Market Behaviour, Arrivals, and Price Behaviour of Cumin in Mandor Market of Jodhpur District, Rajasthan

* *Vinod Kumar Verma*
** *Pradeep Kumar*
*** *R.C. Kumawat*

Abstract

The present study was conducted in Jodhpur district of Rajasthan. Two tehsils, namely Looni and Falodi were selected on the basis of highest production and area. Six villages were selected randomly from the selected tehsils. The present study was carried out to ascertain the marketable surplus, sales pattern, market arrivals, and prices in the cultivation of cumin crop. Primary as well as secondary data were utilized in the study. The marketable and marketed surplus ranged between 95% to 97% on different sized farms. The sample farmers disposed of 85.74% surplus cumin seed in the Mandor regulated market, and only 14.26% of the surplus cumin seed was disposed in the villages to village traders. 53% was sold in the first quarter immediately after harvest (March to May), and the remaining 47% was marketed in the remaining three-quarters of the year (August to February). Small-size farmers disposed off their total surplus cumin seed in one lot as against the medium and large-size farmers, who disposed off their total surplus in two and more lots. It was noted that 63% of the cumin produce arrived in the first quarter (March-May) of the year. The arrivals were 17.93%, 8.54%, and 10.02% in the second, third, and fourth quarters. Farmers got 10.36% higher price by selling cumin in the second quarter over the post-harvest season (peak season or first quarter). Sale of cumin in the third and fourth quarters of the year was not found to be advantageous. The correlation coefficients between monthly wholesale prices and arrival of cumin in the corresponding months and in the subsequent months were -0.578 and -0.588, showing that there existed an inverse relationship between the two. The value of the correlation coefficients was estimated to be higher for the subsequent months than for the corresponding months. The value of the correlation coefficients between yearly arrivals and prices of cumin were negative in four years and was positive only in one year out of the five year study period.

Keywords: Cumin, marketed surplus, sale pattern, relationship between arrivals, prices

Paper Submission Date : February 19, 2013 ; Paper sent back for Revision : August 30, 2013 ; Paper Acceptance Date : October 26, 2013

Cumin (*Cuminum cyminum*) is an important spice mainly cultivated for flavoring vegetables, pickles, soups, sauces, cheese, and for a pleasant aroma. Cumin is one of the important ingredients of human diet throughout the world. It is used in a large number of processed foods as well as in daily food recipes due to its agreeable flavour and aroma. It is also used in seasoning bakery products such as breads and cakes. Besides, it has some medicinal importance for humans and livestock, and acts as an antioxidant. Cumin oil is used in perfumery as well as for flavouring liquors and cordials. In India, cumin is mainly cultivated in the states of Gujarat, Rajasthan, Uttar Pradesh, Madhya Pradesh, Karnataka, and Tamil Nadu. Rajasthan and Gujarat together account for over 90% of the total cumin production within the country. Rajasthan, with 13.91% production, stands second in the production of cumin in the country (Spices Board of India, 2009). Cumin in Rajasthan is mainly grown in the districts of Jodhpur, Jalore, Barmer, Nagour, Pali, Ajmer, Sirohi, Bhilwara, and Tonk.

Though cumin is an important cash crop, its production is most uncertain and fluctuates violently from year to year due to the extreme variations in the climatic conditions and occurrence of a number of diseases namely, powdery mildew, blight, and wilt (Singh, 1999). The uncertainty in production of this crop causes wide variations in the income of the cumin growing farmers from year to year. Production and income uncertainties hamper future production planning of the crop. Any effort to control or minimize the fluctuations in production, productivity, and income of the cumin growing farmers requires a continuous study of different aspects of its cultivation like cost incurred in

*PhD Scholar, Department of Agricultural Economics, S.K.N. College of Agriculture, Jobner-303 329, District-Jaipur, Rajasthan. E-mail : dr.vinod4u@rediffmail.com
** *Associate Professor,* Department of Agricultural Economics, S.K.N. College of Agriculture, Jobner-303 329, District-Jaipur, Rajasthan.E-mail : drpradeep8@gmail.com
*** *Professor,* Department of Agricultural Economics, S.K.N. College of Agriculture, Jobner-303 329, District-Jaipur, Rajasthan.

cultivation and marketing of the crop, different channels involved in the marketing process, and the margins earned by the intermediaries. There is lack of information about the cumin crop, which, if available, may be helpful for the government to decide incentive prices of the crop for boosting the production of the crop, as well as for providing better marketing facilities to the farmer producers. Keeping these facts in mind, the present investigation is an attempt to generate such information with regards to the cumin crop with the following specific objectives:

(1) To study the marketing behaviour with respect to the marketable surplus, sale pattern, and marketing channels of cumin crop in selected districts of Rajasthan,

(2) To study the relationship between market arrivals and prices of cumin in the selected market of the study area.

