Journal of Contemporary Issues in Business and Government Vol. 26, No. 2, 2020
https://cibg.org.au/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2020.26.02.123

A study on trend analysis of spices export from India

D. KRISHNAMOORTHY[1], VINITH RAJA S[2]

[1]Assistant Professor, Saveetha School of Management, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India.
[2]Student, Saveetha School of Management, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamilnadu, India.
Email ID: krishnamoorthyd.ssm@saveetha.com, srisukraenterprises1997@gmail.com

Abstract: The research paper titled " A study on trend analysis of spices export from India" is an attempt to predict the factors influencing the export of spices in India. In this analysis we have predicted the export quantity and value of spices for the year 2021 by using the secondary data of quantity and values for the past 5 years. Through this analysis exporters will be able to analyse the international market and predict the demand for export of spices in future.

Keywords: Export of spices, Indian spices, Innovation, International market, future demand

INTRODUCTION

India is one of the top most spices exporting countries in the world. In India Calicut is called the city of spices. The top countries to export spices are as follows: India, China, Indonesia, Malaysia, Mexico, Turkey and Brazil. India is favoured with a perfect agro-climatic zone, spices of trade to 120 nations. The spice board of India (1987) headquartered in Cochin, pays a way for the fare advancement of Indian spices by promoting and developing it worldwide. It plays a vital role in extensive part as a formative and administrative for Indian spices. The board is the international link between the Indian exporters and the importers abroad. Indian spices are well known for its taste, aroma and texture. International organisation standard of 75 varieties listed out of 109 varieties are exported from India. Although exporting spices was affected during COVID-19 spices board of India passed a circular of mandatory sampling & testing of export consignments spices under the quality evaluation system. The top medicinal use spices are cumin, clove, coriander, turmeric, cardamom and pepper. There are several factors which affect the export of spices in India are low productivity, poor export quality, poor harvest, competition, rejection of export materials and insufficient mechanisation of spice processing and international market prediction for spices.

Our research idea is based on the rich knowledge acquired by our peer teams across the university.(A.C.Gomathi, S.R.Xavier Rajarathinam, A.Mohammed Sadiqc, Rajeshkumar, 2020; Danda et al., 2009; Danda and Ravi, 2011; Dua et al., 2019; Ezhilarasan et al., 2019; Krishnan and Chary, 2015; Manivannan, I., Ranganathan, S., Gopalakannan, S. et al., 2018; Narayanan et al., 2012, 2009; Neelakantan et al., 2013, 2011; Neelakantan and Sharma, 2015; Panchal et al., 2019; Prasanna et al., 2011; Priya S et al., 2009; Rajeshkumar et al., 2019; Ramadurai et al., 2019; Ramakrishnan et al., 2019; Ramesh et al., 2016; Venugopalan et al., 2014)

Currently we are working on " A Study on trend analysis of spices export from India".

REVIEW OF LITERATURE

(Jayesh, 2001) states that in the South Indian states, the development in the territory, production and efficiency and the money-related achievability of pepper and cardamom development were analyzed. In addition, the value integration of these spices in the selected markets, their fare execution, gravity and exchange bearings were examined. For the exam, optional information was used for the period from 1982-83 to 1998-99. The remarkable work of gravity, methods of venture analysis, partnership, ostensible coefficient of insurance and chain investigations were used. The results found that all states reported a vital development in the territory and formation of territories.

(Rajesh, 2002) characterizes that the investigation has shown that during the post liberalization period, every single important flavor, apart from turmeric and chilies, has enlisted a higher development in appreciation terms. This was essentially a result of the expansion in the recognition of unit respect, while the sum exchanged for pepper and ginger during the post-advancement era has shown a decreasing trend. In the post-advancement time frame, variations in value, quantity and unit value have decreased due to cardamom, turmeric and stew.

(K. C. John, 2003) notes that while Indian spices trade has grown in quantity and value and covers countless countries, future possibilities depend on the ability of exporters to follow the quality guidelines set by bringing in countries. Different ventures began to guarantee that the price of great and clean spices could go inseparably with the techniques of marketing and fare advancement.

