping the hidden potential. Discussion Paper 3. Commission for Agricultural Costs and Prices, Ministry of Agriculture, Government of India, New Delhi. pp.32.
- Halikowski S S 2015 In the shadow of a pepper-centric historiography: Understanding the global diffusion of capsicums in the sixteenth and seventeenth centuries. *J. Ethnopharmacol.* 167: 64-77.
- Harilal K N & Dhanya V 2015 The WTO agreement on agriculture and tropical commodities: A study in the context of south India. *Rev. Agrar. Stud.* 5: 39-60.
- Harilal K N & Joseph K J 1999 India -Sri Lanka free trade accord. *Econ. Polit. Weekly* 34: 750-753.
- Harilal K N 2009 India- ASEAN Free Trade Agreement: Implications for primary commodities of South India. *Ind. J. Politics Int. Relat.* 2: 308-328.
- Harilal K N 2014 Regional cooperation for whom? A study of ASEAN-India FTA in the context of plantation/tropical products. *Millennial Asia* 5: 137-155.
- Hazell P B, Jaramillo M & Williamson A 1990 The relationship between world price instability and the prices farmers receive in developing countries. *J. Agric. Econ.* 41: 227-241.
- Hema M, Kumar R & Singh N P 2007 Volatile price and declining profitability of black pepper in India: Disquieting future. *Agric. Econ. Res. Rev.* 20: 61-76.
- Henson S & Jaffee S 2007 Developing country responses to the enhancement of food safety standards. In: Grote U, Basu A K & Chau N H (Eds.) *New frontiers in environmental and social labelling. Sustainability and Innovation* (pp.193-205). Physica-Verlag HD.
- Henson S & Loader R 2001 Barriers to agricultural exports from developing countries: The role of Sanitary and Phytosanitary Requirements. *World Devel.* 29: 85-102.
- Henson S & Olale E 2011 What do border rejections tell us about trade standards compliance of developing countries? Analysis of EU and US Data 2002-2008. UNIDO Working Paper. pp 64. [https://www.unido.org/fileadmin/user\\_media/Services/](https://www.unido.org/fileadmin/user_media/Services/)
- Henson S J, Loader R J, Swinbank A, Bredahl M & Lux N 1999 Impact of Sanitary and Phytosanitary Measures on Developing Countries. Department for International Development, London. pp.105.
- Holmes T J, Hsu Wen-Tai & Lee S 2014 Allocative efficiency, mark-ups, and the welfare gains from trade. *J. Int. Econ.* 94:195-206.
- Hooker N H & Caswell J A 1999 A framework for evaluating non-tariff barriers to trade related to sanitary and phytosanitary regulation. *J. Agric. Econ.* 50: 234-246.
- ICAI (Institute of Chartered Accountants of India) 2008 Handbook on Foreign Trade Policy and Guide to Export & Import. Institute of Chartered Accountants of India, New Delhi. 133pp.
- ICAR (Indian Council of Agricultural Research) 1953 Report of the Spices Enquiry Committee. Indian Council of Agricultural Research, New Delhi, 218pp.
- Idris S, Singh A & Praveen K V 2015 Trade competitiveness and impact of food safety regulations on market access of India's horticultural trade. *Agric. Econ. Res. Rev.* 28: 301-309.



- IISR (Indian Institute of Spices Research) 2015 Annual Report 2014-15. ICAR-Indian Institute of Spices Research, Kozhikode. 106pp.
- ITC (International Trade Centre) 2018 These are the world's three most traded spices. ITC News, 06 February 2018. <http://www.intracen.org/news/>.
- Jaffee S 2005 Delivering and taking the heat: Indian spices and evolving product and process standards, Agriculture and Rural Development Discussion Paper 19. The World Bank, Washington, 48pp.
- Jaffee S & Henson S J 2005 Agro-food exports from developing countries: The challenges posed by standards. In: Aksoy A & John C Beghin (Eds.) Global agricultural trade and developing countries (pp.91-114). The World Bank, Washington DC.
- Jagadambe S 2016 Analysis of export competitiveness of Indian agricultural products with ASEAN countries. Working Paper 356, Institute for Social and Economic Change, Bangalore. 24pp.
- Jambor A, Toth A T, Koroshegyi D 2018 Competitiveness in the trade of spices: A global evidence. Paper presented at 30<sup>th</sup> International Conference of Agricultural Economist, July 28-August 2, 2018, International Association of Agricultural Economists Vancouver.
- Jeromi P D 2007 Farmers' indebtedness and suicides: Impact of agricultural trade liberalization in Kerala. *Econ. Polit. Weekly* 42: 3241-3247.
- Joshi D, Singh H P & Gurung B 2015 Stability analysis of Indian spices export – a Markov chain approach. *Econ. Aff.* 60: 257-262.