Data and Methodology

The study is confined to Jodhpur district of Rajasthan as this district occupied the first place in production (31.23%) and third place in area (18.21%) in terms of cumin crop during 2008-09 (Commissionerate of Agriculture, Rajasthan, 2009). Looni and Falodi tehsils of Jodhpur district were selected for the study because these tehsils had the highest production and area of cumin crop in the district. Out of these tehsils, based upon the information of maximum production and sale of cumin, six villages namely, Guda Vishnoiyan, Looni, Bhandu Kallan, Mandla Kallan, Dadhu, and Gumanpura under the command area of Krishi Upaj Mandi Samti, Mandor, Jodhpur were selected. A list of the cumin growing farmers of these six villages was prepared from the year 2009-10. After arranging the list of farmers in ascending order in terms of size of their operational holdings, these were divided into three size groups, that is, small, medium, and large. Finally, a sample of 60 cumin growing farmers was randomly selected in proportion to their total number in each size group. Mandor market was selected because of the highest arrival of cumin in this market.

The primary data in respect of area under cumin crop and production of cumin, producers' surplus, and sales pattern were collected from the producers through the personal interview method, with a set of well-structured and pre-tested schedules specifically designed for the purpose. The secondary data with respect to monthly wholesale prices and arrival of cumin in Mandor market for the period from 2005-06 to 2009-10 were obtained from the records of the Krishi Upaj Mandi Samti, Mandor, Jodhpur, Rajasthan. The data were analyzed using appropriate statistical tools and techniques. Marketable surplus and marketed surplus of cumin crop was worked out using the formula:

$MS = P - C$

Where,

MS = Marketable surplus,
P = Total production,
C = Total requirements (family and farm).

Marketed surplus was the actual quantity of the produce sold out by the farmers. The marketable surplus was compared with the actual quantity marketed by the farmers, that is, marketed surplus. The sales pattern of the marketed surplus of cumin with respect to time, place, and lots were examined. For studying the sale pattern with respect to time, a year was divided into four seasons (quarters) as under:

Quarters 1: March to May,
Quarters 2: June to August,
Quarters 3: September to November,
Quarters 4: December to February.

There were two marketing channels involved in the sale of cumin :

(1) Channel - I- (Producer - Village - Trader - Wholesaler-Retailer - Consumer),
(2) Channel - II- (Producer - Wholesaler-Retailer - Consumer).

The correlation coefficient was worked out by using the following formula:

$$r = \sqrt{\dfrac{\Sigma XY - \Sigma X.\Sigma Y/N}{[\Sigma X^2 - (\Sigma X)^2/N][\Sigma Y^2 - (\Sigma Y)^2/N]}}$$

Where,

r	=	Correlation coefficient between arrivals (x) and prices (y),
X	=	arrivals in quintals,
Y	=	Prices in rupees per quintal, and
N	=	Number of observations.

Results and Discussion

✢ **Marketable and Marketed Surplus :** The marketable and marketed surplus of cumin on different-sized farms of the selected villages were estimated on the basis of total production as presented in the Table 1. Total production of cumin on the selected farms was 51.95 quintals. Production of cumin on different-sized farms, that is, small, medium, and large-sized farms was 8.12, 16.75, and 27.08 quintals respectively. This shows that production of cumin and farm size were positively associated, that is, with an increase in farm size, area under cumin as well as the total production of cumin increased (Singh, 1999). On farm utilization of cumin was 1.67 quintals or 3.21% of the total production. On farm utilization of cumin on different sized farms was 0.33, 0.54, and 0.80 quintal on small, medium, and large sized farms, respectively. In percentage terms, this varied from 2.96% (of total production) on large sized farms to 4.06% on small sized farms. Among the size groups, the quantity retained for on farm utilization increased with an increase in farm size, but as a percentage of total production, it exhibited a declining trend.