(Vashishtha and Malhotra, 2005) states that seed spices are aromatic vegetable products mainly used for food and beverage seasoning or garnishing. They are used in the preparation of different goods with added value, i.e. Spice oil, oleorosin and ground spices. Coriander, cumin, fennel and fenugreek are the crops covered as main seed spices, while ajowain, dill (sowa), nigella (kalongi), celery and aniseed constitute minor classes. Major export-oriented goods and approximately 11.6% of the total production of spices are exported in raw and value-added items realizing the foreign exchange value of rupees. If quality is improved and prices are kept competitive with other countries, there is strong potential for increased exports of seed spices. With shifting business dynamics, customer tastes, perception of health and the advent of supermarkets, the export focal point has changed to value-added spice products.

(Shinoj and Mathur, 2006) describes India as the world's largest manufacturer, buyer and exporter of spices. In the report, the demand scenario for major spices in India was examined comprehensively. Changes in the patterns of consumption and demand have been induced by shifts in domestic consumer preferences for food goods, increasing urbanization and growing incomes, altered demographic and social influences and changes in the productivity of spices. In order to work out the expenditure elasticities for spices in India, a two-stage budgeting framework, which is a recent development in theory, of demand with quadratic terms of total expenditure/food expenditure and is an effective technique for computing the expenditure elasticities, has been used. The resulting spectrum of expenditure elasticity between 0.40 and 0.60 does not demonstrate any difference across the years and across various income groups or regions. The household consumption demand forecasts for major spices in the country for 2005, 2010 and 2015 also indicate that domestic spice demand will continue to grow in the coming years.

(Malhotra and Vashishtha, 2007) notes that crops of seed spices are a significant emerging spice category and make a significant contribution to export earnings in the national basket. This spice category is mainly used to season or garnish food and beverages. In addition, they have industrial significance and are used as medication for the pharmaceutical and cosmetic industries. The seed spices are grown in semi-arid to arid conditions in low rainfall areas, requiring less water and low inputs. As a producer of large varieties of seed spices, India is in an advantageous position and also has a unique position as a major supplier in the international market.

(Sakamma, 2009) specifies that India has a leading role in the world trade in spices. The study therefore focuses on the analysis of the export results, uncertainty, direction of export trade and competitiveness of major spices in exports of chili, pepper, cumin, turmeric and coriander from India. In order to analyze the data, growth rates, instability analysis, Markov chain analysis and nominal coefficients of security were used.

(Bhardwaj et al., 2011) claims that they are the money of non-industrial nations. The biggest spice makers are India, Egypt, China, Indonesia, Malaysia, Mexico, Turkey and Brazil. Since spices are consistently common in the developed world, it is possible to rely on the cost of these important horticultural products by non-industrial nations to acquire substantial unfamiliar trade. The U.S., Europe, Japan, East Asian and Middle East nations are the main merchants. India trades spices to 120 countries, preferred by striking agro-climatic areas. India has the reputation of a simple exporter of goods.

(Angles et al., 2011) characterizes India as an important supplier of turmeric to the world with a turmeric trade offer of more than 60 percent. For the period from 1974-75 to 2007-08, the production and fare execution of turmeric in India was analyzed using optional information and outstanding kinds of development work were used for the investigation. Because of the appeal combined with expansion, the production underway and fare of turmeric has been accounted for enormous. For pre liberalization and post-progression times, the Flimsiness record was worked for the formation and fare.

(Gayathri, 2014) argue that the horticulture circle has opened up new growth perspectives with regard to the changing monetary market for globalization and the advancement of world trade. The Spices area is one of the main regions in which India has inherent unity in order to overwhelm the world's markets. Zest is defined as a highly improved or strengthened Vegetable-inception sweet-smelling substance, acquired from tropical plants and widely used as sauces or used for other purposes because of their fragrance and additive characteristics. Topping involves something used to prepare or give relish to food or to invigorate hunger with articulated flavor. Obviously, the new legislation broadens the admission to worldwide markets for the value-added type of spices that has become a pushed territory with tremendous potential. As a spotless, checked structure, the value added item can be clear or it can be a truly exceptional item, such as dried out curry powder, zest oil, and oleoresin, very well.

(Solanki and Sharma, 2015)argue that India is a country dependent on agriculture and earns significantly from agricultural product exports. In the world, India is the biggest producer and exporter of spices. Rajasthan's arid and semi arid regions are very conducive to the cultivation of spices. The export production of Rajasthan's four main spices was measured in terms of quantity and value using the Compound Annual Growth Rate (CAGR). The UAE is the only importing country with the highest rating of all four spices. The results show that the UAE, the United States, the United Kingdom, Malaysia, South Africa, Algeria and Sri Lanka have tremendous potential for all four spices to be exported.

