



PAST, PRESENT AND FUTURE TREND FOR CARDAMOM (SMALL) PRODUCTION IN INDIA

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Abstract

This article describes about tendency for cardamom (small) production in India, 1961 – 1962 to 2030 - 2031. Most important purpose of the study is to comprehend the effects of this production by two reforms in India and these reforms are (a) Agricultural Reforms (Green Revolution) in 1960's (b) Economic Reforms in 1990's. Main aim of the study is (a) to analyse the trend of cardamom production in 1961 – 1962 to 1990 – 1991 (b) to find out the tendency of this cultivation in 1991 – 1992 to 2030 - 2031. This research is based on secondary data and it is available in Spice Board of India. This research was performed by the following periods 1961 – 1962 to 2014 – 2015 and left over data were calculated and analysed by time series projection method. Production Index, Compound Annual Growth Rate (CAGR), Arithmetic mean (\bar{x}) and Standard Deviation (σ) are used to analyse the data. Statistical Package for Social Science and MS – Excel is applied to evaluate present study.

Keywords: Compound Annual Growth Rate, Spice Zingibaraceae.

INTRODUCTION

People have different dietary habits in the world. They are mainly used as cereals, pulses, oils and spices (<http://ninindia.org>). Spices are also used as additives for food, fragrance, aroma, health and medicinal products. According to Spice Board of India stated that about 52 different kinds of spices are available to consume. India is called as “Land of Spices” (V.A.Parthasarathy and K.Kandiannan (2008), because; 35 varieties of spices are planted and it is consumed by Indians. More than 20 spices are exported from here. Cardamom is one of the important spices and it called as “Queen of Spices” (<http://agritech.tnau>). It is most expensive aromatic plant. It grows in perennial tropical lands. It is obtained from “*Electtaria Cardamom Maton*” (Y.P.S. Bajaj, 1993) and it depends on ginger family (Zingibaraceae). It grows up from 2000 to 2500 feet above ground level in mountainous area. It is cultivating in South India particularly moist ever green forests in Western Ghats. In India, Kerala, Karnataka and Tamilnadu states are only cultivating this product and above mentioned states are producing 90 per cent, 6 per cent and remaining percentage respectively.

About 5000 years ago, South India entered into the spice market and it exported to some of Middle East countries and European Countries. Tamil ancient literatures such as Chilappathikaram and Devaram were mentioned about cardamom (Gopalakrishnan Nayar, 1987). From the classical age itself, it was more valuable product and it was exchange for precious metals like pearls and gold. India was dominated by this product up to 1980 -81 after that it was controlled by Guatemala, Central American country. It was also cultivated by

Srilanka, Tanzania, Vietnam, Laos, Thailand, Cambodia, Papua New Guinea and El Salvador. It is mainly imported by Gulf countries particularly Saudi Arabia. In India, major trading centre are situated in Vandanmedu, Kumily, Nedukandom and Puliyanmala (Kerala), Bodinayakkanur (Tamilnadu), Mumbai, New Delhi and Kanpur.

NEED FOR THE STUDY

This investigation has been done to find out the impacts of cardamom production by the implementation of two important reforms in India and these reforms are as: (a) Indian **agricultural reform** was ensued in 1960's. Because, Government of India implemented green revolution and main objective of this revolution was to develop agricultural sector particularly to reach self-sufficiency and maintain the sustainability in this sector (b) Major **economic reform** was implemented in the year 1991 – 1992. Particularly, almost all major sectors like agricultural, industrial and service (except Defence & Satellite Research) opened for private sectors and foreign investors. Most of the trade obstacles were removed by this reform.

OBJECTIVES

This study has two objectives and they are as follows:

- (a) to analyse the trend for cardamom production in 1961 – 1962 to 1990 – 1991 and
- (b) to find out the tendency for this cultivation in 1991 – 1992 to 2030 - 2031.

