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Production and Price Behaviour of Small Cardamom in India: An Evaluation

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Abstract: ***Cardamom known as the queen of spices in India is one of the major spices produced in India. It isa native to South India especially to the Western Ghats of Kerala, Tamil Nadu and Karnataka. India and Guatemala are the major producers of cardamom. Cardamom may be of two types, viz., large (black) and small (green). Both the production and price of cardamom are instable and so the revenue to the farmers also shows such irregularity. In this paper an attempt is made to analyse the trend and growth in terms of production, area and productivity of small cardamom in India, the relationship between production and price of small cardamom and the prices of small cardamom on monthly, quarterly and seasonal basis for the period from 2014-15 to 2019-20. It is found that there is no remarkable increase in the area of cultivation of small cardamom throughout the period of study whereas the production and productivity varies. The average monthly prices showed significant variation whereas the seasonal average prices did not show significant variation. There is significant relationship between production and price and the correlation was highly negative. The difference between the highest average price quoted in a month and the lowest average price is seen to be very high and highly detrimental to the interests of the farmers and the industry as a whole. The plantation faces much difficulty due to variations in prices and production. The present e-auction system also failed to provide fair prices on the basis of quality of the product as there are wide fluctuations in the prices quoted for similar lots in the same auction. For the continuation of this cultivation, introduction of a good pricing mechanism is the need of the hour.***

Keywords: Small cardamom, Production, Productivity and Price

1. Introduction

Cardamom is a spice that comes from the seeds of a various plants in the ginger family. The spice is called in different names viz., elettariacardamoum, capalaga, elaichi, green cardamom, true cardamom, Ceylon cardamom etc. Cardamom is considered to be one of the world's oldest spices. The use of this spice dates back at least 4000 years. There are two types of cardamom: Black cardamom and Green cardamom. Black cardamom (large) has much larger pods, unlike green cardamom (small) that is comparatively very small in size.

Green cardamom (small) Black Cardamom (large)

Cardamom, the most traded spice in the world is native to South India especially to the Western Ghats of Kerala, Tamil Nadu and Karnataka. India and Guatemala are the major producing countries of cardamom in the world and now Guatemala became the largest producer and exporter of cardamom with an average annual yield between 25,000 and 29,000 tonnes. India reigned supreme in production and export of the crop, however, now it stands second to Guatemala in terms of production and exports. Guatemala accounted for more than 55% of the global production in 2019. Asian countries such as Indonesia, India, Nepal, and Sri Lanka are also some of the other major producers of Cardamom. It is called as the Queen of spices in India whereas in Guatemala, Green Gold of Guatemala. It has many uses: culinary, medicinal, making recipes etc. and is widely used in India, Gulf nations, European countries etc.

Supply of the product determines the price of the product whereas the production is influenced by various factors such as climatic conditions, pest attack, government controls (banning of pesticides, finance, subsidies etc.), and international conditions. Rather than production, market factors, pandemic situations, economic conditions, any local/ national issues, epidemics, wars and agitations etc. affect the price of the product. So it is a very risky cultivation which the yield and revenue is beyond the control of the farmers. The price may vary day by day or lot to lot without any reason. Shortages in the major producing centres of the world have caused unprecedented rise in the domestic as well as international prices of cardamom. This trend may result in an increase in area under the crop, but, for a corresponding increase in production, concerted effort at proper maintenance, care and pest and disease management need to be done. In most cases, the farmers are not the real beneficiaries of price hike. They were exploited by the big traders as they are not getting adequate/good price in the harvesting season. Price fluctuation is unpredictable but other crops in the producing areas especially in the high-ranges of Idukki district of Kerala state, India are having very low price, farmers produce pepper, coffee and other crops shifted their crop to cardamom. At this juncture when cardamom is assuming a new found status among the farmers of Kerala, this paper analyses the trends in the area, production, productivity and price fluctuations of the crop in India.

2. Review of Literature

Tomy Joseph and R Naidu (1992) in the paper titled "Price Structure of Cardamom in India - An Analysis" examined the seasonal phenomenon in the price of small cardamom

along with the seasonality in related variables like sales at auction centers, export and export price and the inter-relationship between market price and these variables. The seasonal index of price was the highest in January and the lowest in July, while the seasonal index of market sales was the highest in November and lowest in July. The extent of seasonality was more in sales compared to prices and also around 97% variation in yearly price can be explained by the two variables namely export and export price.