(Ibrahim and Arunachalam, 2015) argue that exports play an important role in any country's development and are seen as the engine of economic growth. India requires an enormous amount of foreign exchange for its critical imports and for rapid growth to be achieved. In order to use youth for nation-building, millions of job opportunities must be developed. Although the country has numerous sources of foreign exchange, the secure way to acquire it in the long term is to export earnings. The export of highly priced conventional goods offers not only foreign exchange, but also jobs for a significant number of individuals.
(Babu, 2017) describes that spices have been a primary source of livelihood for millions of people and more than 3 million farmers are directly or indirectly engaged in the production, processing, grading, marketing and other related activities of spices. So, over the past seven decades, the spice sector has been a popular location. India has been the largest producer and exporter in the world. The survival of India's spice industry depends primarily on exports. Powerful competition from many developed countries is now facing India. The Indian spice processing industry has numerous problems, such as raw material supply, unscientific methods of manufacturing, marketing problems, etc.
(Sharangi and Pandit, 2018) puts on a statement that the 'home sweet home' of spices really is India. Spices have naturally been connected to Indian culture and tradition, just to make it richer. India has been the land of quality spices for nations around the world since time immemorial. Spices add natural food flavor and aroma and act as a food-seasoning agent as well. India's numerous agro-climatic eco-regions have helped to develop myriad spices with geospatial characteristics. There is, therefore, tremendous potential for India to feed its enormous domestic demand and access the export markets.
(Thomas and Sanil, 2019) notes that spices are one of the world's most commonly traded agricultural commodities. As the world's leading producer and exporter of spices, India is a significant stakeholder in the export of spices. The paper reviews studies conducted on the export sector of spices, with a specific emphasis on India and on policy issues relating to that sector. The study focuses on the past, competitiveness of trade and regional trade agreement problems, trade barriers and food protection in spice exports. Research gaps are established on issues such as ties between economic growth and spice exports.
(Garlock et al., 2020) to analyze the growth trend in the region, production and productivity of major spices, ii) to examine the direction of trade of major spices from India, and iii) to research the competitiveness of exports of major spices traded during the study period (1980-81 to 2010-11). In the world spice trade, India holds a prominent role. The study therefore focuses on an overview of the export output of major spices, the direction of export trade and the competitiveness of exports from India of chilly, pepper, turmeric and cardamom.
(Meena et al., 2019) presents a study to evaluate the export output of major seed spices from India from 1995-96 to 2017-18, namely cumin, coriander, fenugreek and fennel. Exports of seed spices from India increased faster than total national and agricultural exports during the study period. Cumin exports reported maximum growth among the seed spices, followed by fennel, fenugreek and coriander. India currently exports 13 percent of the total production of seed spices, which can be increased by articulating and enforcing export promotion policies and by using clean and healthy production technologies.
(Anantha et al., 2019) defines that, because of its greater production and export potential of spices in the world, India is often referred to as the "spice hub of the world. The current study explores the path of trade for major exports of spices from India to various destinations. In order to determine the path of spice exports from India, the study utilizes Markov chain analysis and calculates the transitional probability matrices for all major spices. The overall study cycle focused on the National Horticulture Mission has been split into two periods. The study found that after National Horticulture, the retention ability of export destinations for Indian chill increased.
(Kshirsagar et al., 2020) states that in domestic as well as foreign markets, Indian spices are popularly known for their flavor and aroma. India is one of the world's leading manufacturers, buyers, and exporters of spices. The analysis was built on secondary data. The degree of competitiveness of exports and market competitiveness of major spices through chilly, black paper, turmeric, coriander and cumin were analyzed using chilly, turmeric and coriander were highly competitive on the world market at constant prices, while black paper and cumin were moderately competitive on the world market.
(Bagal et al., 2020) claim that India is recognized as a spice country and is also the largest buyer, manufacturer and exporter of spices. India is the world's largest producer of spices, with a production share of 60 per cent and a global spice trade share of 36 per cent. The thesis was based on secondary data and, from 2000-01 to 2016-17, the research was carried out for 17 years. The study showed a substantial increase during the study period in the export of spices from India. The annual compound growth rate of the export of Indian spices during the period 2000-01 to 2016-17 was 23.84 per cent per annum at a significant level of 5 per cent.

