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Production and export performances of major seed spices in India during pre and post-WTO period

M. D. Meena, G. Lal, S.S. Meena and N. K. Meena

ICAR - National Research Centre on Seed Spices, Tabiji-305 206, Ajmer, Rajasthan, India

Abstract

Present study has examined the growth and instability in area, production, productivity and export of major seed spices namely cumin, coriander and fenugreek, along with total spices from 1985 to 2015. Whole period was divided into three equal ten years sub periods. During overall period all the seed spices made significant positive and higher growth than total spices, consequently per cent share of seed spices in spice economy of India has increased over the period. As result of increase in area coupled with yield improvement made faster growth in production. Cumin and fenugreek registered high growth in period 1 and coriander made faster growth in period 3. Seed spices production sown slower growth in period 2 than period 1 and 3. Export of seed spices from India made higher growth than total spices, indicated their increasing acceptance in world market. Export basket has diversified over the period with increasing share of value added products like oils & oleoresins and curry powder. Spice production sown higher instability than its area and yield, has decreased over the period. India has emerged as regular supplier to world spice market indicated by decreasing instability in export over the study period. There is more scope for seed spices to harvest in domestic and world market, is needed to tap in years to come.

Key words : Compound growth rate, instability index, seed spice, production and export.

Introduction

Seed spice are the crops having seed as main economical part, used in whole or value added form for imparting flavour aroma and pungency to food. Other than culinary they are widely used in pharma and other industries for carminative and preservative purposes. As result of diverse agro climatic conditions India produces more than 20 seed spices. Cumin, coriander, dill seeds, fenugreek and fennel are the major seed spices cultivated in the country. Different states are known for different spices but seed spices are mostly grown in Rajasthan and Gujarat with more than 80 per cent contribution. (Jankiram and Lal, 2018). India, world's largest producer and exporter of spices produced 7.07 million tonnes of spices, coming from 3.52 Mha area during 2015-16 (https://dasd.gov.in). Seed spices play a crucial role in Indian spice economy contributing 50.31 and 21.30 per cent area and production share to nation's total spices. Individually chillies, cumin, coriander, garlic and fenugreek are the largest grown spices in the India with 23.05, 22.79, 17.48, 8.39 and 6.42 per cent area share to total spice and 21.88, 7.25, 8.06, 23.07 and 3.56 per cent production share to total spices production, respectively. Spices are high export earning commodity to Indian economy. During 2015-16, India exported 8.43 lakh tonnes spices valued at 2.633 million US$, comes around 12.21 per cent to domestic production. Spice export is very concentrated, out of the 22 spices which are commercially cultivated in the country, 10 contributed around 90 per cent total export earnings. In last three decades scenario of spice production as well as export underwent significant transformation. In present study attempt has been made to capture such changes in spice economy of India. Growth of area, production, productivity and export of seed spices along with total spices during the pre and post WTO has been examined. The instability in the growth and the trend of growth has been studied.

Methodology

This study is based on secondary data compiled from various sources. The information on area, production, productivity and export was taken from Directorate of Arecanut and Spices Development, Calicut, Spice board and Directorate of Economics & Statistics, DAC&FW for the period 1985-86 to 2015-16. To highlight the changes in spice sector during pre and post-WTO period per cent share, compound growth rate and instability index was employed. For comparison whole period has been divided into three sub-periods, period 1 (pre-WTO, from 1985-86 to 1994-95), period 2 (WTO, from 1995-96 to 2004-05) and period 3 (post-WTO, from 2005-06 to 2014-15).

*Corresponding author email: meenamurlidhar@gmail.com

Growth rate analysis

Compound growth rate in area, production, and productivity for total and seed spices and their export from India was computed using formula:

$$Y_t = ab^t e^{ut} \quad \ldots(1)$$

Where,

Y_t = Area/ Production/ Productivity/ Export

a = Intercept

b = (1+g) regression coefficient

t = Time period in years

u_t = Disturbance term for the year 't'

Taking natural log on both sides equation (1) becomes

$$LnY_t = Lna + t\ Lnb + u_t$$

Growth rate = (Antilog of b – 1)*100

Instability analysis

Instability in agricultural is an important decision parameter because it results in wide variations in disposable income of the farmers which adversely affects investment in agriculture. Instability in a crop depends on its nature, production technology, its sensitivity to weather, economic environment, availability of inputs and many other factors. High growth with low instability is desired for sustainable development in agriculture (Joshi and Singh, 2015). Therefore instability in area, production, productivity and export of spices was estimated using the Instability Index of the form:

Instability Index = Standard deviation of natural logarithm (Y_{t+1}/Y_t)

Where,

Y_t = Area / Production / Productivity and export in current year't', and

Y_{t+1} = Area / Production / Productivity and export in next year't+1'.

