Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

Kumareswaran T
Research Scholar, Department of
Agricultural Economics,
Institute of Agricultural Sciences
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

HP Singh
Professor, Department of
Agricultural Economics,
Institute of Agricultural Sciences
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

V Kamalvanshi
Assistant Professor, Department
of Agricultural Economics,
Institute of Agricultural Sciences
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

Avdhesh Sharma
Research Scholar, Department of
Agricultural Economics,
Institute of Agricultural Sciences
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

Debashish Kumar
Research Scholar, Department of
Agricultural Economics,
Institute of Agricultural Sciences
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

Production and export performance of coffee in India

Kumareswaran T, HP Singh, V Kamalvanshi, Avdhesh Sharma and Debashish Kumar

Abstract
Coffee is most predominantly export oriented commodity, more than 65 per cent. Coffee industry earns a foreign exchange to the tune of about Rs.4000 crores. The area under coffee plantations in India has increased by more than three times, from 120321 hectares in 1960-61 to 397147 hectares in 2015-16. The paper attempts to quantify the changing structure of Indian coffee exports. Data for analysis was taken for a period of 30 years from 1985 to 2015. Compound Annual Growth Rate (CAGR) was used for analysing the growth in coffee area, production, yield, export quantity and export value over the years. CGAR concept was used for the estimation trends in growth and EPR was used to estimate the comparative advantage of the commodity. The study revealed that the growth rate in the area, production and yield, export quantity, export value of coffee was showed that 2.4 per cent, 3 per cent, 0.6 per cent, 3.2 per cent, and 4.2 per cent respectively. The result showing that coffee had a stable and positive fluctuation trend in the export performance ratio.

Keywords: Growth rate, instability, export performance ratio

Introduction

According to the world trade, coffee (*Coffea arabica*) is the second important commodity after petroleum product. It was first introduced to India during 1600AD from Yemen and planted in the high hills in Baba Budan's Courtyard, Chikmagalur district of Karnataka. Commercially, the coffee was cultivated in two main species, that is *Coffee Arabica* and *Coffee canephora*, popularly known as arabica coffee and robusta coffee. Indian coffee is mainly grown in the Western Ghats spread over Karnataka, Kerala and Tamil Nadu. Now, India has 16 unique coffee varieties. That has been grown under a canopy of natural shade in ecologically sensitive regions of the Western and Eastern Ghats. Coffee contains some antioxidants and beneficial nutrients that can improve health. Coffee mainly contains caffeine substance, which can scientifically prove to helpful in improving mental performance. The area under coffee plantation in India has increased by more than three times, from 120321 hectares in 1960-61 to 397147 hectares in 2015-16. This phenomenal increase in area could be attributed both to the increase in production and improvement in productivity levels (Darvishi GA and Indira M, 2015) [1]. In 2015, coffee was cultivated in 434436 hectares in all over India, its cover in Karnataka (235438 hectares) 54 per cent,20 per cent in Kerala (85501 hectares), 8 per cent in Tamil Nadu (34932 hectares) and remaining 18 per cent covered by non-traditional areas (78565 hectares). The total production and yield of coffee in India was 348000 tonnes and 876-kilo gram per hectare of yield. Out of it, 251520 tonnes (72%) produced in Karnataka, followed by Kerala 69230 tonnes (20%) and Tamil Nadu 17295 tonnes (5%). While other non-traditional area produced 9955 tonnes which are around three per cent of the total production of coffee.

India has emerged as the seventh largest coffee producer globally, after Brazil, Vietnam, Columbia, Indonesia, Ethiopia and Honduras. In 2015-16, India accounted for 4.05 per cent of global coffee production. Export earnings have increased from Rs 507.82 crore (138.83 million US$) in 1993 to Rs 5157.87 crore (807.52 million US$) in 2015. Italy was the largest export market for Indian coffee, importing 59894 tonnes (22% of India's total exports) in 2014-15. It was followed by Germany (25021 tonnes), Russian Federation (21068 tonnes), Turkey (15857 tonnes) and Belgium (12082 tonnes). Apart from this export remaining production of coffee was consumed by domestic people of India (Gurusamy P and Purinat Y, 2015)[2]. The domestic consumption of coffee was gradually increasing year to year. In 2014-15 India's domestic consumption of coffee was 132000 tonnes as compared to126000 tonnes in 2013-14. In the light of the above facts, the present study has been conducted with following specific objectives: the first one to examine the trend in area, production, yield, export quantity

Correspondence
Kumareswaran T
Research Scholar, Department of
Agricultural Economics,
Institute of Agricultural Sciences
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

and export value of coffee in India and workout the instability in area, production, yield, export quantity and export value of coffee. The focus of the study is to analyses the export performance ratio of coffee in India.