Varghese P.K. (2007), in his research paper titled "Economics of Cardamom Cultivation in Kerala" analysed the three important concepts of cardamom viz., costs, return and profitability. The empirical results emerging out of the analysis portrays that the cost of cultivation is significantly high in Kerala with regard to spice, cardamom. The cost of production per unit of cost (cost per kilogram) is very high in small size as compared to medium and large size groups. Yield per acre is very low among small size cultivators.

Nirmala K, Munilakshmi R and Sandhya V (2015) in the paper titled Price Discovery in Commodity Markets: A Study of Indian Cardamom Market in Multi Commodity Exchange analysed whether Cardamom futures market serves as a price discovery mechanism for spot market prices and vice versa. The analysis involves use of econometric tools like Augmented Dickey Fuller (ADF) test, Granger Causality test and Co-integration technique. The daily closing data from 1st Jan 2012 to 31st Dec 2013 has been taken for the study for analysis. They found that, cardamom futures price movement can be used as price discovery vehicle for spot market transactions.

Govindasamy R (2015) studied the Production and Export Performance of Cardamom in India. The study depicted that India was the largest producer of Cardamom, during 2000 and thereafter, Guatemala pushed her to the second position. India is the second largest exporter of cardamom after Guatemala. India exports roughly 15 per cent to 20 per cents of its total cardamom production.

Anbuchelvi M (2018) conducted a study titled Economics of Cardamom Production in India - A Trend Analysis. The study revealed that there is a positive trend and growth with regard to the area, production and yield of cardamom in India. Moreover, there is much scope for further development and expansion of the marketing structure to make the business economically viable.

.Vijayan A.K et.al (2018), in the paper titled "Small Cardamom Production Technology and Future Prospects" found that integrated pest and disease management is an important aspect of cardamom plantation management. Good quality of the produce can be achieved through timely harvest and adoption of scientific postharvest operations. Promising small cardamom varieties and improved selections coupled with optimum inputs and technologies can increase yield up to 2000 kg ha. Proper scientific management of plantation is the prime reason for successful cultivation.

Jyoti B et.al (2019) conducted an Instability analysis of cardamom production and productivity of India for the period of 1980-81 to 2014-15. The instability in the production, productivity and export of cardamom was estimated using coefficient of variation and Cuddy Della Valle index. The results revealed that there was medium instability in both cardamom production and productivity and high instability in cardamom exports.

Vishnu R et.al (2019) in their paper titled Price Behaviour and Constraints in the Small Cardamom found that the price of the small cardamom highly fluctuated from 2008 – 2018. Irregular variations of the small cardamom price which revealed that prices were subjected to high irregular movements during the period of the study. They represented random effects such as demand and supply shocks. Lot of studies were conducted relating to production, productivity, instability in prices, production etc. but these studies were pertaining to the older period and no study containing detailed analysis of the monthly, seasonal , range in prices and the relationship between price and production has been found .

3. Objectives of the Study

1) To analyse the trend and growth of production, area and productivity of small cardamom in India
2) To find out whether there is any relationship between production and price of small cardamom.
3) To examine the average prices of small cardamom on monthly basis, quarterly and seasonal basis and find out whether there is any difference in seasonal and off-season-prices over the period of study.

4. Methodology of the Study

Secondary data were mainly used in the study and the data on area, production and prices of cardamom for the period from 2014-15 to 2019-20 were collected from the publications of Spices Board of India, Magazines and reports of the Government. Statistical tools such as averages and percentages were used. The analysis is done with the help of statistical software IBM SPSS. Karl Pearson's Co-efficient of Correlation, One Sample t-Test and Paired Sample t -test were applied to find out the relationship between production and price, and the differences in the average prices of cardamom over the study period.

5. Results and Discussions

The data required for the study have been collected for the period from 2014-15 to 2019-20. The data are analysed in fivesections.

5.1 Area of cultivation, Production and Productivity of small cardamom in India

able 1: State-wise Area of cultivation of small cardamom in India (in hectare)

State	Year					
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Kerala	39730	39680	39080	39080	38882	38796
Karnataka	25080	25240	25117	25135	25135	25137
Tamil Nadu	5160	5160	5160	5115	5115	5110
Total	69970	70080	69367	69330	69132	69043

Source: Spices Board of India Publications, compiled data

Table 2: State-wise production of small cardamom in India in tonnes

State	Year					
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Kerala	19500	21503	15650	18350	11535	11823
Karnataka	1500	1437	1449	1450	690	690
Tamil Nadu	1000	950	891	850	715	710
Total	22000	23840	17990	20660	12940	11823