RESEARCH METHODOLOGY

Trend analysis: The excel trend is a function which is used to predict or calculate a linear trend line and the trend line can be extended to predict future values also. It is a widespread practice of attempting to make a pattern by collecting data and information. It is used to predict future ranks, events and uncertain past. In my study I have used trend analysis to predict the export of spices for the upcoming year using the previous year data.

Secondary data: It refers to the data which is collected by someone other than the user. Secondary data can be collected from sources like censuses, organisational records, data collected for other research purposes and information collected from other government departments. Although it's not as exciting as collecting primary data, secondary data saves time and money and helps you to develop existing research. In my research, I have collected the past 5 years export data from government official sites.

DATA ANALYSIS AND RESULTS

Table 1:

YEAR	QUANTITY			
	PEPPER	CARDAMOM SMALL	FENNEL	FENUGREEK
2015 - 2016	28100	5500	15320	33330
2016-2017	17600	3850	35150	34680
2017 -2018	16840	5680	34550	29280
2018- 2019	13540	2850	26250	27150
2019-2020	16250	2090	23800	27660
2020-2021	24018	5558	25402	34194

INTERPRETATION: Table 1 represents export of pepper, cardamom small, fennel and fenugreek in terms of quantity is forecasted to increase 147, 265.93, 196.77, 203.59 percentage respectively.

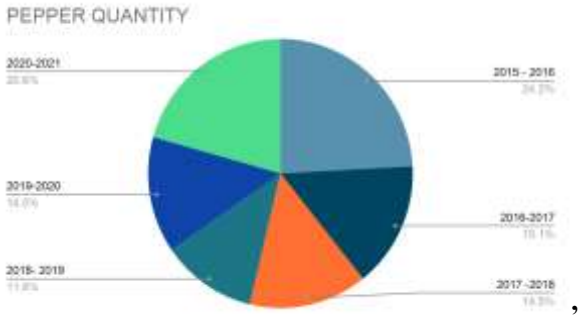

Fig.1: This chart represents export of pepper in terms of quantity and is forecasted to increase 147 percent respectively.

Table 2:

YEAR	QUANTITY		
	GARLIC	NUTMEG AND MACE	OTHER SPICES (2)
2015 - 2016	23085	4050	43955
2016-2017	32200	5070	40210
2017 -2018	46980	5500	38305
2018- 2019	29500	3300	43300
2019-2020	23350	2955	41050
2020-2021	31457	4967	41908

Interpretation: Table 2 represents export of garlic, nutmeg and mace, other spices is forecasted in terms of quantity to increase 209.78, 215.42, 220.59 percentage respectively.

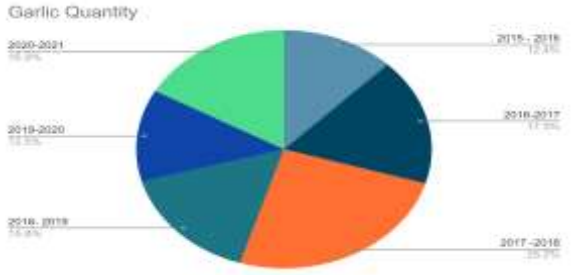

Fig.2: This chart represents export of garlic is forecasted in terms of quantity to increase 209.78, percentage respectively.

Table 3:

YEAR	QUANTITY			
	CHILI	GINGER	TURMERIC	CUMIN
2015 - 2016	347500	347500	88500	97790
2016-2017	400250	400250	116500	119000
2017 -2018	443900	443900	107300	143670
2018- 2019	468500	468500	133600	180300
2019-2020	484000	484000	136000	210000
2020-2021	360580	360580	93960	93008

INTERPRETATION: This chart represents export of chilli, ginger, turmeric and cumin is forecasted in terms of quantity to decrease 134.22, 261.20, 144.74 and 225.78 percentages respectively.

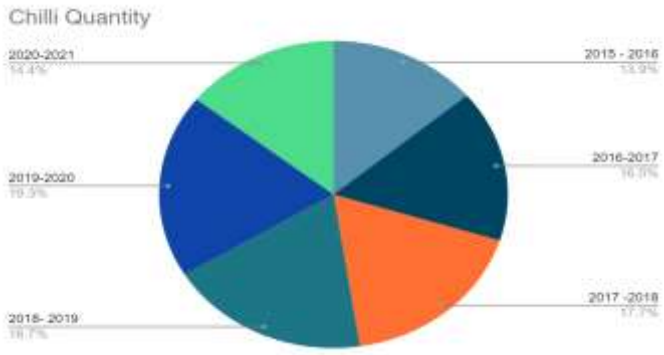

Fig.3: This chart represents export of chilli is forecasted in terms of quantity to decrease 134.22 percentages respectively.