It is a unit free and very good measure to arrest the deviations of a variable from its underlying trend. Standard deviation is zero indicates no deviation from the trend. Where if series detour more over the trend, the ratio of Y_{t+1}/Y_t fluctuates more indicates higher instability among variables (Chand *et.al.*, 2011).

Results and discussion

Current scenario of seed spices production and export in India

Based on average of last three years i.e. TE 2015-16, sixteen major spices namely cumin, chillies, coriander, garlic, turmeric, fenugreek, ginger, cardamom, fennel, tamarind, ajwain, dill, poppy, celery, nutmeg, saffron, vanilla, cinnamon, tejpat and clove cultivated in India 33.50 Mha area produced 64.79 million tonnes spices at an average of 1933 kg ha^{-1} (https://dasd.gov.in). Higher yield was harvested in ginger (6042 kg ha^{-1}), garlic (5480 kg ha^{-1}) and turmeric (5052 kg ha^{-1}). As of higher yield above three spices contributed 51.36 per cent share to total spice production from 18.09 per cent area. During last three years, major seed spices namely cumin, coriander, fenugreek, fennel, ajwain, dill, poppy and celery contributed 49.38 and 19.77 per cent to national spice area and production respectively. Cumin and coriander are first and third most grown spices in the country with 24.43 and 17.02 per cent area and 7.59 and 7.58 per cent production share to total spices respectively. During last three years area under seed spices expanded by 13 per cent coupled with 14 per cent yield enhancement resulted in 29 per cent increase in seed spice production in the country. Among seed spices highest area expansion (134%), was seen in fenugreek and was followed by fennel (94%) and coriander (37%). As a result production of above three seed spices increased by 123, 115 and 65 per cent, respectively. On the other hand, cumin cultivation shrunken by 14 per cent from 2013-14 to 2015-16, area decreased by 1.36 lakh ha joined with yield decrease resulted 16 per cent lose in cumin production is the point to ponder (Table 1).

India has a legacy of more than 5000 years in spice trade. India had been dream land for navigators to reach in search of spices. It had been the major supplier of spices and its value added products to the world market. During TE 2015-16, India exported nearly 13 per cent of her production, which accounts with a 46 per cent share by volume and 23 per cent share by value, in the world market. Export basket of Indian spices includes around 50 spices in whole form and about 80 in value added form (Babu, 2017). Ten major spices contributed around 90 percent of export quantity and value. Major exported spices are chilli, cumin, turmeric, coriander and fenugreek which jointly constitute 72.75 and 43.10 per cent share in quantity and value respectively. Mint products, Pepper and spice oils & oleoresins are low volume high value spice products which holds 41.13 per cent share to total spice export earnings from 6.93 per cent volume share in quantity term respectively. Chilli alone accounts for 40 per cent in volume and 23 per cent in value to total export, followed by cumin, turmeric and coriander (Table 3). During 2012-13 to 2015-16, spice export from India increased by 3.18 per cent in quantity term and 23.61 per cent in value term as result of more export of value added products like peeper, small cardamom, cinnamon, cassia, saffron, curry powder, spice oils and oleoresins and celery. On the other hand there was 14 per cent decrease in seed spices volume export but in value term it increased by 6.75 per cent.

Table 1. Area, production and productivity of major spices in India with per cent share to total spice area & production during TE 2015-16

Crops	Area (000 ha)	Production (000 tonnes)	Yield (Kg ha^{-1})	Area Share (%)	Production Share (%)
Cumin	818.73	491.84	596.00	24.43	7.59
Chillies	791.33	1565.76	1980.00	23.62	24.17
Coriander	570.25	491.43	851.33	17.02	7.58
Garlic	271.91	1488.80	5480.67	8.12	22.98
Turmeric	184.24	928.58	5052.00	5.50	14.33
Fenugreek	156.12	166.60	1071.33	4.66	2.57
Ginger	149.74	910.51	6042.67	4.47	14.05
Others	126.78	57.00	447.52	3.78	0.88
Cardamom	85.39	24.44	286.00	2.55	0.38
Fennel	56.62	91.67	1600.33	1.69	1.41
Tamarind	54.70	201.92	3692.00	1.63	3.12
Ajwain	27.83	16.83	605.33	0.83	0.26
Dill/Poppy/Celery	25.06	22.22	886.33	0.75	0.34
Nutmeg	21.16	14.34	677.33	0.63	0.22
Saffron/Vanilla	5.72	0.80	131.67	0.17	0.01
Cinnamon/Tejpat	2.75	5.05	1838.33	0.08	0.08
Clove	2.32	1.22	525.67	0.07	0.02
Seed spice	1654.61	1280.60	771.70	49.38	19.77
Total	3350.65	6479.02	1933.00	100	100

Source: Directorate of Arecanut and Spices Development data, 2018.