METHODOLOGY

This study is based on secondary data and it is collected from Spice Board of India, Cochin. Various types of spices information are available in this board and it has long period of statistical records. This research is only carried out on cardamom (small) production and its trends are calculated from 1961 - 1962 to 2030 - 2031.

ANALYSIS

This research is based on secondary data. It was collected from 1961 - 1962 to 2014 - 2015. Availability of cardamom production information is only up to 2014 - 2015 only and remaining part 2015 to 2031 is generated by time series analysis and other statistical analysis are used for this data and they are as follows: Compound Annual Growth Rate (CAGR), Arithmetic Mean (\bar{x}) and Standard Deviation (σ).

For this study, 1961 - 1962 to 2030 - 2031 periods are measured. It is classified in to two major parts: (a) before 1991-1992 Period or Pre-liberalisation, Privatisation and Globalisation Period and (b) after 1991- 1992 Period or Post- liberalisation, Privatisation and Globalisation Period.

BEFORE 1991-1992 PERIOD

Totally 30 years are quantified for this analysis and it is 1961 - 1962 to 1990 - 1991. It is categorised into three parts: (a) 1961 - 1962 to 1970 - 1971 (b) 1971 - 1972 to 1980 - 1981 and finally (c) 1981 - 82 to 1990 - 1991.

AFTER 1991 - 1992 PERIOD

The following forty years of statistical data have been taken for analysis. It is calculated to estimate the trends of this spice and it is 1991 - 1992 to 2030 - 2031. It is arranged into four parts: (a) 1991 -1992 to 2000 - 2001 (b) 2001 - 2002 to 2010 - 2011 (c) 2011 - 2012 to 2020 to 2021 and as a final point (d) 2021- 2022 to 2030 - 2031.

METHOD OF DATA COMPUTATION

Time Series Analysis: Statistical Package for Social Science (SPSS) is used to analyse the data. Time series analysis helps to estimate the Past, Present and Future trends of cardamom production in India. It will be estimated by the following statistical method mentioned below. Traditional forecasting model is generated for this study. There are two variables are considered for this analysis and it is "Period" and "Cardamom production" take into account as an independent variable and

dependent variable respectively. Stationary R^2 statistics and Goodness of fit are used to know the fit measures and comparing various statistical models. Series plots are applied for individual models and various values are utilised and they are as follows: observed values, forecasts and fit values. This method of calculation produces all models output like Predicated Values, Lower Confidence Limits (LCL) and Upper Confidence Limits (UCL). Forecast Periods of data and trends will be showed after given value of statistical information. MS-Excel is used to compute the following calculations: (a) Compound Annual Growth Rate (CAGR) (b) Arithmetic Mean (c) Standard Deviation and finally Cardamom Production Index.

PRODUCTION INDEX

$$\text{Cardamom Production Index} = \left(\frac{\text{Current Year}}{\text{Base Year}} \right) \times 100$$

Base Year = 1991 - 1992

CAGR

$$\text{CAGR} = \left(\frac{\text{END VALUE}}{\text{STARTING VALUE}} \right)^{\frac{1}{\text{YEARS}}} - 1$$

FOR EXAMPLE

In the following data has 10 years of data: 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970 Years. Following analysis like CAGR, Arithmetic Mean and Standard Deviation is taken for every decade.

$$1961 - \text{Starting Value: } 1970 - \text{End Value: } \frac{1}{\text{YEARS}}$$

$$= \frac{1}{\text{No.of YEARS} - 1}$$

ARITHMETIC MEAN

$$\text{Arithmetic Mean} = \left(\frac{\sum x}{n} \right)$$

$\sum x$ = Sum of all of the numbers: n = Number of items

STANDARD DEVIATION

$$\sigma = \sqrt{\frac{\sum (X - \bar{x})^2}{n}}$$

$\sum X$ - Sum of all of the numbers: \bar{x} - Arithmetic Mean: n - Number of items