Table 4:

YEAR	QUANTITY		
	CELERY	MINT PRODUCTS (3)	SPICE OILS & OLEORESINS
2015 - 2016	5310	26550	11635
2016-2017	6250	28500	12100
2017 -2018	6480	30150	17200
2018- 2019	6100	33850	12750
2019-2020	6510	38200	13950
2020-2021	5680	25720	12471

INTERPRETATION: Table 4 represents export of celery, mint products, spice oils & oleoresins is forecasted in terms of quantity to decrease 116.85, 100.4 and 118.85 percentages respectively.

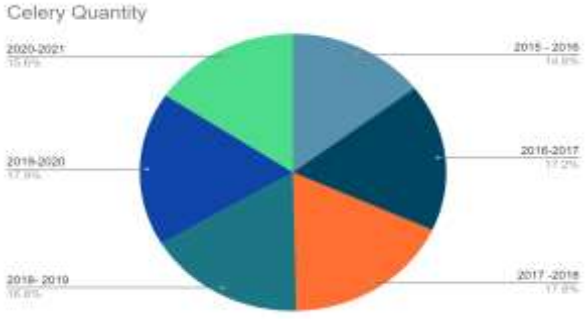

Fig.4: This chart represents export of celery, mint products, spice oils & oleoresins is forecasted in terms of quantity to decrease 116.85, 100.4 and 118.85 percentages respectively.

Table 5:

YEAR	VALUE			
	CHILI	GINGER	TURMERIC	CUMIN
2015- 2016	399743.97	27,595.56	92,165.00	153113
2016-2017	507075.63	25,704.85	124190.65	196320.14
2017 -2018	425632.74	21,607.49	103567.63	241798.78
2018- 2019	541117.5	19,602.00	141616	288480
2019-2020	622170	44,905.00	121640	322500
2020-2021	403369.18	22179.774	101360.786	154255.612

INTERPRETATION: Table 5 represents export of chilli, ginger, turmeric and cumin is forecasted in terms of value to decrease 154.24, 202.511, 120 and 209.06 percentages respectively.

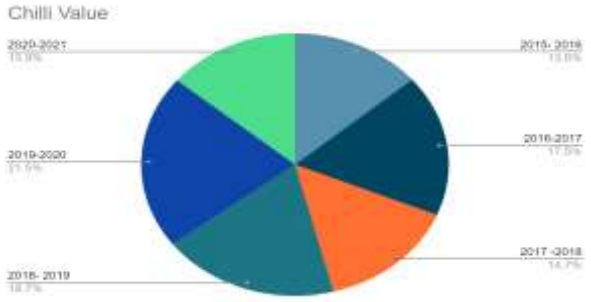

Fig.5: This chart represents export of chilli, ginger, turmeric and cumin is forecasted in terms of value to decrease 154.24, 202.511, 120 and 209.06 percentages respectively.

Table 6:

YEAR	VALUE			
	CELERY	MINT PRODUCTS (3)	SPICE OILS & OLEORESINS	CURRY POWDER & PASTE
2015- 2016	5,328.24	258130.47	214255	53,174.50
2016-2017	6,246.11	252749.67	2,45,532.80	59,910.43
2017 -2018	5,950.30	322834.86	266172.39	61,619.55
2018- 2019	6,649.00	374933.5	219300	74,470.00
2019-2020	7,175.50	383835	264525	83,410.00
2020-2021	5450.348	243778.122	227095.598	51510.782

INTERPRETATION: Table 6 represents export of celery, mint products, spice oils & oleoresins and curry powder & paste is forecasted in terms of value to decrease 209.06,157.44, 116.48 and 161.92 percentages respectively.

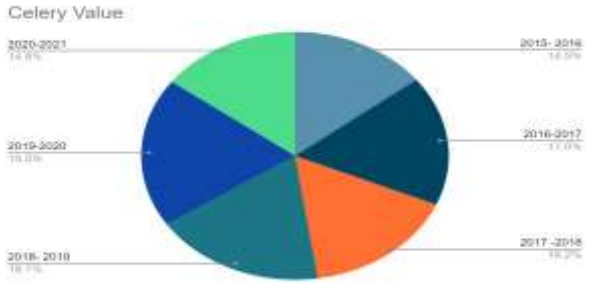

Fig.6: This chart represents export of celery and is forecasted in terms of value to decrease 209.06 percentages respectively.