The utilization of seeds on the farms accounted for 3.20%, 2.51%, and 2.33% of total production on small, medium, and large sized farms respectively. The family consumption accounted for 0.86%, 0.71%, and 0.63% of the total production on small, medium, and large sized farm groups respectively. The percentage share in total production of quantity retained for consumption by different-sized farms exhibited a declining trend, with an increase in the size of the holding. On an overall basis, farm utilization was 0.69% and 2.52% for family consumption and seeds respectively. The marketable surplus of cumin crop, on an average, was 50.28 quintals or 96.78% of the total production. Among the different sized groups, the marketable surplus in absolute as well as in percentage terms increased with an increase in farm size. In percentage terms, this being 95.94%, 96.78%, and 97.04% on small, medium, and large sized farms. The marketed surplus was found to be equal to the marketable surplus on all farm size groups of farms. This has been so due to the poor retention capacity of the farmers and deterioration in quality with the passage of time.

Table 1. Marketable and Marketed Surplus of Cumin Crop on Sample Farms of Looni and Falodi Tehsil 2009-10

(Quantity in Quintals)

S. No.	Size of group	Total number of farmers	Total production	Utilization			Marketable surplus	Marketed surplus
				Consumed by family	Kept for seed	Total utilization		
1	Small (< 2 ha)	28	8.12 (100)	0.05 (0.86)	0.26 (3.20)	0.33 (4.06)	7.79 (95.94)	7.79 (95.94)
2	Medium (2-4 ha)	22	16.75 (100)	0.12 (0.71)	0.42 (2.51)	0.54 (3.22)	16.21 (96.78)	16.21 (96.78)
3	Large (> 4 ha)	10	27.08 (100)	0.17 (0.63)	0.63 (2.33)	0.80 (2.96)	26.28 (97.04)	26.28 (97.04)
	Overall	**60**	**51.95 (100.00)**	**0.36 (0.69)**	**1.31 (2.52)**	**1.67 (3.21)**	**50.28 (96.78)**	**50.28 (96.78)**

Source: Field Survey by the Investigators (2009-10)

Sale Pattern

Sale Pattern of the Cumin Produce has been Studied Under the Following Heads :

(1) Sale Pattern of Cumin According to Place : Farmers sold the surplus cumin to the local traders of their villages as well as in the nearby regulated market in Mandor. The quantity of cumin marketed by the farmers at different places is shown in the Table 2. Farmers of the selected villages sold 85.74% cumin in the regulated market (Mandor) and only

Table 2. Place Wise Disposal Pattern of Marketed Surplus of Cumin by the Sample Farmers (2009-10)

(Quantity in quintals)

Place of sale	Farm size groups			Overall
	Small	Medium	Large	
Village sale	2.93 (37.61)	4.24 (26.16)	-	7.17 (14.26)
Market sale	4.86 (62.39)	11.97 (73.84)	26.28 (100)	43.11 (85.74)
Total	7.79 (100)	16.21 (100)	26.28 (100)	50.28 (100)

1. Source: Field Survey by the Investigators (2009-10)

2.Figures in parentheses are the percentage of the quantity sold by the respective size group farmers

14.26% in the villages. Among the different sized groups, small and medium-sized farmers sold 37.61% and 26.16% surplus cumin in the village itself. Small-size farmers sold 62.39%, medium size farmers sold 73.84%, and large size farmers sold 100% of the cumin produce in the market. The large size farmers sold their total surplus of cumin in the regulated market in Mandor (Agarwal & Meena, 1995).

(2) Sale Pattern of Cumin According to Time : The quarter (season) wise disposal pattern of sale of cumin by the farmers of different size groups has been presented in the Table 3. The Table reveals that 70% to 75% cumin was marketed by the farmers in the first two quarters after harvest and only 25% to 30% was marketed by them in the last two quarters of the year. Farmers of all size groups sold, on an average, 53.10%, 18.64%, 13.74%, and 14.52% surplus in the first, second, third, and fourth quarters of the year. As such, more than 70% of the produce was sold in the first two quarters and more than 85% of the produce was sold in the first three quarters of the year. Among all the size groups, small, medium, and large size farmers sold 100%, 61.94%, and 33.75% of their total surplus of cumin in the first quarter. This shows that total disposal in the first quarter decreased with an increase in farm size. 100% percent quantity by the small size farmers and 61.94% surplus by the medium-size farmers was sold immediately after harvest in the first quarter to meet the cash needs for domestic purposes as well as for clearing the loan obligations. 18% cumin was disposed of by the farmers in the second quarter (June to August). All the size groups decreased with an increase in farm size. Small size farmers did not have any surplus to sell in the third quarter. On the other hand, medium and large size farmers sold 15.61% and 16.67% in the third quarter respectively. Only the large size farmers sold 27.78% in the fourth quarter. The small size farmers sold their total surplus in the first quarter, the medium size farmers sold their total surplus in the first three quarters, and large size farmers sold the same in all the four quarters in the marketing year (Agarwal &Meena 1995 ; Mishra, Vishwakarma, & Rawat, 1999).