Source: Spices Board of India Publications, Compiled data

Table 3: State-wise productivity of small cardamom in India (Per hectare)

State	Year					
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Kerala	490	542	400	470	297	305
Karnataka	59.80	57	58	58	27	27
Tamil Nadu	193.79	184	173	166	140	139
Total (wtd. Average)	314.42	340.18	259.34	298	187.17	171.24

Source: Spices Board of India Publications, compiled data

India is one of the major producers of small cardamom stands second to Guatemala. Kerala, Karnataka and Tamil Nadu are the major green cardamom growing states in India (Table 1).The state wise area, production and productivity of the crop are given in Tables 1, 2 and 3 respectively. Table I shows that the area under cultivation remains static in all the major producing states and in India as a whole. Kerala accounts major portion in terms of area of cultivation, production and productivity. The production and productivity of the crop in Kerala, Karnataka and Tamil Nadu shows wide fluctuations under the period of study.The fluctuations in production and productivity caused serious implications on the income of the farmers.

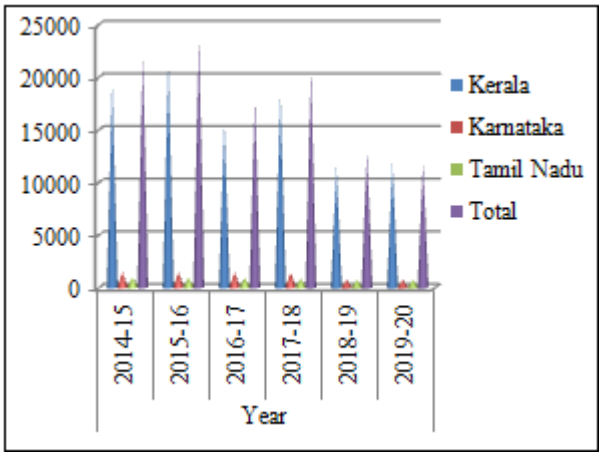

Figure 1: Production of small cardamom in India

5.2 Domestic Prices (Average Auction Price) of Small Cardamom

The marketing of cardamom is done in two ways: through E-auction and direct selling in the open market. Cultivators depends these two modes of selling and the selection of each mode depends on their urgency for money and market conditions. The market price of the product is influenced by the auction prices. The auction prices may subject to wide variations: lot-wise, day-wise and auctioneer-wise. Therefore we could see wide fluctuations in the price of cardamom and there is no perfect system of determining the price based on quality of the product. The deviations in the price of cardamom (auction prices) in different months of a year are given in Table 4 and Fig.2.

5.2.1 Monthly Domestic Prices (Average Auction Price) of Small Cardamom

Table 4: Average Domestic Prices of Small Cardamom in India

Sl. No.	Month	Year						
		2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
1	Aug.	817	634	841	1064	1132	3251	1687
2	Sept.	773	657	956	**1144**	1271	3040	1634
3	Oct.	737	610	1011	931	1197	2652	1462
4	Nov.	757	610	**1221**	837	1300	2803	-
5	Dec.	776	595	1197	908	1317	3125	
6	Jan.	875	598	1351	968	1432	**3802**	
7	Feb.	**873**	544	1198	952	1398	3313	
8	Mar.	771	638	1154	915	1813	2000	
9	Apr.	708	638	1154	915	1812	2000	
10	May	663	697	929	927	2442	1770	
11	June	663	743	957	914	2873	1477	
12	July	637	**793**	957	1022	**3436**	1619	
	Yearly average	**754**	**647**	**1077**	**958**	**1785**	**2571**	**1594**