TABLE NO.1
CARDAMOM PRODUCTION IN INDIA

Metric Tonnes (MT)										
Sl. No.	Year	Prod	W.S	P/B	Sl. No.	Year	Pro	W.S	P/B	
1.	1961-62	3205	84	64	37.	1997-98	7900	32	158	
2.	1962-63	3400	84	68	38.	1998-99	7170	32	143.4	
3.	1963-64	4130	76	83	39.	1999-00	9330	42	186.6	
4.	1964-65	2200	91	44	40.	2000-01	10480	51	209.6	
5.	1965-66	2000	85	40	41.	2001-02	11365	49	227.3	
6.	1966-67	2700	100	54	42.	2002-03	11920	47	238.4	
7.	1967-68	2400	86	48	43.	2003-04	11580	36	231.6	
8.	1968-69	2100	81	42	44.	2004-05	11415	33	228.3	
9.	1969-70	2300	76	46	45.	2005-06	12540	33	250.8	
10.	1970-71	3170	74	63	46.	2006-07	11235	28	224.7	
11.	1971-72	3785	67	76	47.	2007-08	9450	23	189	
12.	1972-73	2670	75	53	48.	2008-09	11000	33	220	
13.	1973-74	2780	69	56	49.	2009-10	10075	22	201.5	
14.	1974-75	2900	55	58	50.	2010-11	10380	25	207.6	
15.	1975-76	3000	53	60	51.	2011-12	15000	36	300	
16.	1976-77	2400	47	48	52.	2012-13	14000	26	280	
17.	1977-78	3900	46	78	53.	2013-14	16000	31	320	
18.	1978-79	4000	58	80	54.	2014-15	18000	NA	360	
19.	1979-80	4500	58	90	Forecasted Periods & Data					
20.	1980-81	4400	62	88						
21.	1981-82	4100	51	82	Forecasted Periods & Data	55.	2015-16	18279	-	365.58
22.	1982-83	2900	50	58		56.	2016-17	18558	-	371.16
23.	1983-84	1600	40	32		57.	2017-18	18837	-	376.74
24.	1984-85	3900	24	78		58.	2018-19	19117	-	382.34
25.	1985-86	4700	39	94		59.	2019-20	19396	-	387.92
26.	1986-87	3800	27	76		60.	2020-21	19675	-	393.5
27.	1987-88	3200		64		61.	2021-22	19954	-	399.08
28.	1988-89	4250		85		62.	2022-23	20233	-	404.66
29.	1989-90	3100		62		63.	2023-24	20512	-	410.24
30.	1990-91	4750		95		64.	2024-25	20792	-	415.84
31.	1991-92	5000		27	100	65.	2025-26	21071	-	421.42
32.	1992-93	4250	25	85	66.	2026-27	21350	-	427	
33.	1993-94	6600	34	132	67.	2027-28	21629	-	432.58	
34.	1994-95	7000	32	140	68.	2028-29	21908	-	438.16	
35.	1995-96	7900	34	158	69.	2029-30	22187	-	443.74	
36.	1996-97	6625	29	132.5	70.	2030-31	22466	-	449.32	

Production Index = P/B = Production Per Year/Base Year (1991 – 1992). Prod – Production: WS – India's World Share in Cardamom Production: NA – Not Available.