Material and Methods
To examine the trend in the area, production, productivity, export quantity and export value of coffee in India compound growth rate (CGR) was worked out, to examine the tendency of the variable to increase, decrease or stagnant over a period of time (Bhaskar NP, Nirban A, 2010) [3]. It also indicates the magnitude of the rate of change in the variable under consideration per unit of time.

$$Y = ab^t \qquad\qquad --- (1)$$

Where,
Y = Area, Production, Productivity / export quantity / export value
t = Time variable or element which takes the value 1, 2, 3… n
b = Regression coefficient
a = Intercept value (value of Y when t = 0)

Equation (1) will be converted into the natural logarithmic form in order to facilitate the use of linear regression. Taking logarithms on both sides we obtain,

Log Y = Log a+ t Log b

The compound growth rates 'r' will be computed by using the formula:

CGR (r) = [Antilog (log b) -1] x 100

Where, r = Compound growth rate
Instability in export is expected to hamper the process of economic development. The degree of instability in the area, production, yield, export quantity and export value of coffee was measured by using the coefficient of variation (Dhakre DS, 2010)[4]. The standard deviation as a percentage of mean is called as the coefficient of variation.

Coefficient of variation (CV) = $\frac{\sigma}{\bar{X}} \times 100$
Where,
σ = Standard deviation
$$\sigma = \sqrt{\frac{\sum(X - \bar{X})^2}{n}}$$
$\bar{X}$ = Arithmetic mean

To measures the comparative advantage of the commodity of coffee exports, Export Performance Ratio (EPR), as suggested by Balassa (1965) was used. Export performance ratio is a measure of international trade specialization. It identifies the comparative advantage or disadvantages a country has for a commodity with respect to another country or group of countries or the world. The EPR of the ith commodity (EPR) can be expressed as:

$EPR_i = ((E_i/CE))/ (W_i/WE)$

Where,

E_i = Export of coffee commodity from India
CE = Aggregate export of agricultural products from India

W_i = Total world export of coffee commodity product
WE = Total world export of all agricultural products

A value of EPR greater than unity implies that India has a comparative advantage in the exports of particular commodity products and vice versa.

Results and Discussion
The compound growth trend equation was fitted to assess growth trend in area, yield, production, export quantity and value of coffee. To assess the trends in area, yield, production, export quantity and value of export, the data over the period from 1986 to 2015 were considered. The total study period (1986 to 2015) was divided into three periods namely, period I (1986 to 2000), period II (2001 to 2015) and overall period (1986 to 2015).
Compound growth analysis of area under coffee registered a significant and positive growth trend during overall period (1986 to 2015) at the rate of 2.4 per cent per annum. The compound growth rate of yield showed that the highest and the significant growth was observed during period I. During the period II coffee yield was registered a negative compound growth rate of - 0.7 per cent per annum. The compound growth analysis of production showed that the highest and significant growth was observed during period I followed by overall period and period II. It was concluded that the area, yield, production of the coffee crop was decreased during investigation period II because the climatic condition and the rainfall were in not favor of the coffee plantation which has led to decreasing and fluctuation of production and yield of coffee in India (Sheikhwaheeda et al. 2015) [5].
The highest growth rate for export quantity of coffee was observed in period I at the rate of 6 per cent per annum. The result showed that increasing trend of coffee export quantity but also faced many fluctuations because of the low prices of coffee in domestic and international market (Shende NV et al. 1999) [6]. The compound growth trend analysis of export value showed that the highest and significant growth was observed during period II followed by overall period and period I. The variation in the trend was because of the fall in the price of the coffee in foreign markets. The area, production, export quantity and export value of coffee shown that positive and increasing compound growth trend in overall study period. But in the case fluctuation was observed in export value due to the increasing of global exporters and fall in foreign market price (Suresh A, Mathur VC 2016) [7].

Instability analysis of coffee
In order to study the instability in area, yield, production, export quantity and export value of coffee during the study period, co-efficient of variation was used, the results are presented in table 2.
The table.2 period II registered the lowest variability in coffee area 6.64 per cent, followed by period I (13.32%). During the overall study period, coffee area registered 26.27 per cent of instability which is higher when compared to the period I and Period II. Table.2 shows that coffee yield variability was more in period I (17.85%) followed by period II (6.62%). During the overall study period, coffee yield registered 13.03 per cent. In case of variability in production of coffee was found to be more in period I (26.12%) compared to period II (7.07%). During the overall period with co-efficient of variation at 25.56 per cent. As regards the export quantity of coffee exists more variability was observed in period I (28.45%) and less variability was observed in period II with co-efficient of variation at 19.95 per cent. However in overall

period co-efficient of variation was height i.e. 29.73 per cent. Export earnings in terms of value showed higher instability in the overall period with 54.14 per cent of co-efficient of variation when compared to the period I (38.52%) and period II (51.91%). The variation of export quantity and export value in the coffee was because of the number of exporter is increasing and price fluctuation changes in the coffee market.