Table 3. Quarter Wise Disposal Pattern of Marketed Surplus of Cumin by the Sample Farmers (2009-10)

(Quantity in quintals)

Quarter the year	Farm size groups			Overall
	Small	Medium	Large	
I Quarter (March to May)	7.79 (100)	10.04 (61.94)	8.87 .(33.75)	26.70 (53.10)
II Quarter (June to august)	-	3.64 (22.45)	5.73 (21.80)	9.37 (18.64)
III Quarter (September to November)	-	2.53 (15.61)	4.38 (16.67)	6.91 (13.74)
IV Quarter (December to February)	-	-	7.30 (27.78)	7.30 (14.52)
Total	7.79 (100)	16.21 (100)	26.28 (100)	50.28 (100)

1 Source: Field Survey by the Investigators (2009-10)

2 Figures in parentheses are the percentage of the total quantity sold by the respective size groups of farmers

(3) Sale Pattern According to Number of Lots : The distribution of farmers according to the number of lots in which they disposed of their cumin surplus is shown in the Table 4. On an average, 80% of the farmers sold their surplus cumin in one lot, 16.67% farmers sold their surplus cumin in two lots, and only 3.33% of the farmers sold the extra cumin in more than two lots. The quantities of cumin sold by the farmers in one, two, and three lots were 72.67%, 18.79%, and 8.53% with respect to the total marketed quantity. Among all the size groups, 100% of the small farmers

sold their marketed surplus of cumin in one lot (Agarwal & Meena,1995). The corresponding figures for sale in one lot for medium-size farmers was 68.18%, that is, 73.84% of the produce was sold in one lot. 50% of the large farmers sold 63.86% of the produce in one lot. Only 20% large size farmers sold 16.32% of the produce in more than two lots.

Table 4. Lot Wise Disposal Pattern of Marketed Surplus of Cumin by the Sample Farmers (2009-10)

Farm size groups	Selling in one lot		Selling in two lots		Selling in more than two lots	
	No. of farmers	Quantity (Qtls)	No. of farmers	Quantity (Qtls)	No. of farmers	Quantity (Qtls)
Small (< 2 ha)	28 (100)	7.79 (100)	-	-	-	-
Medium (2-4 ha)	15 (68.18)	11.97 (73.84)	7 (32.82)	4.24 (26.16)	-	-
Large (> 4 ha)	5 (50)	16.78 (63.86)	3 (30)	5.21 (19.82)	2 (20.00)	4.29 (16.32)
Overall	**48 (80)**	**36.54 (72.67)**	**10 (16.67)**	**9.45 (18.79)**	**2 (3.33)**	**4.29 (8.53)**

1.Source: Field Survey by the Investigators (2009-10)

2.Figures in parentheses are the percentage of numbers/ quantity of produce in the respective size group

Marketing Channels

The producer - farmers sold cumin in the study area both at the village site as well as in the nearby regulated market. The marketing channels identified in the sale of cumin at these places are presented in the Table 5.

✤ **Channel – I (Producer - Village Trader - Wholesaler - Retailer - Consumer) :** The study revealed that producer farmers sold 14.26% of the total marketed surplus of cumin to the village traders. Out of 60 sample farmers, 15 farmers (25%) sold cumin in the village. None of the large-size farmers sold cumin in the village. According to different size groups, eight and seven farmers of small and medium size of holding sold cumin in the village respectively, the reason being the low quantity of surplus available with them.

✤ **Channel II (Producer - Wholesaler - Retailer - Consumer) :** Mandor market is one of the main markets of Jodhpur district for transaction of cumin. Mandor market stands first among the important mandies of Rajasthan for cumin arrivals. The arrival of cumin in the Mandi starts from the month of February, with peak arrivals in March to May. More than 85.84% surplus cumin was brought by 75% of the farmers to the Mandor market (Agarwal & Meena, 1995). According to different size groups, 71.43% small, 68.18% medium, and 100% large farmers brought the produce to the mandi.