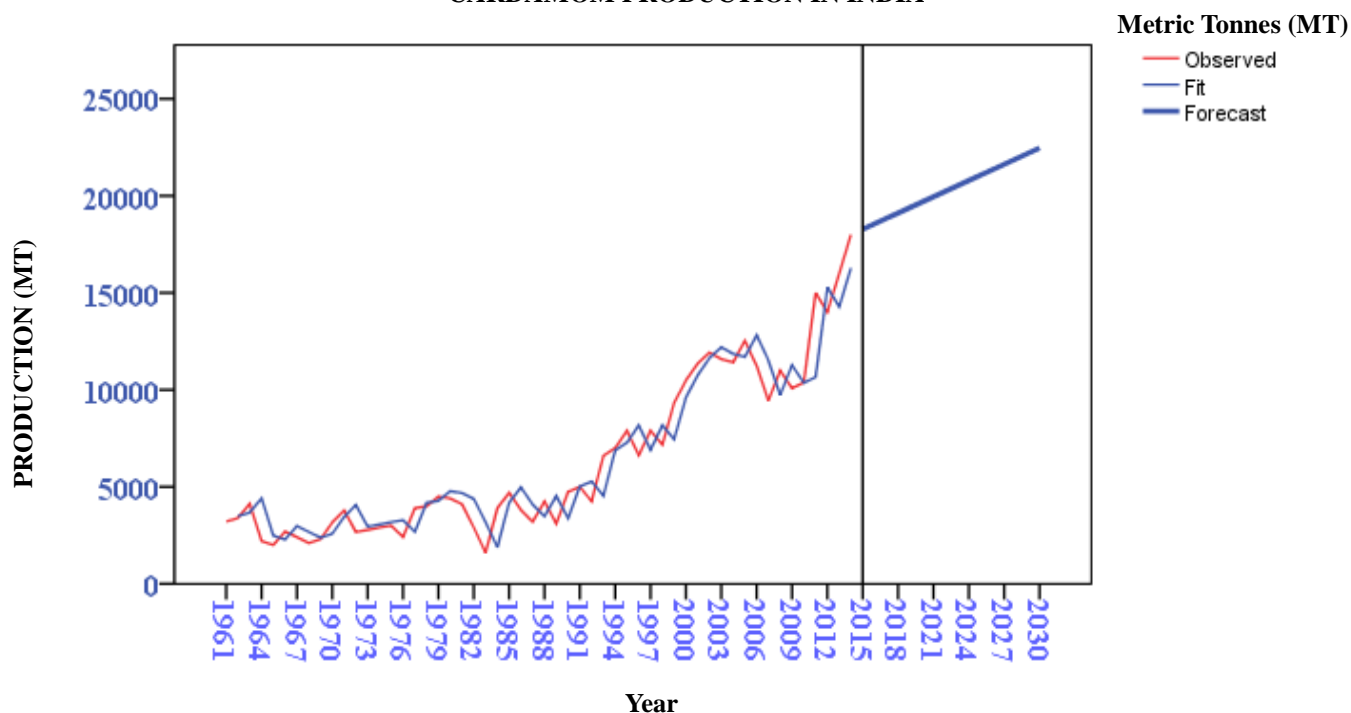
Source: Spice Board, Cochin.

TABLE NO. 2
COMPOUND ANNUAL GROWTH RATE, MEAN & STANDARD DEVIATION FOR
CARDAMOM PRODUCTION IN 1961 TO 2031

Classification of Periods (Base Year `1991-92)	YEARS	CAGR	\bar{x}	σ
Before 1991-92 (Before LPG) (Agricultural Reform)	1961 - 1969 to 1970 – 1971	-0.12%	2760.5	693.16
	1971 - 1972 to 1980 – 1981	1.69%	3433.5	766.25
	1981 - 1982 to 1990 – 1991	1.65%	3630.0	956.03
After 1991-92 (After LPG) (Economic Reform)	1991 - 1992 to 2000 – 2001	8.57%	7225.5	1842.19
	2001 - 2002 to 2010 – 2011	-1.00%	11096.0	910.77
	2011 - 2012 to 2020 – 2021	3.06%	17686.2	1873.69
	2021 - 2022 to 2031 – 2031	1.33%	21210.2	845.10

CAGR - Compound Annual Growth Rate: \bar{x} - Arithmetic Mean: σ - Standard Deviation

**FIGURE NO.1 SWAY
CARDAMOM PRODUCTION IN INDIA**



Above statistical table Nos. 1 & 2 & Figure No. 1 describes about cardamom production in India. This study is classified in to major parts (a) Trend of cardamom production in 1961 – 1962 to 1990 – 1991 (b) trend of cardamom production in 1991 – 1992 to 2021 – 2031.