Export performance ratio of coffee
Export performance ratio is the method to analyze the performance of coffee over the years. In the present study, export performance was computed for a period of 30 years from 1986- 2015. It is presented in Table 3.

The EPR of coffee in figure 1 shows that there is fluctuation in the export performance in the overall period of study. In Table 3 during the year 1986 to 2011, the export performance ratio more than one which shows that the commodity had a more comparative advantage during that period (Gurusamy P and Purinat Y, 2015) [2]. In 1994 the country enjoyed the high comparative advantage at the ratio of 3.15. The export performance ratio of coffee fell sharply during in 2012 to 0.88 and reached 0.93 in the year of 2015 indicating that the commodity had a comparative disadvantage in 2012 to 2015. The overall study period, coffee had a stable and positive trend in the export performance ratio.

Table 1: Trend in area, yield, production, export quantity, export value of coffee in India.

S. No	Source	Particulars	Period I (1986-2000)	Period II (2001-2015)	Overall period (1986-2015)
1.	Area (Ha)	R^2	0.757	0.990	0.941
		Coefficient	0.0241	0.0147	0.0236
		P value	$0.248E^{-4}$	$0.175E^{-13}$	$0.923E^{-18}$
		Growth rate	2.4**	1.5**	2.4**
2.	Yield in (Kg/Ha)	R^2	0.271	0.208	0.108
		Coefficient	0.0226	-0.0066	0.0054
		P value	0.0468	0.0872	0.0757
		Growth rate	2.3**	-0.7	0.6***
3.	Production (Tonnes)	R^2	0.594	0.261	0.737
		Coefficient	0.0467	0.0080	0.0291
		P value	0.0007	0.0514	$0.1307E^{-8}$
		Growth rate	4.8**	0.8***	3**
4.	Export quantity (Tonnes)	R^2	0.833	0.491	0.761
		Coefficient	0.0586	0.0311	0.0317
		P value	$0.214E^{-5}$	0.0036	$0.328E^{-9}$
		Growth rate	6*	3.2**	3.2**
5.	Export value (1000 US $)	R^2	0.166	0.882	0.460
		Coefficient	0.0372	0.1189	0.0410
		P value	0.1315	$0.214E^{-6}$	$0.383E^{-4}$
		Growth rate	3.8**	12.6**	4.2**

***, **,* indicates significance at 1, 5, 10 per cent level, respectively

**Table 2:** Instability of area, yield, production, export quantity and value of Indian coffee (1986 to 2015)

Particulars	Mean	SD	CV
Area (Ha)			
Period I	240338.6	32025.48	13.32
Period II	348110.7	23131.23	6.64
Overall Period	294224.7	60266.31	26.27
Yield (Kg/Ha)			
Period I	792.5333	141.5011	17.85
Period II	837.6	55.49105	6.62
Overall Period	815.0667	106.2478	13.03
Production (Tonnes)			
Period I	192200	50217.78	26.12
Period II	290991.7	20599.09	7.07
Overall Period	241595.8	61764.21	25.56
Export Quantity (Tonnes)			
Period I	121653.4	34618.71	28.45
Period II	179953.1	35918.47	19.95
Overall Period	150803.2	44844.79	29.73
Export value (1000 US $)			
Period I	226802.1	87381.7	38.52
Period II	372608.3	193421.4	51.91
Overall Period	299705.2	162286.7	54.14

Note: SD- Standard Deviation and CV- Co-efficient of Variation

Table 3: Export performance ratio of coffee (1986 to 2015)