- Joshi P K & Kumar P 2016 Food demand and supply projections to 2030: India. In: Brouwer F & Joshi P K (Eds.) International Trade and Food Security: The Future of Indian Agriculture, Part 2 (pp.29-63). CABI Publishing, Boston.
- Kalidasan V K 2015 The routes of pepper: Colonial discourses around the spice trade in Malabar. In: Shiju Sam Varughese & Satheese Chandra Bose (Eds.) Kerala Modernity: Ideas, Spaces and Practices in Transition, Orient Blackswan, New Delhi. 237pp.
- Karp L S & Perloff J M 2002 A synthesis of agricultural trade economics. In: Gardner B & Rausser G (Eds.) Handbook of Agricultural Economics, Volume 2 (pp.1945-1998). Elsevier Science B.V.
- Karthick V, Alagumani T & Anbarassan A 2015 Growth and export performance of ginger in India- An economic analysis. *Econ. Aff.* 60: 207-214.
- Kaur A 2018 Factors affecting trade competitiveness of BRICS countries. *Ind. J. Econ. Dev.* 6: 1-8.
- Keay J 2006 The Spice Route: A History. University of California Press, Berkeley. 304pp.
- Kenichi K 2003 The impact of free trade agreements in Asia. Discussion Paper Series 03-E-018. The Research Institute of Economy, Trade and Industry (RIETI).
- Kumar N C & Muraleedharan V R 2007 SPS regulations and competitiveness: An analysis of Indian spice exports. *South Asia Econ. J.* 8: 335-346.
- Kumar N C 2011 Agricultural Trade Facilitation in Asia: Prioritising the Invisible Infrastructure. *Millennial Asia.* 2: 3-22.
- Kumar N C 2016 Sensitivity of India's agri-food exports to the European Union: An institutional perspective. Working Paper 366. The Institute for Social and Economic Change, Bangalore. 24pp.
- Lafay G 1992 The measurement of revealed comparative advantages. In: Dagenais M G & Muet PA (Eds.) International Trade Modelling (pp.209-234). Chapman & Hill, London.
- Lakner Z, Szabó E, Szûcs V & Székács A 2018 Network and vulnerability analysis of international spice trade. *Food Control.* 83: 141-146.
- Lakra K, Bairwa S L, Meena L K & Saket K 2014 Comparative advantage in export of major agricultural commodities in India: A post-reforms analysis. *Econ. Aff.* 59: 107-116.
- Lal G 2018 Scenario, importance and prospects of seed spices: A review. *Curr. Inves. Agric. Curr. Res.* 4: 491-498.
- Masahiro E 2005 The effects of the GSTP on trade flow: mission accomplished?. *Appl. Econ.* 37: 487-496.

- Meena M D, Lal G, Meena S S & Meena N K 2018 Production and export performances of major seed spices in India during pre and post-WTO period. *Int. J. Seed Spices* 8: 21–30.
- Mehta R, Saqib M & George J 2003 Addressing sanitary and phytosanitary agreement: A case study of select processed food products in India. *RIS-Discussion Paper 39/2003*, Research and Information System for the Non-Aligned and Other Developing Countries, New Delhi, 70pp.
- Muthupandi P, Sekhar C & Karunakaran K R 2018 Barriers to trade and their impact on production and export of red chilli in India. *Indian J. Econ. Devel.* 6: 1–16.
- Nagoor B H 2010 Trade aspect of plantation sector of India. *National Research Programme on Plantation Development. Discussion Paper No 8*. Centre for Development Studies, Thiruvananthapuram, 82pp.
- Naik V R & Hosamani S B 2013 Growth and export dimensions of Indian turmeric. *Int. Res. J. Agric. Econ. Stats.* 4: 91–97.
- OECD (Organisation for Economic Co-operation and Development) 2014 Glossary of Statistical Terms. <https://stats.oecd.org/glossary/detail.asp?ID=399>.
- Parthasarathy V A, Kandianan K & Srinivasan V (Eds.) 2008 *Organic Spices*. New India Publishing Agency, New Delhi. 694pp.
- Patnaik U 1996 Export oriented agriculture and food safety in developing countries and India. *Econ. Polit. Weekly*. September 1996: 2429–2447.
- Paul R K, Saxena R, Chaurasia S, Zeeshan & Rana S 2015 Examining export volatility, structural breaks in price volatility and linkages between domestic and export prices of onion in India. *Agric. Econ. Res. Rev.* 28: 101–116.
- Peterson E W, Paggi M & Hemy G 1988 Quality restrictions as barriers to trade: The case of European Community regulations on the use of hormones. *Western J. Agric. Econ.* 13: 82–91.
- Pickersgill B 2017 *The British East India company, John Bradby Blake and their interests in spices, cotton and tea*. *Curtis's Bot. Mag.* 34: 379–401.
- Pingali P, Aiyar A, Abraham M & Rahman A 2019 *Transforming Food Systems for a Rising India*. Palgrave Studies in Agricultural Economics and Food Policy. Springer Nature, Switzerland, 382pp.
