Price structure of cardamom in India - an analysis

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ABSTRACT

The seasonal phenomenon in the price of small cardamom along with the seasonality in related variables like sales at auction centres, export and export price are analysed. The interrelationship between market price and these variables is also studied. The analysis shows that 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. Compared to export price, sales price showed more marked seasonality. An attempt is made to quantify the extent of relationship between yearly sales price and variables like production, quantity of sales at auction centres, export and export price by employing multiple regression analysis. The analysis shows that around 97% variation in yearly price can be explained by the two variables namely export and export price. The compound growth rates in production, export and prices during the period are also worked out.

Key words: auction sales, autocorrelation, Durbin-Watson statistic, explanatory variable, least squares method, multiple regression analysis.

Introduction

The prices of cardamom unlike other plantation crops was the most unstable over the years. Even within the same year, the crop experienced marked seasonality in prices. The Indian cardamom industry experienced marked fluctuations

in the supply side also. The price forma-
tion in cardamom is considerably influ-
enced by the international demand and
supply situation as well (Sreedharan *et al*
1988). In this context, it will be interesting
to study the supply demand relations
with price in this crop.

In cardamom, the crop year extends from
September to August where as harvest is
spread over August to January
(Sudharsan *et al* 1988). Hence it is highly
likely that the prices will be characterised
by the seasonality in production. The
monthly export also may affect the local
prices. Due to the highly sensitive nature
of the crop to agroclimatic factors, there
are severe intra-year variations in pro-
duction and consequently in prices
(Cheriankunju 1985). Hence it may be
useful to study the structure of the carda-
mom prices in India. The main objectives
of the present study are to analyse the
seasonal behaviour in prices and related
variables like sales through auctions,
export and export price; to explore the
possible relationship between market
prices and these variables; and to quan-
tify the relationship between market price
and related variables, thereby arriving
at a suitable estimation model for the
yearly prices.

Materials and methods

The secondary data compiled from the
official publications of the Spices Board is
used in the present study. Monthly data
on sales through auctions, export and
export price were compiled for the 15
years, 1974-75 to 1988-89 based on Crop
Year (September-August).

The seasonalities in prices and related
variables were analysed by working out
the seasonal indices for these variables.
The seasonal indices were worked out by
the ratio to trend method (Elhance 1969).
To study the extent of relationship be-

tween market price and related variables,
a multiple regression analysis was em-
ployed. The assumed regression equa-
tion is of the form

$$P_t = a_0 + \sum_{i=1}^{4} b_i X_i + E \quad \text{where}$$

P_t = Price in year t,
X_1 = Production in year t,
X_2 = Export in year t.
X_3 = Export price in year t,
X_4 = Quantity of sales through auctions
in year t.

a_0, b_1, b_2, b_3 & b_4 are the partial regression
coefficients and E is the random error.

The market growth is studied by working
out the compound growth rates for the
respective variables.

Results and discussion

1.   Seasonal indices in prices of
      sales and export

Table 1. Seasonal indices of sales
          price and export price of
          small cardamom in India
          during 1974-75 to 1988-89.

The seasonal indices of sale price and
export price worked out by the classical

	Seasonal indices of	
	Sales price	Export price
Sept	98.39	99.10
Oct	102.81	101.41
Nov	104.77	103.28
Dec	104.73	99.83
Jan	108.93	101.87
Feb	102.43	96.00
Mar	98.34	98.63
Apr	98.18	104.49
May	94.61	101.49
Jun	95.87	100.04
Jul	91.71	100.66
Aug	99.23	93.20

decomposition method is given in Table 1. This data show that the seasonal indices ranged between 9.71 in July and 108.93 in January. The seasonal indices were low during the months May, June and July while it was high during the period from October to February.(Fig. 1). It is to be noted that cardamom is mainly sold through the government registered auction centers giving scope for more competitive prices.
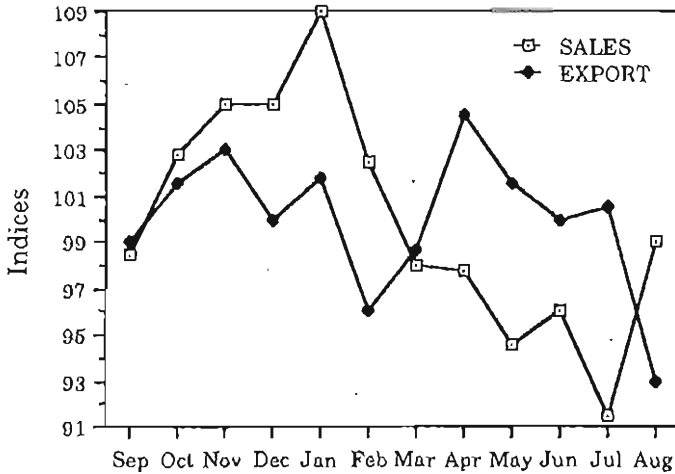

Fig. 1. Monthly indices of sales and export price

The yearly production, quantity sold through auction centres and its relative share of production is given in Table-2. From Table-2, it is evident that around 75% of the production is sold through auctions, thereby ensuring better price at the farmers' level.