Note: Seed spices includes coriander, cumin, fennel, fenugreek, ajwain and dill/poppy/celery

Change in scenario of spice cultivation and export in India

During the study period acreage under spice cultivation has almost doubled from 18.82 lakh ha in 1985-86 to 34.57 lakh ha in 2015-16 at CGR of 1.63 per cent per annum. Spice productivity has also doubled from 967 kg ha^{-1} in 1985-86 to 1996 kg ha^{-1} in 2015-16 at CGR of 2.84 per cent per annum. As a result in production become four times from 18.21 to 69.02 lakh tones in respective years increased at the CGR of 4.51 per cent per annum. During this period chilli, coriander, cumin, fennel, peeper, turmeric, fenugreek, and ajwain are the major spices grown in the country, jointly contributed 85 per cent to the area and 70 per cent to the spice production in the country.

During overall study period, spice export from India in volume increased at CGR of 8.23 per cent per annum from 74.50 thousand tonnes in 1985-86 to 843 thousand tonnes in 2015-16. Whereas in value term it increased at double rate of 15.69 per cent per annum as result of increased unit prices in world market other than quantity exported. Table 2 reveals that since 1980s Indian spices sector has moved towards seed spice cultivation resulting their share in spice economy of India have improved. The area share of seed spices to total spices has increased from 31 per cent in 1980s to more than 46 per cent during 2010-16. Similarly production share of seed spices to total spices also increased from 17.63 to 20.52 per cent in respective above periods. Among seed spices highest increase in area share was recorded in ajwain, followed by fennel, cumin and fenugreek. Similar trend was also seen in production share. On contrast a decreasing share in coriander was observed whose area share decreased from 21.31 per cent in 1980s to 14.72 per cent 2000s, improved to 17.59 per cent during 2010 to 2016 (Figure 1&2). Coriander, cumin, fennel, fenugreek and ajwain occupied 36 per cent of the spice area in the country in overall study period. Area under seed spices has increased at CGR of 3.07 per cent per annum coupled with 2.18 per cent growth in yield resulted in 5.32 per cent growth in seed spices production in the country during 19985-86 to 2015-16. In overall study period highest area share to seed spices was contributed by coriander (17.87%), was followed by cumin (13.98%), fenugreek (2.07), fennel (1.48%) and ajwain (0.86%). Over the period area share of coriander decreased from 19.95 per cent in period 1 to 17.87 in period 3. On the other hand area share of cumin increased from 9.05 per cent in period 1 to 19.01 per cent share in period 3. Similarly area share of fenugreek, fennel and ajwain increased from 1.55 to 2.70, 0.73 to 2.69, 0.69 to 1.22 per cent, respectively from period 1 to period 3.

Table 2. Change in area and production share (%) of seed spices to total spices in India from 1980 to 2016

Crop	Share	1980s	1990s	2000s	2010-16	% Change
Coriander	Area	21.31	19.46	14.72	17.59	-17.47
	Production	10.28	8.91	7.07	8.72	-15.24
Cumin	Area	6.86	11.35	17.12	20.96	205.73
	Production	3.99	4.12	4.96	6.99	75.33
Fennel	Area	0.74	0.87	1.94	2.61	251.64
	Production	0.94	0.93	1.76	2.12	125.05
Fenugreek	Area	1.83	1.54	2.33	3.74	104.39
	Production	2.31	1.53	2.02	2.32	0.66
Ajwain	Area	0.36	0.68	0.77	1.38	282.88
	Production	0.11	0.21	0.30	0.37	250.15
Seed Spices	Area	31.10	33.90	36.89	46.29	48.83
	Production	17.63	15.71	16.12	20.52	16.41