Source: Spices Board of India Publications

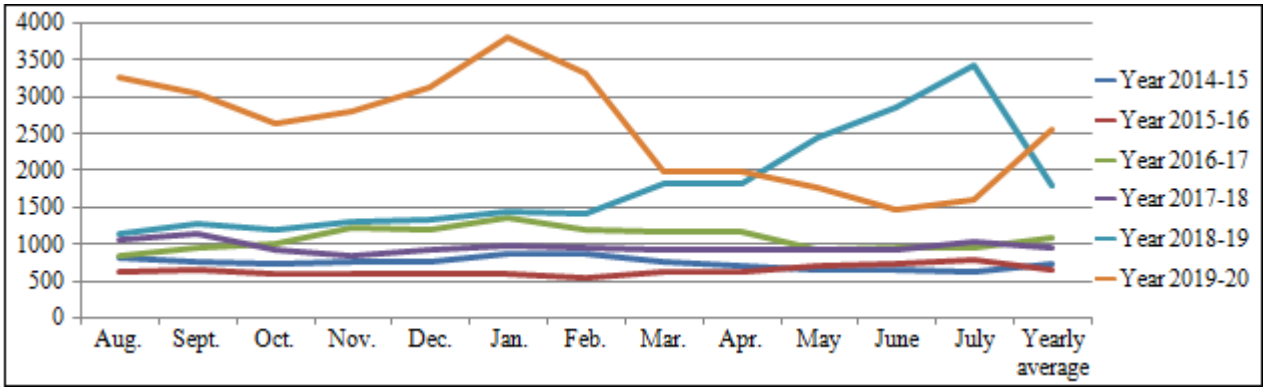

Figure 2: Average monthly auction price of small cardamom and yearly average price

Hypothesis 1

H0: The variation in the prices of cardamom in different months is highly insignificant**.**

H1: The variation in the prices of cardamom in different months is highly significant.

Table 5: Paired Samples Statistics

Sl. No.	Year	Mean	N	Standard deviation
1	2014-15	754.17	12	77.793
2	2015-16	646.42	12	68.696
3	2016-17	1077.17	12	154.363
4	2017-18	958.08	12	82.313
5	2018-19	1785.25	12	745.147
6	2019-20	2571.00	12	769.440

Source: Data Analysis

Table 6: One Sample Test

S.No	Year	t	df	Test Value = 0		95% Confidence Interval of the Difference	
				Sig. (2-tailed)	Mean Difference	Lower	Upper
1	2014-15	33.583	11	.000	754.167	704.74	803.59
2	2015-16	32.596	11	.000	646.41667	602.7692	690.0642
3	2016-17	24.173	11	.000	1077.16667	979.0890	1175.2443
4	2017-18	40.321	11	.000	958.08333	905.7844	1010.3822
5	2018-19	8.299	11	.000	1785.25000	1311.8063	2258.6937
6	2019-20	11.575	11	.000	2571.00000	2082.1214	3059.8786

Source: Data Analysis

In order to find out whether there is any difference in the average prices of cardamom in different months is significant,one sample t test has been used. It is observed from table **6that t**he corresponding t value at degrees of freedom 5 and 5% significance level were 33.583, 32.956, 24.173, 40.321, 8.299 and 11.575. As the p values for the year from 2014-15 to 2019-20 were 0.000 which is less than 0.05.,the null hypothesis is rejected and inferred that difference the average prices in different months is statistically significant over the study period.

5.2.2 Average Auction Price of Small Cardamom (Range)

Table 5: Auction price of small cardamom

		Year						
Sl. No	*Price details*	*2014-15*	*2015-16*	*2016-17*	*2017-18*	*2018-19*	*2019-20*	**2020-21*
1	Highest	873	793	**1221**	1144	**3436**	3802	**1687**
2	Lowest	637	544	841	**914**	**1132**	1477	1462
3	Average	754	627	1088	956	1520	2909	**1574**
4	Range (H-L)	**236**	**249**	**380**	**188**	**2304**	**2325**	**112**
5	%ge difference	**37.04**	**45.77**	**45.48**	**19.66**	**203.50**	**157.41**	**7.60**

Source: Compiled by the author, *based on the three months data

Table 5 showed the disparities in the price of cardamom in a particular year. The highest price, lowest price, the range in prices (highest –lowest) and the average price are given. The percentage of difference is very high in all the years especially in the years 2018-19 and 2019-20. The differences in all the other years are also noticeable. This rate of fluctuation will be harmful both to the farmers and to the industry as a whole.