Table 5. Distribution of Producer Farmers Adopting Different Marketing Channels

Marketing channels	Size groups			
	Small	Medium	Large	Total
Channel I (Producer-village trader-wholesaler- retailer-consumer)	8 (28.57)	7 (31.82)	-	15 (25)
Channel III (Producer-wholesaler-retailer-consumer) (in Mandi sale)	20 (71.43)	15 (68.18)	10 (100)	45 (75)
Total	**28 (100)**	**22 (100)**	**10 (100)**	**60**

1. Source: Field Survey by the Investigators (2009-10)

2. Figures in parentheses are the percentage of their respective column totals

Relationship Between Market Arrivals and Prices

The relationship between market arrivals and prices of cumin in the Mandor market of Jodhpur district was examined using monthly data on arrivals and prices of cumin obtained from the records of Mandi Samiti for the last 5 years, that is, 2005-06 to 2009-10. The section has been divided into three sub-sections, which are as under:

(1) Pattern of market arrivals and price behaviour of cumin in Mandor market in different seasons of the year,

(2) Relationship between monthly arrivals and wholesale price of cumin and,

(3) Relationships between yearly arrivals and wholesale prices of cumin.

(1) Pattern of Market Arrivals and Price Behaviour of Cumin Crop in Mandor Market : In this section, the intra-seasonal variations in arrivals and prices have been examined.

↪ **Seasonal Pattern of Market Arrivals :** The arrivals of cumin in different seasons (quarters) of the year, that is, peak, mid, lean, and off marketing seasons (quarters) during the study period from 2005-06 to 2009-10 in Mandor market is given in the Table 6. Arrivals of cumin were 58.33% to 71.25% of the total arrivals in the peak seasons of the year during the study years. Arrivals in the peak season were the highest in the year 2007-08 (71.25%) and were the lowest in the year 2006-07 (58.33%), with overall arrivals of 63.51%. Arrivals ranged between 15.80% to 21.69% in the second season (mid season); the highest arrivals in this season being in the year 2005-06 (21.69%), and the lowest arrivals happened in the year 2007-08 (15.80 %), with overall arrivals being 17.93 %. In the lean period, arrivals ranged between 5.00% to 10.67%, with an overall of 8.54%. In the fourth season (off season), arrivals were 5.53% to 12.90% of the total arrivals, with an overall of 10.02%. The pattern of arrivals of cumin in different seasons indicated that about 63.51% of the total annual arrivals were in the first season or peak season, that is, immediately after the harvest of the crop within a period of 3 months. Arrivals decreased in the subsequent seasons, that is, in the second and third seasons of the year. Arrivals were less in the fourth season as compared to the second and third seasons. More than 70% quantity of cumin arrived in the first two seasons (within six months) and only 30% cumin arrived in the other two seasons of the year (Prasad, Murthy, & Satyanarayan, 1988 ; Singh, Chandaj, & Kataria, 2010).

Table 6. Pattern of Market Arrivals of Cumin in Different Seasons of the Year During 2005-06 to 2009-10

(Qty. In q.)

Year	I season (Peak) (March-May)	II season (mid) June-Aug.	III season (Lean) (Sept-Nov.)	IV season (Off) Dec-Feb	Total
2005-06	16496.17 (65.21)	5486.92 (21.69)	1264.85 (5.00)	2049.06 (8.10)	25297 (100)
2006-07	18028.05 (58.33)	5686.89 (18.40)	3297.78 (10.67)	3894.28 (12.60)	30907 (100)
2007-08	15680.07 (71.25)	3477.26 (15.80)	1632.99 (7.42)	1217.68 (5.53)	22008 (100)
2008-09	18817 (62.30)	4862.84 (16.10)	3114.03 (10.31)	3410.04 (11.29)	30204 (100)
2009-10	6228.43 (61.79)	1738.80 (17.25)	812.45 (8.06)	1300.32 (12.90)	10080 (100)
Overall	**75249.81 (63.51)**	**21252.71 (17.93)**	**10122.10 (8.54)**	**11871.38 (10.02)**	**118496 (100)**