S.no	Year	EPR of coffee
1	1986	1.61
2	1987	2.13
3	1988	2.53
4	1989	2.53
5	1990	1.90
6	1991	2.06
7	1992	2.51
8	1993	2.40
9	1994	3.15
10	1995	2.42
11	1996	2.36
12	1997	2.11
13	1998	2.34
14	1999	2.43
15	2000	1.71
16	2001	2.21
17	2002	2.24
18	2003	2.22
19	2004	1.88
20	2005	1.89
21	2006	1.76
22	2007	1.26
23	2008	1.38
24	2009	1.10
25	2010	1.15
26	2011	1.08
27	2012	0.88
28	2013	0.98
29	2014	0.96
30	2015	0.93
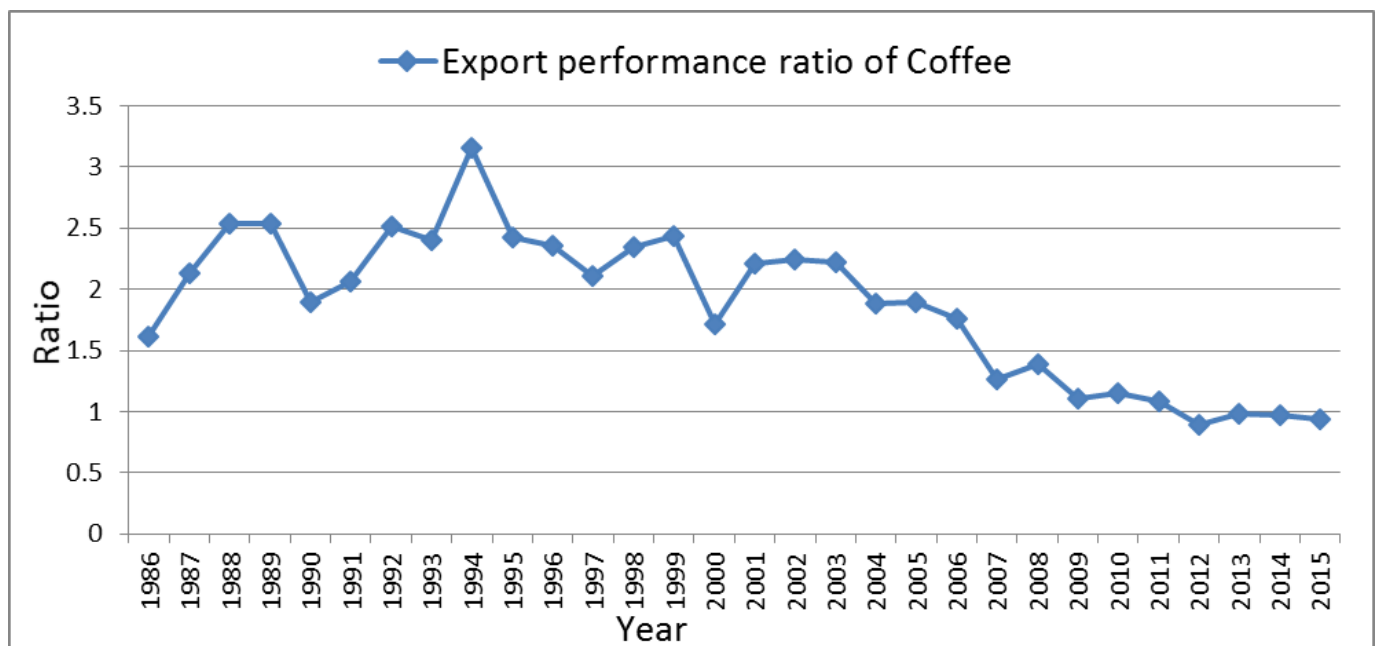
Fig 1: The export performance ratio of coffee in India.

Conclusion
Coffee mainly exports oriented commodity. India is the growing exporter of coffee among world competitors. The area, production, and export quantity of coffee registered a similar and fluctuation growth rate during the overall study period. It's indicating that there is scope for increasing the coffee area and production for strengthening the coffee exports in India. This should be done by adopting new technology and cultivation practices for coffee growing region. There is a fluctuation in export performance of coffee due to the increasing the global exporters but it is stable and positive trend in the overall study period. If government takes proper initiative in supporting the coffee producers and as well as exporters the market will find stable and prospect.

Reference
1. Darvishi GA, Indira M. An analysis of changing pattern in area, production and productivity of coffee and tea in India. International Journal of Marketing Financial Services and Management Research. 2013; 2(9):46-60.

2. Gurusamy P, Purinat Y. Export performance of coffee in India- An analytical study. International Journal of Multidisciplinary Research and Development. 2015; 2(2):118-122.
3. Bhaskar NP, Nirban A. Trends in the Export of mango from India. Shiv Shakti International Journal in Multidisciplinary and Academic Research. 2010; 2(3):1-11.
4. Dhakre DS. National trends on agricultural crop (tea) production and export, A statistical analysis. International Journal of Biological Research, Environmental, Agriculture Science. 2015; 1(1):39-44.
5. Sunny, Sheikhwaheeda. Growth and Composition of Indian Agricultural Exports during Reform Era. National Monthly Refereed Journal of Research in Commerce and Management. 2013; 1(6):92-104.
6. Shende NV, Bhole BD, Shende PV. Export performance of India in tea, coffee and tobacco. Indian Journal of Agricultural Marketing. 1999; 13(3):78-81.
7. Suresh A, Mathur VC. Export of agricultural commodities from India, Performance and prospects. Indian Journal of Agricultural Sciences. 2016; 86(7):876-883.