TREND FOR CARDAMOM PRODUCTION FROM 1961 – 1962 TO 1990 – 1991

This part of study is classified into three segments: (a) Period of 1961 – 1962 to 1970 – 1971 (b) Period of 1971 – 1972 to 1980 – 1981 and (c) Period of 1971 – 1972 to 1990 – 1991. Main aim of this part of study is to know the impact of agricultural reforms (Green Revolution) in India.

TREND FOR 1961 – 1962 TO 1970 – 1971

During this decade, India's share of the world's cardamom production was crucial. It means that India had more than three – fourth of world market share. In this period, production index shows that data ranges between 40 to 83 per cent. It was high level of production in 1963 – 1964 and it was low in 1965 – 1966. CAGR was negative trend and it average production was 2760 Metric Tonnes. In this decade, above mentioned growth rate shows that negative development (-0.12%). In the year 1964 to 1970, this production trend was declining. Cultivation deviation was 693.

TREND FOR 1971 – 1972 TO 1980 – 1981

India acted as a primary merchant of world market till the end in this period. Average production of

cardamom was 3433. Almost 60 per cent of world market was occupied by India. In this decade, CAGR was 1.69 per cent in this group of ten years. According to standard deviation analysis portrays that Production variation was 766 M.Tonnes. In the year 1980 – 81, this production was reached maximum level to compare with other years. In this episode, some of years were sloped in downwards. Because, Central American country of Guatemala was newly entered this agricultural field. It was gradually increased cultivation area and production. Demand for this product was same quantity but supply was increased.

TREND FOR 1981 – 1982 TO 1990 – 1991

In this period, Guatemala's share of production was rapidly increased and India's share was sharply decreased. In the year 1981 – 1986, Indian portion of cardamom was 44 per cent and second five year period (1986 – 1991), this production had just 27 per cent of world market. But in Guatemala was increased from 41 to 66 percent. Range of production index was 33 to 95 per cent. This production was low in 1984 -1985 and it was high in 1990 – 1991. CAGR shows that 1.65 per cent of positive growth in this decade. Average production was 3630 Metric Tonnes and it standard deviation was 956. In this period of time, there was a fierce market rivalry between Guatemala and India. After that, Guatemala became top most suppliers in the world.

Due to Green Revolution (Agricultural Reforms) effects, quantity of production was increased. Government of India took necessary steps to provide following facilities: High Yielding Variety of Seeds, Fertilisers and Fertilisers, Mechanisation, Institutional

Support (Credit facilities from banking Sector), Organised Marketing system and introduced new marketing area. According to Spice Board's secondary data shows that Indian farmers particularly most of the Idukki region farmers came forward and they were willing to do this cultivation. Because of nearly three – fourth of cardamom is cultivating by Kerala farmers almost 80 per cent of Kerala production is getting from Idukki district. This development was very low to compare with Guatemala India lost its supremacy in this decade. This is because Guatemala began to grow into world leading producers in this field and they were ready to supply cheaper price than Indian farmers.

TREND FOR CARDAMOM PRODUCTION IN 1991 – 1992 TO 2030 – 2031

In this part of the study, availability of secondary data was up to 2014 – 2015 only and remaining years are calculated with the help of Time Series Analysis. This period of time was most important period for Indian Economy. This period of time was most important period for Indian Economy. This is because of major economic changes was done by Government of India particularly introduction of LPG Policy. This study has been classified into four decade of periods and they are follows:

TREND FOR 1991 – 1992 TO 2000 – 2001

In 1991 - 1992, major economic reforms were made by the Government of India. In this reason, this period of time was taken as a basic year for previous and present period of study. CAGR was achieved maximum percentage and it was happening only in current situation. The most significant reason was the increase in cultivation almost all the years and it except in 1992 – 1993, 1996- 1997 and 1998 – 1999. This data was deviating in 1842 level. Average cultivation was almost twofold to compare with earlier decade. India's share was achieved 51 per cent in 2000 – 2001. In this decade, Guatemala was most competitive country for India. During this period alone, there was declining in Guatemala production which increased the demand for Indian products.