Table 2. Production, auction sales and its relative share of production during 1974-75 to 1988-89.

Year	Production (MT)	Auction sales (MT)	Auction sales as percentage of production
1974-75	2900	1912	66
1975-76	3000	2156	72
1976-77	2400	1382	58
1977-78	3900	2960	76
1978-79	4000	3339	83
1979-80	4500	3107	69
1980-81	4400	3356	76
1981-82	4100	3099	76
1982-83	2900	2018	70
1983-84	1600	989	62
1984-85	3900	2353	60
1985-86	4700	3670	78
1986-87	3800	2812	74
1987-88	3200	2725	85
1988-89	4250	3380	80

With regard to the export side, though there is seasonality in export price, it is not as predominant as the seasonality in sales price. Seasonal indices of export price ranges between 93.2 in August and 104.49 in April, indicating a relatively stable situation (Fig.1).

2. Inter relationship between prices and related variables

Cardamom was primarily known as an export oriented crop till mid eighties. So export and export price has a direct effect on the sales price. Even now Government of India is making all possible efforts to boost up the export, though we have a relatively good internal consumption market at present. The yearly export and its relative share in total production is given in Table 3.

Table 3. Yearly export and its relative share of total produc tion of cardamom in India during 1974-75 to 1988-89.

Year	Export	Export as % of production
1974-75	1473	51
1975-76	1893	63
1976-77	1179	49
1977-78	2763	71
1978-79	2902	73
1979-80	2691	59
1980-81	2288	52
1981-82	1883	46
1982-83	927	32
1983-84	527	33
1984-85	2569	66
1985-86	3212	68
1986-87	1014	27
1987-88	369	12
1988-89	643	15

From the data presented in Table-3, it is evident that export which was more than

50% of the production till 1985-86 has fallen sharply since then. In 1982-83 and 1983-84 also export was comparatively less. This was due to the abnormal fall in production in these years due to severe drought. Thus we can see that the instability in production and the consequent abnormality in price are the major factors which led India in loosing its position in the international market. But this loss in the international market has resulted in boosting the internal consumption and market. In this context, the efforts of the Spices Board in promoting internal consumption is worth mentioning.

To analyse the seasonal patterns in sales and export, the respective indices has been worked out. As we have already seen, auction sales constitute the bulk of the sales in this crop. Hence in working out the indices of sales, auction sales alone has been considered. The seasonal indices of sales and export are given in Table-4.

Table 4. Seasonal indices of sales and export of small cardamom in India during 1974-75 to 1988-89.

Month	Seasonal indices of	
	Sales	Export
Sept	92.89	35.27
Oct	212.44	83.57
Nov	244.41	157.33
Dec	201.68	225.83
Jan	155.83	160.10
Feb	89.78	118.70
Mar	88.25	129.69
Apr	45.21	101.09
May	24.06	70.77
Jun	12.90	50.30
Jul	10.03	39.90
Aug	22.53	27.46

Perusal of the data presented in Table-4 reveals that when the monthly indices of sales was high during September to February, the indices of export was also high during the same period indicating the close relationship between sales and export. Also the seasonal indices of sales price was highest during the same period which illustrates the influence of these variables on the sales price. On the other hand though sales price was relatively lower during the months of March to July, export price was relatively higher, but quantity of export is less (Fig-2). Hence by adjusting the storage strategy, we can get better returns from the export side, which is quite possible by evolving more durable storage techniques.
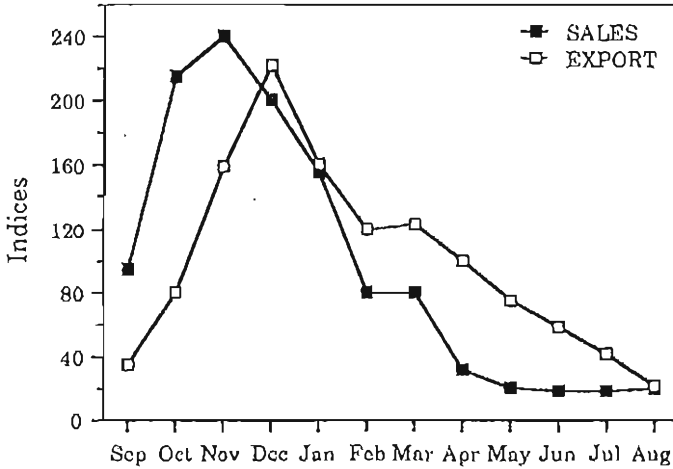