Table 7:

YEAR	VALUE		
	PEPPER	CARDAMOM SMALL	FENNEL
2015 - 2016	173041.5	44,982.75	17,239.60
2016-2017	114312.6	42,150.33	30,875.93

2017 -2018	82,078.48	60,908.15	25,906.35
2018- 2019	56,868.00	35,625.00	24,412.50
2019-2020	55,187.00	42,629.50	22,888.00
2020-2021	154928.23	47505.512	23297.802

INTERPRETATION: Table 7 represents export of pepper, cardamom small and fennel is forecasted in terms of value to increase 147, 265.93 and 200.2 percentages respectively.

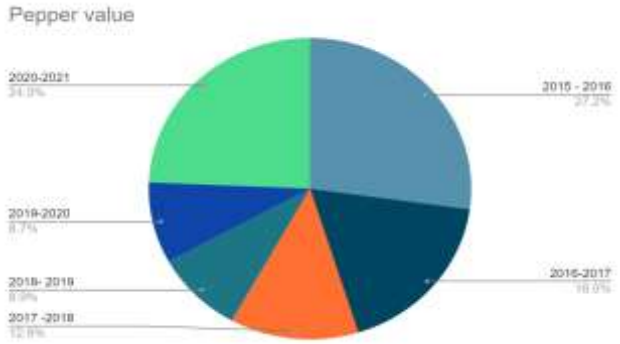

Fig.7: This chart represents export of pepper, cardamom small and fennel is forecasted in terms of value to increase 147, 265.93 and 200.2 percentages respectively.

Table 8:

YEAR	VALUE		
	FENUGREEK	GARLIC	NUTMEG AND MACE
2015 - 2016	23,380.70	15,959.00	20,928.25
2016-2017	18,276.49	30,711.50	23,641.65
2017 -2018	12,688.57	30,936.38	22,094.31
2018- 2019	13,846.50	17,110.00	15,015.00
2019-2020	16,383.60	17,232.50	13,630.75
2020-2021	20600.01	24600.776	23706.322

INTERPRETATION: Table 8 represents export of fenugreek, garlic and nutmeg and mace is forecasted in terms of value to increase 206.76, 212.66 and 218.06 percentages respectively.

Fig.8: This chart represents export of fenugreek is forecasted in terms of value to increase 206.76, percentages respectively.

CONCLUSION

India is the largest producer as well as the shopper of the spices within the world. The request for spices and its products are ever expanding both within the inner and outside markets. India incorporates a worldwide reputation as the nation which produces nearly all sorts of spices. By this study and analysis I had concluded that The trend of pepper export is moving downwards from 2015-2020, in the year 2020 the trend has changed and the export quantity increased to 20% followed by a positive forecast to increase by 147%. The trend of chilli export quantity is moving upwards from 2015-2020 and the trend has changed to decrease in the year 2020-2021 by 116.08%. The trend of fenugreek export is moving downwards from 2015-2020, in the year 2020 the trend has changed and the export value increased followed by a positive forecast to increase by 206.7%. The trend of pepper export is

moving downwards from 2015-2020, in the year 2020 the trend has changed and the export value increased to 32% followed by a positive forecast to increase by 147%. The trend of celery export is moving upwards from 2015-2021 and the export value increased by a positive forecast to increase by 209.05. The trend of garlic export is moving upwards from 2015-2020, in the year 2020 the trend has changed and the export quantity decreased to 13% followed by a negative forecast to decrease by 134.22%. The important spices produced within the nation are dark pepper, ginger, turmeric, garlic, chillies, coriander, cumin, fennel, fenugreek, celery, clove,cassia, nutmeg, mace, cardamom, saffron, vanilla and group of home grown spices. The overwhelming spices within the worldwide showcase have far exceeded supply. India once in the past the world's greatest maker has been hit by edit disappointments owing to the late rainstorm downpours in 2009 and illness. The issues for Indian providers have implied that it was overwhelmed by Vietnam as the world biggest maker, which supplies a few 30 percent of the world's trades. Be that as it may its claim stocks are nearly depleted, contributing to the cost rises. India is one of the biggest indian spice industries which acquires 40-50% of global export and the quantity has gone over 4 lakhs tons annually.