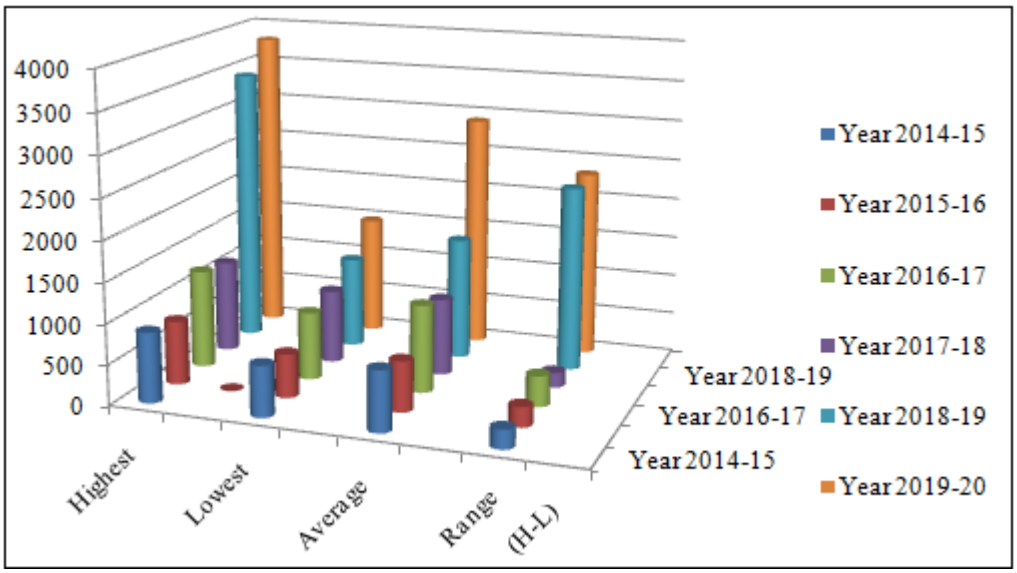

Figure 2: Average Auction Price of Small Cardamom (Range)

5.2.3 Quarterly Average Price of Cardamom

Table 6: Quarterly average price of small cardamom (peak season August to October)

Months	Year						
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Aug. to October (Q1)	776	633.7	936	1046.3	1200	2981	1594
November to January (Q2)	803	601	1256.3	904.33	1349.7	3243	NA
February to April (Q3)	784	606.7	1168.7	927.3	1674.3	3313	NA
May to July (Q4)	654.3	744.3	947.67	954.3	2917	1622	NA

Source: Compiled by the author

On the basis of quarterly average price, first three quarters showed highest average prices over various years and in quarter 4 (May to July) the price was low.

5.2.4 Seasonal Average Price of Cardamom

Cardamom plants normally start bearing capsules from the third year of planting. Picking is carried out at an interval of 40-50 days. Harvesting season in Kerala is August to January and the peak period of harvest is from August to November. Therefore it is important to analyse whether there is any difference in the price obtained in the harvesting period and post-harvesting period. The months starting from August to January is considered as the harvesting season and February to July as the Post-harvesting season.

Table 7: Seasonal Average Price of Cardamom

Year	Average Auction Price	
	Harvesting Period	Off-season period
2014-15	789	719
2015-16	617	675
2016-17	1069	1058
2017-18	975	940
2018-19	1274	2295
2019-20	3112	2044

Source: Compiled by the author

It is evident from Table 7 that the average price obtained for cardamom in the harvesting season and off-season was not the same. The average price in the harvesting was higher in the year, 2014-15, 2016-17 and 2019-20 where as in 2015-16 and 2018-19, the off-season price was high. Considering the production, average price was high in the harvesting season where the production was high and high in the off-season where there is shortage of supply. The year 2019-20 was an exception due to the impact of Kovid19.

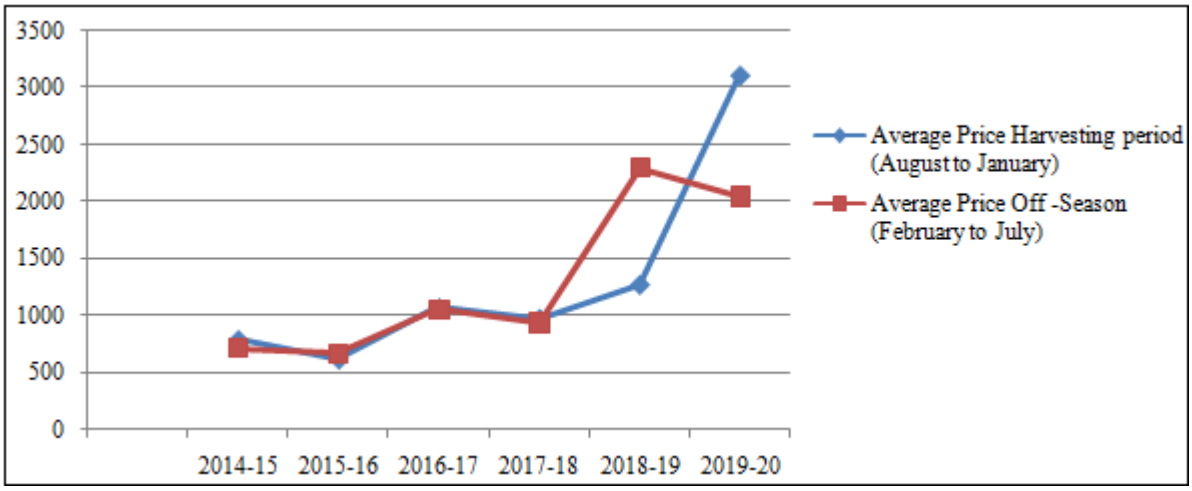

Figure 3: Seasonal Average Price of Cardamom

Hypothesis 2

H0: There is no significant difference in the prices of Cardamom in the harvesting season and off-season