Fig. 2. Monthly indices of sales and export quantity

Thus the analysis of the market shows that an increase in the arrival of the crop in the market is followed by a better price and as the arrival of quantity decreases, price also decreases. This situation is quite contrary to the classical concept of supply response to demand reported in similar cash crops (Ipe 1988). This may be due to the convergence of consumption during the same period due to the festival season when market is most active and also due to the seasonal nature in the market structure of cardamom where storage for a longer period is difficult with the present technical know-how.

3.   Prediction model for the yearly sales price based on related variables

To find the extent of relationship between sales price and related variables like production, export, export price and quantity of sales through auctions, a multiple regression analysis was carried out. The assumed equation is the same as that mentioned in the materials and methods.

The regression coefficients were estimated the ordinary least squares method (Wonnacott and Wonnacott 1970). In the successive steps regression variables not showing significant relationships were eliminated. The full model regression equation thus estimated is:

$$P_1 = 9.1823 - 0.0140X_1 - 0.0173X_2{}^{**} + 1.0785X_3{}^{**} + 0.0157X_4$$
$$(0.0145)\quad(0.0050)\quad(0.0621)\quad(0.0144)$$

with an R^2 value of 0.9775. The Durbin-

Watson statistic is 1.9015, showing no autocorrelation between the explanatory variables. The standard error of the estimated equation is 12.25. Thus we can see that around 89% of the variation in the price can be explained by these variables together. However in practice it is difficult to get data on all these variables together for the estimation of price. Hence a stepwise regression is applied. In the stepwise regression after eliminating variables X_1 and X_4 whose relationship was not significant, the R^2 value is 0.9749. The modified regression equation is

$$P_1 = 3.6606 - 0.0186\overset{**}{X_2} + 1.0716\overset{**}{X_3}$$
$$(0.0033) \quad (0.0516)$$

with a standard error of 11.83.

This shows that without any loss of accuracy, the variation in price between years can be explained by these two variables alone. The observed yearly prices and the prices estimated by the revised equation is given in Table 5. The influence of previous year's export and sales price on the current year prices was also explored, but was found to be not significant. Hence these lag variables are not introduced in the model.

Table 5. Observed and estimated prices during 1974-75 to 1988-89.

Year	Production (MT)	Auction sales (MT)	Auction sales as percentage of production
1974-75	76.24	68.50	7.44
1975-76	86.45	78.41	8.04
1976-77	156.75	178.44	-21.69
1977-78	134.41	138.07	-3.66
1978-79	166.42	169.35	-2.93
1979-80	134.88	143.03	-8.15
1980-81	98.91	107.54	-8.63
1981-82	116.02	113.79	2.23
1982-83	161.08	165.33	-4.24
1983-84	370.49	355.12	15.37
1984-85	199.91	208.61	-8.70
1985-86	131.82	110.44	21.38
1986-87	119.60	118.20	1.40
1987-88	139.63	146.67	-7.04
1988-89	134.50	125.61	8.89

4. Market growth rate

To study the market growth rate, the compound growth rates in production, export, export price and sales price are worked out. Production grew at an annual rate of 2.60% while export declined at the rate of 5.37% during the period.

The export price showed a growth rate of 2.52% while sales price showed a growth rate of 3.86%. This shows that even with sudden declining trend in export, Indian cardamom industry can expect protection in price due to the internal consumption market it had established.

Conclusions

The analysis of the trends in prices of cardamom in India shows that the indices of sales price are higher in the months for which the indices of sales are also higher, which depicts a situation quite contrary to the one in similar cash crops. But with regard to export, though the price indices are relatively higher during the off seasons, indices of export are lower. This emphasizes the need for evolving more durable storage strategies for better returns from exports. The price model for the yearly sales price shows that the market prices can be well explained (97%) by the two variables namely export and export price.

Acknowledgements

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