TREND FOR 2001 – 2002 TO 2010 – 2011

Almost all the years in 2001 to 2011, production was fluctuated by various grounds. In this reason, it was not attain constant development in over the period. India's contribution to world market was constant in 2004 -2005, 2005 -2006 and 2008 – 2009. In the starting of study period, nearly half of the world market was occupied by India. In end of period, it came down to one – fourth of percentage. Production index was around 222 in this decade. High level of fluctuations in production was main reason to obtain in negative growth rate (-1.00%) in CAGR. Average production of cardamom (small) was 11096 and it deviated in 911.

TREND FOR 2011 – 2012 TO 2020 – 2021

This part of study is based on actual data and estimated data. Availability of data was just for four years only. It was accessible only from 2011 – 2015 and it is called as 'Observed period' and remaining period (2015 – 21) is called as 'Predicted period'. Predicated value was calculated by Time Series Analysis. During this period, production trend was increasing. But, India's world market on cardamom was declined. Minimum production was attained in the period of 14000 M.T. and maximum was 19675 M.T. Range of production index was 280 per cent to 394 per cent as per 1991 -1992 base year. This production deviated approximately 1874 and it was highest deviation to compare with decades.

TREND FOR 2021 – 2022 TO 2030 – 2031

This research is conducted in the year 2015 – 2016. But, availability of information is up to 2014 - 2015. For this reason, the following data is based on predicated value. Main aim of using conjecture value helps to understand the future trend of production. This value of Arithmetic Mean analysis shows that average production per year will possible to achieve 21210 MT and Volume of production will be deviated 845 in over all this study period. Annual growth as per CAGR will probable to achieve 1.33 per cent. Cardamom production will increase from 19954 MT to 22466 MT.

After the introduction of economic reform, there is colossal development in Indian cardamom production and this reform is likely to be a factor in this growth. The above statistical data have proven this to be true. This reform created a number of opportunities to identify for this product and the new markets for exporting countries. This economic reform had also lead to the importation of essential goods and services from abroad.

CONCLUSIONS

During these two reforms, cardamom production increased. But, this production took place higher growth in economic reform period rather than agricultural reform period. However, India's share in world market was steadily declining. One of the main reasons was Central American country Guatemala achieved huge growth in cardamom production and also new countries like Tanzania, El Salvador and various countries were also entered in this field. For this reason, India's share on cardamom production was shrink in global market. India maintains its distinctiveness position in cardamom (small) in terms of superiority, taste, aroma, nature and quality compared to other countries. Therefore, this Indian product has worldwide significant and special markets. The main importer of this product is Saudi Arabia. Because of almost 70 percent of imports are made by this country.

SUGGESTIONS

LABOURERS ORIENTED

1. Government should establish and provide suitable training and workshop institutes for these labours and it must relate to pre-harvesting and post-harvesting oriented skill improved programme.
2. Government should fix the minimum wage for these workers.
3. Government should recommend providing safety measures like proper dresses and medical facilities for him/her.

FARMERS ORIENTED

1. Government should establish open, transparent, regulated markets and global – oriented e-auction method and it must help to abolish intermediaries like agents and traders.
2. Government should fix the fair price (low price period) for farmers.
3. Government should initiate to start genuine organisation and it must provide information related past, present and future trend of demand & supply and it's pricing.
4. Non-Governmental Organisations and Central & State governments should provide necessary

training and workshops and it related to new cultivation techniques, mechanisation, weather forecasting & production methods and storage facilities.

5. Government should minimise the export procedures.

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