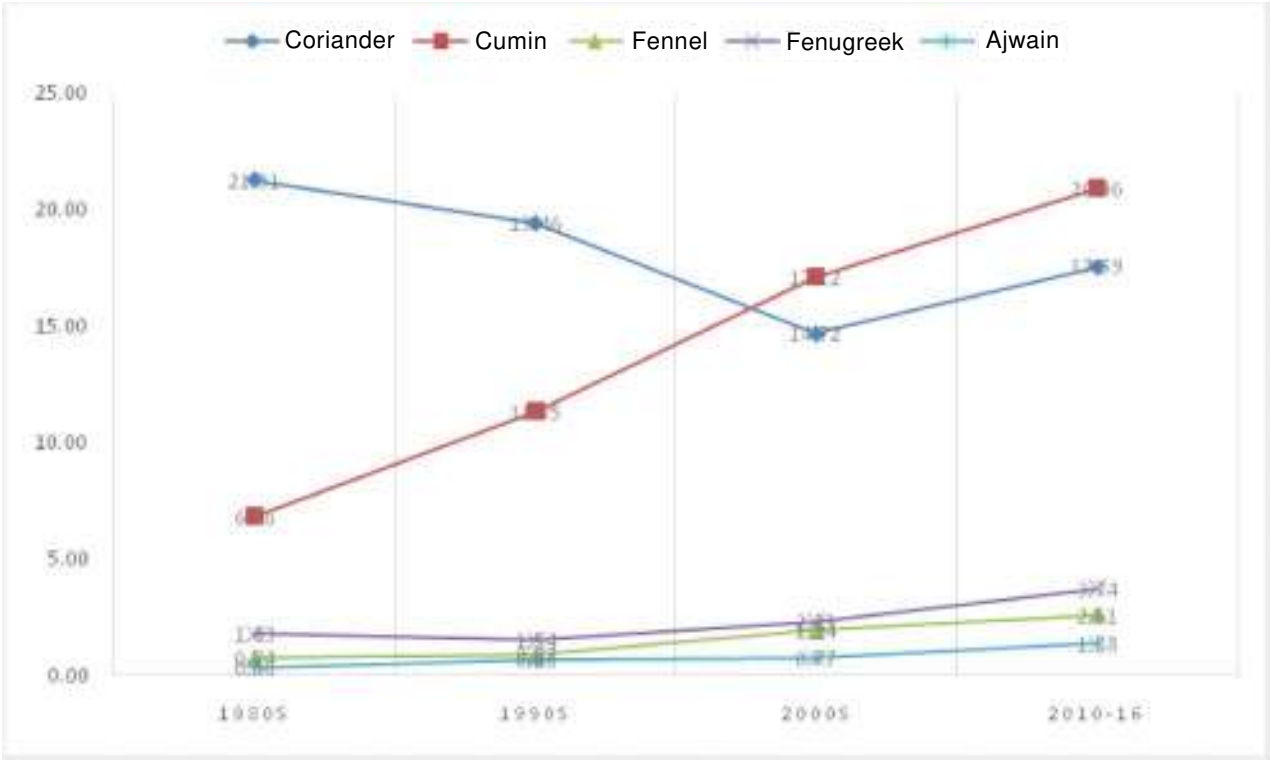

Fig. 1. Area share of major seed spices to total spices from 1980 to 2016

Composition of export basket of Indian spice has witnessed a structural shift during the study period. During early 90s, Pepper, Chilli, Turmeric and Ginger together accounted for 66 per cent of total spices export earnings (Rao, 2009) reduced to 38.22 per cent in TE 2015-16. There is significant shift towards value- added products like mint products, spice oils and curry powders which constitute about 36 per cent of total spices export earnings in recent years (Table 4). During 1995-96 Pepper, chilli and oil & oleoresins were the largest export earning spices to the country with 24.40, 24.29 and 14.30 per cent share respectively to total spice export value. During 2015-16,

Table 3. Major spics export from India in quantity and value term with percent share to total spice export during 2015-16.

Crop	Quantity (tonnes)	Value (in lakhs)	Quantity (% share)	Value (% share)
Chilli	335666.67	339035.67	39.42	22.59
Cumin	125233.33	166841.67	14.66	11.24
Turmeric	84000.00	77758.67	9.87	5.19
Coriander	43950.00	43226.67	5.17	2.90
Other spices (2)	33566.67	43938.67	3.92	2.90
Fenugreek	30658.33	16902.00	3.63	1.12
Ginger	29500.00	28603.00	3.44	1.92
Other seeds (1)	26566.67	16020.00	3.12	1.08
Curry powder/Paste	24983.33	46977.67	2.94	3.14
Mint Products (3)	23800.00	289908.67	2.80	19.67
Pepper	23600.00	129295.33	2.78	8.55
Garlic	23253.33	10404.33	2.74	0.69
Fennel	14756.67	15469.00	1.75	1.04
Spice Oils & Oleoresins	11508.33	192890.00	1.35	12.91
Celery	5683.33	4580.00	0.67	0.30
Nutmeg & Mace	4325.00	24670.67	0.51	1.67
Cardamom (S)	4298.33	35237.00	0.51	2.34
Cardamom (L)	791.67	7899.33	0.09	0.53
Seed spices	220281.67	247019.33	25.86	16.60
Total	851475.00	1492803.67	100.00	100.00

Source: Directorate of Arecanut and Spices Development data, 2018.