1 Source: Records of Krishi Upaj Mandi Samiti (KUMS) Mandor (Jodhpur), (Various Years)

2 Figures in parentheses are the percentages of the total arrivals in the respective year

↪ **Seasonal Pattern in Prices of Cumin :** The average seasonal prices and the percentage change over the seasons have been shown in the Table 7. The inter-seasonal variation in prices of cumin showed that prices decreased in the second season (June-August) over the first season (March-May) in one year and increased in the fourth year out of the five year study period. The increase in prices of cumin from the first to the second season was maximum (16.07%) in the year 2008-09. The lowest increase in price from the first to the second season was in the year 2007-08, that is, 12.25%. On the whole, the prices were higher in the second season over the first season by 10.36%. The prices were higher in the third season (September to November) over the second season (June to August) in two years and were low in three years. The highest increase in prices from the second to the third season happened in the year 2006-07 by 16.19%. In three years, that is, 2005-06, 2007-08, and 2008-09, the prices were lower in the third season over the second season. On the whole, the prices were lower in the third season over the second season by only 0.69%. The prices showed an increase in one year and a decrease in four years in the fourth season over the third season. The magnitude of increase in prices from the third to the fourth season was 6.55% in the year 2006-07 in four year prices, which were lower in the fourth season over the third season (Kumar, Sharma, & Sharma, 2006; Vekariya, Khant, & Gajupara, 2006). From the results presented in this section, it can be inferred that farmers got 10% higher price by sale of cumin in the second season over the sale in the post-harvest season.

Table 7. Price of Cumin in Different Seasons of the Year in Mandor Market

(₹/q)

Year	I season (March-May)	II season (June-Aug)	III season (Sept-Nov)	IV season (Dec-Feb)
2005-06	6566.67	73339.38 (+13.29)	7068.44 (-11.60)	6399.07 (-2.70)
2006-07	7666.67	7441.74 (-2.93)	8646.56 (+16.19)	8953.51 (+6.55)
2007-08	9866.67	11075.34 (+12.25)	10487.24 (-5.31)	9656.65 (-7.92)
2008-09	9333.33	10833.20 (+16.07)	9666.54 (-10.76)	9440.92 (-2.34)
2009-10	10400	11684.40 (+12.35)	12170.47 (+4.16)	11533.95 (-5.23)
Overall	**8766.67**	**9674.81 (+10.36)**	**9608.05 (0.69)**	**9196.74 (-4.28)**

1. Source: Records of Krishi Upaj Mandi Samiti (KUMS), Mandor (Jodhpur), Various Years

2. Figures in parentheses are the percentage change during the season over the previous season

(2) Relationship Between Monthly Arrivals and Wholesale Prices of Cumin : The monthly arrivals and average monthly wholesale prices of cumin during the period from 2005-06 to 2009-10 is show in the Table 8. The monthly arrivals data shows that there has been continuous decrease from June to February months, and an increase from March until May months. Arrivals were higher in April to May due to the arrival of new crops. Prices showed an increase during May to August, and a decrease from September to February, and again an increase in the March month. The relationship between arrivals and average monthly wholesaler prices is depicted in the Figures 1 and 2. The relationship between market arrivals and wholesale prices of cumin in different months of the year was also examined by working out the sample correlation coefficients.

Table 8. Monthly Market Arrivals and Monthly Wholesale Prices of Cumin in Mandor Market During 2005-06 to 2009-10

Months	Arrivals (in quintals)	Average wholesale prices (₹ /q)
March	4191.42	8937.88
April	5258.20	8670.98
May	5600.34	8640.00
June	1518.96	8725.00
July	1236.78	9020.00
August	1494.80	9427.88
September	1065.00	9827.88
October	513.49	10376.01
November	446.78	9823.87
December	638.00	9547.94
January	828.33	9452.35
February	907.94	9300.00

Source: Records of Krishi Upaj Mandi Samiti (KUMS), Mandor (Jodhpur) (Various Years)

The correlation coefficients were worked out, firstly, between wholesale prices and arrival of the crop in the corresponding months and secondly, between wholesale prices and arrival of the crop in the subsequent months. The correlation coefficient between average wholesale prices and market arrivals in the corresponding months and also between the prices and arrivals in the subsequent months has been shown in the Table 9. The value of the correlation coefficients between monthly wholesale prices and arrival of cumin in the corresponding months and in the subsequent months were -0.578 and -0.588 respectively. The negative sign of the correlation coefficients between the arrivals and wholesale prices indicated the existence of an inverse relationship between them. Furthermore, the prices prevailing in a month in general had a luring effect on the arrival of the output in the subsequent months rather than in the same month, and thus, the second type of relationship is more important in taking decisions regarding the timing of sale of