REFERENCES

1. A.C.Gomathi, S.R.Xavier Rajarathinam, A.Mohammed Sadiqc, Rajeshkumar, 2020. Anticancer activity of silver nanoparticles synthesized using aqueous fruit shell extract of Tamarindus indica on MCF-7 human breast cancer cell line. J. Drug Deliv. Sci. Technol. 55.
2. Anantha, V.P.B., Sidana, B.K., Others, 2019. Economic analysis of export performance of major Indian spices. International Research Journal of Agricultural Economics and Statistics 10, 302–310.
3. 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.
4. Babu, P.H., 2017. Export performance of spices in India: an empirical study. Parikalpana: KIIT Journal of Management 13, 66–74.
5. Bagal, N.U., Kshirsagar, P.J., Torane, S.R., Manerikar, S.S., Others, 2020. Export of spices from India: An instability analysis. International Research Journal of Agricultural Economics and Statistics 11, 55–63.
6. Bhardwaj, R.K., Rohatash, K., Sikka, B.K., Singh, A., Sharma, M.L., Singh, N.K., 2011. Challenges and constraints of marketing and export of Indian spices in India. In: Proc. International Conference on Technology and Business Management. researchgate.net, pp. 28–30.
7. Danda, A.K., Ravi, P., 2011. Effectiveness of postoperative antibiotics in orthognathic surgery: a meta-analysis. J. Oral Maxillofac. Surg. 69, 2650–2656.
8. Danda, A.K., S, R., Chinnaswami, R., 2009. Comparison of gap arthroplasty with and without a temporalis muscle flap for the treatment of ankylosis. J. Oral Maxillofac. Surg. 67, 1425–1431.
9. Dua, K., Wadhwa, R., Singhvi, G., Rapalli, V., Shukla, S.D., Shastri, M.D., Gupta, G., Satija, S., Mehta, M., Khurana, N., Awasthi, R., Maurya, P.K., Thangavelu, L., S, R., Tambuwala, M.M., Collet, T., Hansbro, P.M., Chellappan, D.K., 2019. The potential of siRNA based drug delivery in respiratory disorders: Recent advances and progress. Drug Dev. Res. 80, 714–730.
10. Ezhilarasan, D., Apoorva, V.S., Ashok Vardhan, N., 2019. Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells. J. Oral Pathol. Med. 48, 115–121.
11. Garlock, T., Asche, F., Anderson, J., Bjørndal, T., Kumar, G., Lorenzen, K., Ropicki, A., Smith, M.D., Tveterås, R., 2020. A Global Blue Revolution: Aquaculture Growth Across Regions, Species, and Countries. Reviews in Fisheries Science & Aquaculture 28, 107–116.
12. Gayathri, R.S., 2014. A Study on the Performance of Major Spices in India. Bangalore 3, 37–46.
13. Ibrahim, Y.C., Arunachalam, P., 2015. Export performancecof Indian spices in the WTO regime: a disaggregated analysis. Cochin University Of Science And Technology.
14. Jayesh, T., 2001. Production and export performance of selected spices in South India-An economic Analysis.
15. K. C. John, 2003. Spices Export from India: A Stocktaking. Econ. Polit. Wkly. 38, 1832–1834.
16. Krishnan, R., Chary, K.V., 2015. A rare case modafinil dependence. J. Pharmacol. Pharmacother. 6, 49–50.
17. Kshirsagar, P.J., Bagal, N.U., Wadkar, S.S., Manerikar, S.S., 2020. Export competitiveness in spices from India. IJCS 8, 2450–2453.
18. Malhotra, S.K., Vashishtha, B.B., 2007. Seed certification standards for seed spices crops. Ed. Malhotra SK and Vashishtha BB Production, Development, Quality and Export of Seed Spices. NRCSS, Ajmer 84–92.
19. Manivannan, I., Ranganathan, S., Gopalakannan, S. et al., 2018. Mechanical Properties and Tribological Behavior of Al6061–SiC–Gr Self-Lubricating Hybrid Nanocomposites. Trans Indian Inst Met 71, 1897–1911.
20. Meena, M.D., Lal, G., Meena, S.S., Lal, S., Chaudhary, N., 2019. Seed spices export from India: Prospects and constraints. International J. Seed Spices 9, 12–20.
21. Narayanan, V., Kannan, R., Sreekumar, K., 2009. Retromandibular approach for reduction and fixation of mandibular condylar fractures: a clinical experience. Int. J. Oral Maxillofac. Surg. 38, 835–839.
22. Narayanan, V., Ramadorai, A., Ravi, P., Nirvikalpa, N., 2012. Transmasseteric anterior parotid approach for