Note: (1) includes ajwain, dill, poppy, anise, mustard etc. (2) includes asafoetida, cinnamon, cassia, cambodge, saffron and spice (NES). (3) includes menthol, menthol crystal and mint oils. Seed spices includes coriander, cumin, fennel, fenugreek, ajwain and dill/poppy/celery

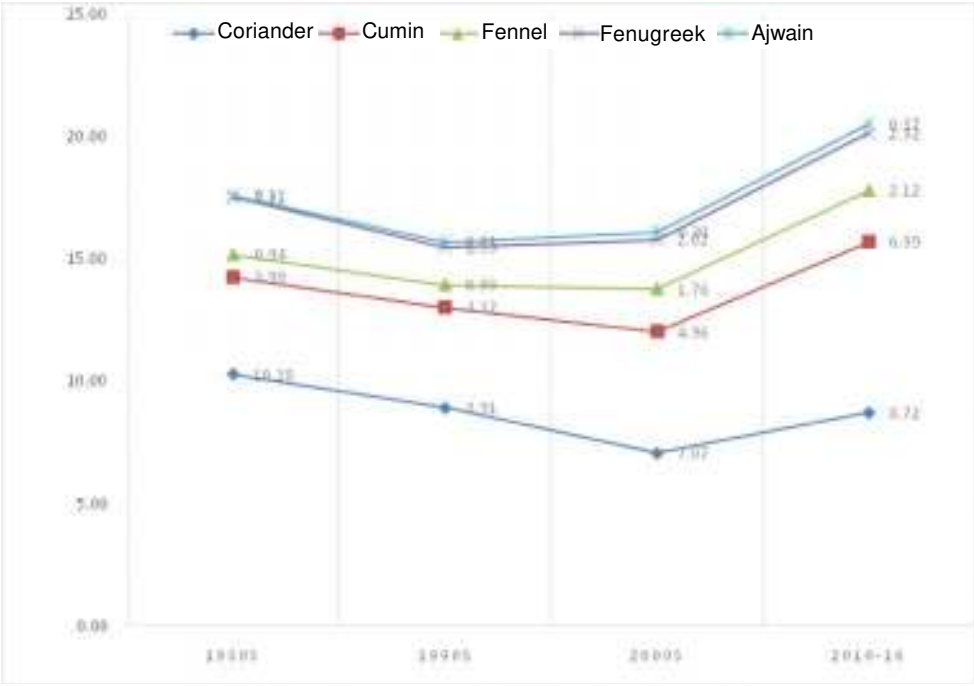

Fig. 2. Production share of major seed spices to total spices from 1980 to 2016

Table 4. Change in per cent share of different spices to total spice export and their ranks

Crop	Value share (in %)		Ranks	
	1995-96	2015-16	1995-96	2015-16
Pepper	24.4	8.55	1	5
Cardamom (S)	1.61	2.34	12	9
Chilli	24.29	22.59	2	1
Ginger	4.84	1.92	6	10
Turmeric	5.74	5.19	5	6
Coriander	2.79	2.9	7	8
Cumin	2.16	11.24	11	4
Fenugreek	2.32	1.12	9	12
Nutmeg & Mace	0.084	1.67	13	11
Tamarind	2.57	N.A.	8	N.A.
Mint Products	5.9	19.67	4	2
Oil and oleoresin	14.3	12.91	3	3
Curry products	2.18	3.14	10	7
Others	6.79	6.76		

share of peeper has decreased to less than 10 per cent and its rank in total export value come down to fifth place from top position. Whereas chilli has taken top position from second place. The contribution of seed spices in total spice export earning is increasing over the period. Share of seed spices increased to more than double from less than 8 per cent in 1995-96 to more than 16 per cent in 2015-16. Percentage share of cumin has increased from 2.16 to 11.24 per cent and share of coriander also increased. The contribution of value added products of spices like mint and curry products has increased from 5.9 and 2.18 per cent, respectively in 1995-96 to 19.67 and 3.14 per cent in 2015-16 (Table 4). It can be conferred that spices exports from India have witnessed changes in commodity composition from traditional spices towards value added products. Also decrease in proportionate share of individual spice pointed out the diversification of export over period.