cumin crop (Kesar, Pant, & Rasane, 1996). In decision making, the study of the relationship in prices and arrivals of the crop in the subsequent months has been more useful to the producer-farmers because farmer producers take decisions regarding the sale of the crop based on the price on that particular day in the market with the hope that the current day's price will prevail the next day as well.
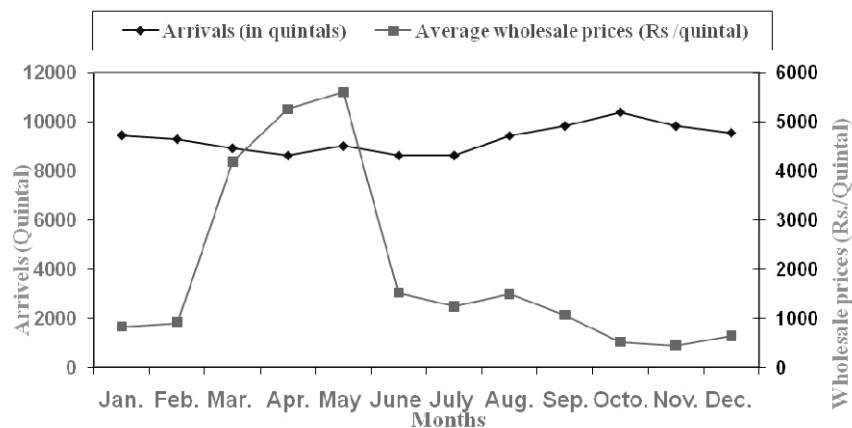
Table 9. Correlation Coefficient Between Monthly Arrivals and Wholesale Prices of Cumin During the Period from 2005-06 to 2009-10

| S. No	Particulars	Correlation Co-efficient (r)
1	Correlation Co-efficient between wholesale prices and arrivals of cumin in the corresponding months	-0.578*
2	Correlation Co-efficient between wholesale prices and arrivals of cumin in the subsequent months	-0.588*

Source: Based on the Table No.8

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

Figure 1. Average Wholesale Prices and Arrivals of Cumin in the Corresponding Months in Mandor Market During 2005-06 to 2009-10

Source : Based on Table No. 8

Figure 2. Average Wholesale Prices and Arrivals of Cumin in the Subsequent Months in Mandor Market During 2005-06 to 2009-10
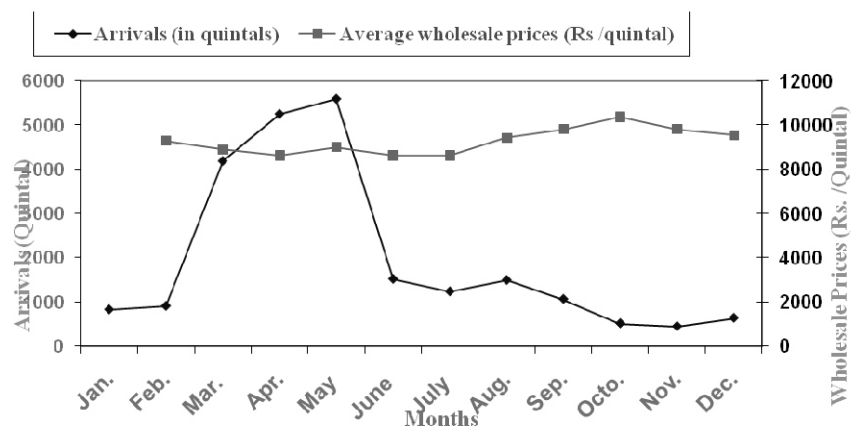
Source: Based on Table No. 8

(3) Relationship Between Yearly Arrivals and Wholesale Prices of Cumin : The relationship between the monthly arrivals and prices is not a true reflector of the relationship between the two because of the wide variations in arrivals and prices from month to month due to the exogenous factors, that is, temporary increase in demand or decrease in supply of output. The correlation coefficients between yearly prices and arrival of cumin in the Mandor market during the period from 2005-06 to 2009-10 are presented in the Table 10. Prices of cumin were negatively correlated with market arrivals in four years, and were positively correlated in one year out of the five years study period from 2005-06 to 2009-10 (Kumar et al., 2006; Vijay, 1992).