condylar fractures: experience of 129 cases. Br. J. Oral Maxillofac. Surg. 50, 420–424.
23. Neelakantan, P., John, S., Anand, S., Sureshbabu, N., Subbarao, C., 2011. Fluoride release from a new glass-ionomer cement. Oper. Dent. 36, 80–85.
24. Neelakantan, P., Sharma, S., 2015. Pain after single-visit root canal treatment with two single-file systems based on different kinematics--a prospective randomized multicenter clinical study. Clin. Oral Investig. 19, 2211–2217.
25. Neelakantan, P., Subbarao, C., Sharma, S., Subbarao, C.V., Garcia-Godoy, F., Gutmann, J.L., 2013. Effectiveness of curcumin against Enterococcus faecalis biofilm. Acta Odontol. Scand. 71, 1453–1457.
26. Panchal, V., Jeevanandan, G., Subramanian, E.M.G., 2019. Comparison of post-operative pain after root canal instrumentation with hand K-files, H-files and rotary Kedo-S files in primary teeth: a randomised clinical trial. Eur. Arch. Paediatr. Dent. 20, 467–472.
27. Prasanna, N., Subbarao, C.V., Gutmann, J.L., 2011. The efficacy of pre-operative oral medication of lornoxicam and diclofenac potassium on the success of inferior alveolar nerve block in patients with irreversible pulpitis: a double-blind, randomised controlled clinical trial. Int. Endod. J. 44, 330–336.
28. Priya S, R., Krishnan, C., S, J.R., Das}, J., 2009. Growth and characterization of NLO active lithium sulphate monohydrate single crystals. Crystal research and technology 44, 1272–76`.
29. Rajeshkumar, S., Menon, S., Venkat Kumar, S., Tambuwala, M.M., Bakshi, H.A., Mehta, M., Satija, S., Gupta, G., Chellappan, D.K., Thangavelu, L., Dua, K., 2019. Antibacterial and antioxidant potential of biosynthesized copper nanoparticles mediated through Cissus arnotiana plant extract. J. Photochem. Photobiol. B 197, 111531.
30. Rajesh, S.R., 2002. Export performance of major spices in India. Thesis for Degree of Doctor of Philosophy in Agricultural Economics to the ….
31. Ramadurai, N., Gurunathan, D., Samuel, A.V., Subramanian, E., Rodrigues, S.J.L., 2019. Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial. Clin. Oral Investig. 23, 3543–3550.
32. Ramakrishnan, M., Dhanalakshmi, R., Subramanian, E.M.G., 2019. Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry - A systematic review. Saudi Dent J 31, 165–172.
33. Ramesh, A., Varghese, S.S., Doraiswamy, J.N., Malaiappan, S., 2016. Herbs as an antioxidant arsenal for periodontal diseases. J Intercult Ethnopharmacol 5, 92–96.
34. Sakamma, S., 2009. Export Trade of Major Spices of India: An Economic Analysis.
35. Sharangi, A.B., Pandit, M.K., 2018. Supply Chain and Marketing of Spices. In: Sharangi, A.B. (Ed.), Indian Spices: The Legacy, Production and Processing of India's Treasured Export. Springer International Publishing, Cham, pp. 341–357.
36. Shinoj, P., Mathur, V.C., 2006. Analysis of demand for major spices in India. Agric. Econ. Res. Rev. 19, 367–376.
37. Solanki, P., Sharma, R., 2015. Growth and export performance of major seed spices. International Journal of Seed Spices 5, 95–98.
38. Thomas, L., Sanil, P.C., 2019. Competitiveness in spice export trade from India: A review. Journal of Spices & Aromatic Crops 28.
39. Vashishtha, B.B., Malhotra, S.K., 2005. Seed spices crops–Status and production potential in low rain areas. Sustainable Agriculture Systems for the.
40. Venugopalan, S., Ariga, P., Aggarwal, P., Viswanath, A., 2014. Magnetically retained silicone facial prosthesis. Niger. J. Clin. Pract. 17, 260–264.