Analysis of growth and instability of seed spices production

Growth and instability index was measured to analyse period-wise performance of seed spices between 1985 and 2015 in term of area, production and productivity. Table 5 reveals that area under total spices cultivation has almost doubled in overall study period at CGR of 1.63 per cent per annum. Area under spices cultivation made highest growth (3.98%) during period 3 where it increased by 10 lakh ha from 24 to 34 lakh ha from 2006-07 to 2015-16. In period 1 also, spices attracted 3.32 lakh ha addition area at CGR of 2.56 per cent per annum. There was slow growth between 1995-96 and 2004-05, area varying between 22 to 25 lakh ha. Spices cultivation got the momentum in last ten years and expanded at CGR of 3.98 per cent per annum. Spice productivity in the country shown continuous upward trend as result of technology advancement through research and development. Yield doubled from 967 kg ha^{-1} in 1985-86 to 1996 kg ha^{-1} in 2015-16, at rate of 2.84 per cent per annum in overall period with maximum growth in period 2. As result of doubling acreage and yield in overall period spice production in the country increased to almost four times. Production made fastest growth of 6.17 per cent per annum in period 3 as combined effect of highest growth in area and second highest growth in yield. In period 3 spice production increased from 39 to 69 lakh tonnes from 2006-07 to 2015-16. The increase in production can be attributed to higher productivity of coriander in Rajasthan, one of the major coriander growing states in India (Kumawat and Meena, 2005). The growth in cumin production was mainly contributed by high productivity which was probably attributed to introduction of high yielding varieties coupled with Integrated Nutrient Management (Soumya *et al.*, 2014).

Instability in area, production and productivity was measured to assess the deviation from normal trend. During study period, production was found more varying compared to area and yield. Highest instability of eleven per cent was measured in spice production whereas area and yield was found equally varying with instability index of seven per cent each. Area, production and yield were found more fluctuating in period 2 than period 1 and 3. Seed spices area and production was measured more fluctuating than total spices as denoted by higher instability in former than later. However, instability in seed spices area, production and productivity has decreased over the period indicated that their performances has

Table 5. Growth and Instability of area, production and yield of major seed spices in India during 1985 to 2015

Particulars		Average				Compound growth rate				Instability			
		P1	P2	P3	Overall	P1	P2	P3	Overall	P1	P2	P3	Overall
Total Spice	Area (ha)	2073630	2468240	2811348	2451073	2.56	1.11	3.98	1.63	0.07	0.08	0.07	0.07
	Production (ton)	2040597	3141134	4937597	3373109	4.35	3.93	6.17	4.51	0.09	0.13	0.09	0.11
	Productivity (Kg ha^{-1})	980.886	1270.928	1742.987	1331.6	1.75	2.79	2.11	2.84	0.06	0.10	0.04	0.07
Coriander	Area (Ha)	411880	436622	454143	434215	0.07	-3.49	7.23	0.51	0.21	0.29	0.14	0.22
	Production (Tones)	189400	268371	380626	279465.7	1.87	1.23	12.10	3.52	0.31	0.39	0.24	0.32
	Productivity (Kg ha^{-1})	457.9688	620.6313	813.5676	630.7226	1.80	4.89	4.54	2.99	0.18	0.15	0.14	0.16
Cumin	Area (Ha)	195035	343795	538943	359257.7	18.36	8.54	7.72	6.48	0.38	0.22	0.07	0.26
	Production (Tones)	84540	130924	300994	172152.7	15.88	9.03	12.43	7.49	0.51	0.36	0.22	0.38
	Productivity (Kg ha^{-1})	446.249	382.1225	543.7211	457.3642	-2.10	0.45	4.37	0.94	0.27	0.29	0.19	0.26
Fennel	Area (Ha)	15190.2	25878.6	75748.9	38939.23	11.85	6.20	2.54	8.36	0.43	0.48	0.37	0.43
	Production (Tones)	17116.4	29842.2	113686.5	53548.37	13.92	5.88	2.88	10.01	0.51	0.47	0.35	0.45
	Productivity (Kg ha^{-1})	1098.347	1163.381	1510.509	1257.412	1.86	-0.30	0.34	1.52	0.13	0.12	0.06	0.11
Fenugreek	Area (Ha)	32198	49367.1	77634.7	53066.6	4.09	7.62	13.23	4.68	0.23	0.49	0.20	0.35
	Production (Tones)	33428.5	59185.1	94943.4	62519	5.52	9.02	12.86	5.60	0.28	0.46	0.23	0.35
	Productivity (Kg ha^{-1})	1026.538	1194.742	1223.845	1148.375	1.38	1.30	-0.33	0.88	0.09	0.17	0.07	0.12
Ajwain	Area (Ha)	14281.6	16053.3	28331.4	19555.43	1.54	-3.59	6.70	3.20	0.34	0.29	0.31	0.32
	Production (Tones)	4308.2	7672.6	18513.5	10164.77	11.88	4.81	12.08	8.39	1.04	1.08	0.55	0.92
	Productivity (Kg ha^{-1})	294.773	475.408	633.2293	467.8034	10.18	8.72	5.04	5.03	1.07	0.91	0.39	0.84

Source: Directorate of Arecanut and Spices Development data, 2018.