H1: There is significant difference in the prices of Cardamom in the harvesting season and off season

Table 8: Paired Samples Statistics

Mean	N	Standard deviation	Std. Error Mean
1306.00	6	913.280	372.845
1288.5000	6	701.30129	286.30505

Source: Data analysis

Table 9: One Sample t-test

		Mean	Std. deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. two-tailed
					Lower	Upper			
Pair 1	Seasonal price and off-season price	17.50	661.735	270.152	--677.168	711.728	0.064	5	.951

Source: Data analysis

Interpretation

In order to find out whether there is any difference in the average prices of cardamom in the harvesting season and off-season, paired t- test has been used. It is observed that the average price in the two seasons were 1306 and 1288.50 with standard deviation 913.280 and 701.301 respectively. One sample test showed that the mean difference was 17.50 with standard deviation, 661.735. The corresponding t value at degrees of freedom 5 at 5 % significance level was 0.064and p value was 0.951As the p value is more than 0.05,the null hypothesis is accepted and inferred that the average prices in both the seasons are not statistically significant over the study period.

5.5 Relationship between Production, Productivity and Price

Table10: Production, productivity and price

S No.	Year	Production	Productivity/ ha	Price
1	2014-15	22000	314	754
2	2015-16	23840	340	627
3	2016-17	17990	259	1088
4	2017-18	20660	298	956
5	2018-19	12940	187	1520
6	2019-20	11823	171	2909

Source: Compiled by the author

The price of cardamom mainly varies in accordance with the production. If the supply is low, price will increase and vice-versa. In this part an analysis id made to know the relationship between price and production.

Hypothesis 3

H0: There is no significant relationship between production and price of cardamom

H1: There is no significant relationship between production and price of cardamom

Table 11: Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Standard deviation
production	6	11823	23840	18208.83	4912.811
price	6	627	2909	1309.00	842.748

Source: Data analysis

Table 12: Correlations

Variables	Mean	Production	Price
Production	Pearson Correlation	1	-.874*
	Sig. (2-tailed)		.023
	N	6	6
Price	Pearson Correlation	-.874*	1
	Sig. (2-tailed)	.023	
	N	6	6

***Correlation is significant at the 0.05 level (2-tailed)**

Source: Data analysis

Interpretation

The relationship between production and price of cardamom over various years is checked using Karl Pearson's Correlation method. It is evident from table 12 that the p value was 0.023 and the Pearson's correlation was -.874. as the P value is below 0.05, it is inferred that there is significant relationship between production and price. It is also found that the correlation is highly negative which

means that increase in production resulted decrease in the price of the commodity and vice-versa.

6. Conclusion

Cardamom known as the queen of spices in India is one of the major spices produced in India is native to South India especially to the Western Ghats of Kerala, Tamil Nadu and Karnataka. India was the major producer of cardamom for a long period but now Guatemala stands first in production, export and productivity. The price of cardamom largely depends on production and the production varies due to many factors such as climatic conditions, pest attack, labour availability etc. it is a very risky cultivation which the yield and revenue is beyond the control of the farmers. The area of cultivation of small cardamom stands more less the same throughout the period of study whereas the production and productivity varies. The price of cardamom is highly sensitive to the market factors, economic conditions, climatic conditions, epidemics and any other abnormal conditions. So the farmers are affected by the fluctuations in price and they find it difficult to continue their occupation. The average monthly prices showed significant variation whereas the seasonal average prices did not show significant variation. There is significant relationship between production and price and the correlation was highly negative. So the plantation faces high difficulty due to variations in prices and production. The present e auction system also failed to provide fair prices on the basis of quality of the product as there are wide fluctuations in the prices of the same quality product in the same auction. The movement of prices on a day/in two auctions is detrimental to the farmers. For the continuation of this cultivation, a good pricing mechanism is the need of the hour.

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