- Pollmer U 2000 The spice trade and its importance for European expansion. *Migr. Diff.* 1: 58–72.
- Rajur B C & Patil B L 2013 Export performance of chilli – An analysis. *Karnataka J. Agric. Sci.* 26: 233–237.
- Rao H C H 2001 WTO and viability of Indian agriculture. *Econ. Polit. Weekly* 36: 3453–3457.
- Rao S D 2013 Building an optimal trade portfolio for Indian spices exports by mean variance optimization. *Ind. J. Finance* 7: 45–50.
- RBI (Reserve Bank of India) 2003 Report on External Sector dated 31 March 2003. Reserve Bank of India, Mumbai. <https://www.rbi.org.in/scripts/>
- Redding S 1999 Dynamic comparative advantage and the welfare effects of trade, *Oxf. Econ. Pap.* 51: 15–39.
- Regmi A (Ed.) 2001 Changing structure of global food consumption and trade. *Agriculture and Trade Report WRS01-1*, Market and Trade Economics Division, Economic Research Service, US Department of Agriculture, Washington DC. 107pp.
- Riedel J 1984 Trade as the engine of growth in developing countries, revisited. *Econ. J.* 94: 56–73.
- Roberts D, Josling T E & Orden D 1999 A framework for analyzing technical barriers in agricultural markets. *Economic Research Service, USDA Washington, DC*. 52pp.
- Robins N 2012 The Corporation that changed the world: How the East India Company shaped the modern multinational. *Asian Aff.* 43: 12–26.
- Schiff M & Valdes Alberto 2002 Agriculture and the macroeconomy, with emphasis on developing countries. In: Gardner B & Rausser G (Eds.) *Handbook of Agricultural Economics*, Vol. 2 (pp.1945–1998). Elsevier.
- Sekhar C S 2003 Volatility of agricultural prices - An analysis of major international and domestic markets. Working Paper 103. Indian Council for Research on International Economic Relations (ICRIER), New Delhi. pp.78.

- Sengupta U & Roy S S 2011 Behaviour of India's horticultural exports: does price competitiveness play a determining role?. *Ind. J. Agric. Econ.* 66: 230–241.
- Sharma K 2003 Factors determining India's export performance. *J. Asian Econ.* 14: 435–446.
- Shinoj P & Mathur V C 2008 Comparative advantage of India in agricultural exports vis-à-vis Asia: A post-reforms analysis. *Agric. Econ. Res. Rev.* 21: 60–66.
- Sikdar C & Nag B 2011 Impact of India-ASEAN Free Trade Agreement: A cross-country analysis using applied general equilibrium modelling. Working Paper 107. Asia-Pacific Research and Training Network on Trade (ARTNeT), Bangkok. pp.64.
- Sivasankari B & Rajesh R 2014 A study on growth and direction of black pepper trade in India—a Markov chain approach, *Trends Biosci.* 7: 3200–3205.
- Soumya X, Burark S S, Lathika S & Sita R 2015 Export competitiveness of Indian cumin, *Ind. J. Agric. Mark.* 29: 180.
- Spices Board 2019 Review of export performance of spices during 2017-18. Spices Board, Kochi. <http://www.indianspices.com/export/>
- Sunil A & Nair K S 2018 Marketing opportunities and export competitiveness of Indian spices: An econometric analysis. *Eur. J. Bus. Manag.* 10: 41–56.
- Suresh A & Mathur V C 2016 Export of agricultural commodities from India: Performance and prospects. *Ind. J. Agric. Sci.* 86: 876–883.
- Székács A, Wilkinson M G, Mader A & Appel B 2018 Environmental and food safety of spices and herbs along global food chains. *Food Control* 83: 1–6.
- Umali Deininger D & Sur M 2007 Food safety in a globalizing world: opportunities and challenges for India. *Agric. Econ.* 37: 135–147.
- UNECE (United Nations Economic Commission for Europe) 1998 Standards and Regulations in International Trade. United Nations Economic Commission for Europe, Geneva. <http://www.unece.org/>
- Van der Veen M & Morales J 2015 The Roman and Islamic spice trade: New archaeological evidence. *J. Ethnopharmacol.* 167: 54–63.
- Veeramani C & Saini G K 2010 Impact of ASEAN-India FTA on India's plantation commodities: A simulation analysis. Working Paper 2010-004, Indira Gandhi Institute of Development Research, Mumbai. pp.22.
- Wilson J & Otsuki T 2003 Balancing risk reduction and benefits from trade in setting standards. In: Unnevehr L J (Ed.) *Food Safety in Food Security and Food Trade. A 2020 Vision for Food, Agriculture and the Environment* (pp.13–14). International Food Policy Research Institute, Washington, DC.
- Wilson J S, Mann C L & Otsuki T 2005 Assessing the benefits of trade facilitation: A global perspective. *World Econ.* 28: 841–871.