Note: P1,P2,P3 and overall indicates 1985-86 to 1994-95, 1995-96 to 2004-05, 2005-06 to 2014-15 and 1985-86 to 2014-15, respectively.

Table 6. Growth and Instability of spices export from India in Quantity (in 000 tones) and Value (in lakh Rupees) term during 1985 to 2015

Particulars		Average				Compound growth rate				Instability			
		P1	P2	P3	Overall	P1	P2	P3	Overall	P1	P2	P3	Overall
Total spice	Quantity	116.75	248.03	570.04	311.61	10.18	3.59	10.62	8.23	0.20	0.09	0.07	0.14
	Value	36603.05	173141.27	791018.77	333587.70	9.16	8.87	21.16	15.69	0.17	0.14	0.10	0.15
Coriander	Quantity	6620.80	18493.40	34484.70	19866.30	33.25	6.78	7.88	11.10	0.86	0.31	0.23	0.55
	Value	903.80	4925.27	20696.53	8908.53	41.32	10.89	20.54	19.50	0.62	0.31	0.28	0.43
Cumin	Quantity	2331.50	11296.50	60694.41	24840.80	15.67	8.27	26.33	17.25	0.71	0.53	0.41	0.55
	Value	830.11	8206.61	73057.10	27364.60	31.01	15.94	34.49	25.35	0.53	0.60	0.35	0.51
Fenugreek	Quantity	4567.50	10013.50	20551.74	11710.91	12.49	-0.04	11.86	7.84	0.40	0.47	0.35	0.42
	Value	463.85	1850.19	7509.38	3274.47	26.66	5.68	19.87	15.64	0.29	0.39	0.29	0.34

Source: Directorate of Arecanut and Spices Development data, 2018.

Note: P1,P2,P3 and overall indicates 1985-86 to 1994-95, 1995-96 to 2004-05, 2005-06 to 2014-15 and 1985-86 to 2014-15 respectively.

become more uniform in period 2 and 3 compared to period 1. It can be implied that seed spices cultivation has become more attractive to the farmers over the period. It is confirmed by 10 per cent growth in seed spices production in last ten years in the country. Further increased growth with decreased instability indicated the increasing in sustainable cultivation of seed spices in the spice economy of the India.

Among seed spices crop-wise analysis was also made. Highest CGR was measured in area of fennel (8.36%) was followed by cumin (6.48%), fenugreek (4.68%) and ajwain (3.20%). Highest growth in production was measured in fennel followed by ajwain as of higher growth in productivity; was followed by cumin and fenugreek. In all seed spices production was found more varying compared to their area may be because highly vulnerable yield in seed spices especially in cumin which recorded highest instability in yield (0.26) was followed by coriander. Highest instability in production was measured in ajwain (92%) whereas coriander production was found most stable in all the seed spices.

Analysis of growth and instability of seed spices export

Export from a country plays an importance role in its economic development. It is necessary for a developing country like India. In the long run export earnings is the safest and reliable source of foreign exchange (Ibrahim, 2015). Spice export plays an important role in Indian economy with export earning of 17,66,461 lakh rupee by exporting 9.74 lakh tonnes spices during 2015-16. Peeper cardamom, ginger, turmeric, chilli, cinnamon nutmeg/ mace, cloves and vanilla along with seed spices like cumin, coriander, fennel, fenugreek, sesame seeds, mustard, sage, bay, oregano thyme and mint are the most important spices traded in the world markets. However few spices namely chilli, cumin, turmeric, coriander, fenugreek, peeper, garlic and fennel and the value added form like curry powder or paste, spice oils and oleoresins and mint products constitute a major segment of the country's spice export basket.

Table 6, reveals the export growth of major seed spices along with total spices exports during different period. In study period spices export from India has increased to more than 11 and 57 times in terms of quantity and value respectively. Seed spices export increased by higher times than total spices. Cumin, coriander and fenugreek export raised to 92, 22 and 14 times in quantity and 924, 267 and 236 times in value term respectively indicated many fold increased prices for seed spices in world market. It confirmed the increasing weight of seed spices

to total spice export earnings. Export of different spices has increased as different pace in different periods. In overall period total spices measured a growth of 8 and 16 per cent per annum in volume and value term respectively. In overall period highest growth in quantity exported as well as in value term was recorded in cumin followed by coriander. In period 1, total seed spices export doubled from 74 to 155 thousand tonnes at CGR of 10 per cent per annum. Export of cumin, coriander and fenugreek in volume increased faster than total spices. During first half of period1 i.e. 1985 to 1990, fenugreek was the major exported seed spices was followed by coriander and cumin. While in second half of period1 i.e. 1990 to 95 coriander export surpassed fenugreek export as a result coriander export recorded highest growth (33%) was followed by cumin (16%) and fenugreek (12%). In value term export earnings from seed spices increased at faster rate than total spices. Coriander export increased by 8.9 thousand ton from 1985-86 to 1994-95 whereas cumin export increased by 4.5 thousand tonnes in respective years. Fenugreek was the second highest exported commodity next to coriander whose export increased from 2.3 to 7.9 thousand ton from 1985-86 to 1994-95.

In period 2, growth of total and also seed spices export decelerated, may be due to adverse impact of globalisation of agriculture trade during mid 90's resulted in increased competition in world market. Growth rate of total spices export and in cumin reduced to less than half in quantity term. Further low in case of coriander export growth is reduced to one fifth and was found negative in fenugreek exported volume. The quantity of coriander and cumin export almost tripled. It increased from 11 to 33 thousand tonnes in coriander and 4 to 13 tonnes in cumin from 1995-96 to 2004-05. Growth in value of seed spices was found low in period 2 compared to period 1 indicated the unfavourable prices in world market in periods. The adverse effect of globalisation diminished during period 3 where growth performance of total spices as well as seed spices has sown recovery. Total spice export increased almost two and half times from 35 to 89 lakh tones from 2005-06 to 2014-15 at CGR of 10.62 per cent per annum. In value terms, export earnings increased by almost six times from 2,62,762 to 14,89,967 lakh crore rupees at CGR of 21 per cent per annum. Export of cumin performed better than coriander and fenugreek in period 3 against period 1. Cumin export in quantity term recorded highest growth (26.33%) in quantity exported due to highest increase in its prices in world market, was followed by fenugreek (11.85%) and coriander (7.87%). As a result cumin export earning to total spice earnings increased to 12.34 per cent in 2014-15 from 3.35 per cent in 2005-06 whereas this share of coriander was found varying between 2 to 3 per cent.

Instability was found to decline in total spice export. It indicated that India has become regular supplier to the world spice market since 1985. In value term also, instability decreased in this period pointed out the prices become more stable over the period. Export in value term was more volatile than export volume because other than quantity exported there are many factors like export price, exchange rate, demand in domestic and world market, SPS measures *etc.,* which affects the export value. In overall period export of seed spices i.e. cumin, coriander and fenugreek was found more volatile compared to total spices in overall period both in quantity as well as value term. Instability in coriander export has reduced to one third in period 3 compared to period 1 in quantity term and in value term it reduced to half in respective periods. In period 1, coriander export recorded high growth with high instability whereas in period 3 there was comparatively low growth but was consistent indicated increased worthiness in world market. In cumin also, instability decreased over the period in quantity exported. But in value term it increased in period 2 due to more variation in unit prices in international market in post-WTO period got corrected in period 3 and resulted in decreased instability in this period compared to period 2 and period 1 also. Alike cumin in fenugreek too there was more fluctuation in period 2 than period 1 which decreased in period 3. There was less variation in fenugreek quantity exported in period 3 than period 1 and 2. The instability analysis highlighted out that India become regular supplier of seed spices to world market over the study period.

Conclusions

In last three decades importance of seed spices on spice map of India has improved in term of area, production and export share to total spices. Among seed spices area share of cumin, fennel and fenugreek has shown increasing trend during study period but coriander acreage has sown decreasing trend, calls need to arrest further shrinkage. Spice export has increased in both quantity as well as value term. Although there was setback to seed spices in term of production and export between 1995 and 2005, may be due to globalisation of agricultural trade has been corrected in last period. During period 1, growth performance of coriander export was highest. In period 3, cumin outperformed the coriander. Instability in seed spices export has reduced indicated that India emerged as reliable supplier of spices to the world market. There is scope to improve of India share in world spice

market by diverting more spices to world market through appropriate policy support at central and state levels.

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