Table 10. Correlation Coefficients Between Yearly Wholesale
Prices and Arrivals of Cumin During 2005-06 to 2009-10

Years	Correlation co-efficient (r)
2005-06	0.282 NS
2006-07	-0.301 NS
2007-08	-0.177 NS
2008-09	-0.351 NS
2009-10	-0.568 NS

Source: Based on Table No. 6 & 7

NS - Non significant

Conclusion

To recapitulate the results, cumin is an important seed spice crop having 97.04% marketable surplus of total production. Farmers market 100% surplus immediately after harvest as the colour of seeds deteriorates due to storage. Place-wise sales data showed that 85.74% of the surplus was sold in the regulated markets and the village sale was only 14.26%. Time pattern-wise sales data revealed that 71% of the surplus was sold in the first two quarters after harvest, and 29% of the surplus was carried in the last two quarters by the medium and large size group of farmers. Two marketing channels were identified in the sale of cumin by the farmers. The results show that the pattern of market arrival of cumin in different seasons indicated that the arrival of cumin was 63.51% in the first peak season of the total. Arrivals were low in the second, third, and fourth seasons. Prices of cumin were higher in the second season by 10.36% over the first-season. Prices were negative by 4.28% in the fourth season over the third season. There existed an inverse relationship between prices and arrival of cumin in the corresponding as well as in the subsequent months. The higher negative value of correlation coefficients for subsequent months compared to the corresponding months explains that the effect of prices on arrivals was more pronounced in the subsequent months than it was in the corresponding months. The correlation in yearly prices and arrivals of cumin were negative in four years and were positive in one year. This relationship reveals that prices of cumin were not only affected by arrivals, but were affected by other factors also, that is, demand, export potential, and seasonality of the crop.

Research Implications

(1) Storage facilities for the farmers' produce should be created so that the farmers may store the produce and sell it when the conditions are favourable for them.

(2) The storage of the produce should be given loan facility so that the farmer is not forced to make a distress sale.

(3) A wide gap existed in prices of cumin seed in the village and in the regulated market. Prices were much lower in the village markets for the same quality of cumin seeds as compared to the regulated market.

(4) There is a need for development of village markets as sub- yards or as Kisan Mandi for providing reasonable prices to all farmers in general, and more specifically to the small sized farmers, having small produce for disposal.

References

Agarwal, N.L., & Meena, B.L. (1995). Performance of cumin marketing in Rajasthan. *The Bihar Journal of Agricultural Marketing, 5* (3), 319-328.

Commissionerate of Agriculture Rajasthan. (2009). *Area and production of major seed spices in Rajasthan. Rajasthan agricultural statistics at a glance* (2008-09). Rajasthan : Government of Rajasthan.

Kesar, D.V., Pant, R.C., & Rasane, V.S., (1996) Behavioural of prices and arrivals of red chillies - A case study from Maharashtra. *Indian Journal of Agriculture Marketing, 19* (3), 78-81.

Kumar, V., Sharma, H.R., & Sharma, R.K., (2006). Market arrivals and price behaviour of potato a study of four metropolitan markets. *Indian Journal of Agricultural Marketing, 20* (1), 78-89.

KUMS. (2006). *Arrivals and prices of cumin during the year 2005-06*. Records of Krishi Upaj Mandi Samiti. Mandor, Jodhpur, Rajasthan.

KUMS. (2007). *Arrivals and prices of cumin during the year 2006-07*. Records of Krishi Upaj Mandi Samiti . Mandor, Jodhpur, Rajasthan.

KUMS. (2008). *Arrivals and prices of cumin during the year 2007-08*. Records of Krishi Upaj Mandi Samiti . Mandor, Jodhpur, Rajasthan.

KUMS. (2009). *Arrivals and prices of cumin during the year 2008-09.* Records of Krishi Upaj Mandi Samiti . Mandor, Jodhpur, Rajasthan.

KUMS. (2010). *Arrivals and prices of cumin in during the year 2009-10*. Records of Krishi Upaj Mandi Samiti . Mandor, Jodhpur, Rajasthan.

Mishra, J.P., Vishwakarma, R.S., & Rawat, S.K. (1999). Production and marketing of chillies in Azamgerh, Basti and Gorakhpur district of Uttar Pradesh. *The Bihar Journal of Agricultural Marketing, 7* (2), 36-43.

Prasad, Y.E., Murthy E.S., & Satyanarayan, G., (1988). An analysis of arrivals and prices of turmeric in Guntur market. *Indian Journal of Agricultural Marketing, 3* (1), 34-37.

Singh, G., Chandaj, S.S., & Kataria, P. (2010). Studies on behaviour of arrivals and prices of green chillies in Punjab. *Indian Journal of Agricultural Marketing, 24* (1), 26-37.

Singh, N. (1999). *An economics analysis of production and marketing of cumin seed in Nagaur district of Rajasthan* (Unpublished PhD Thesis, pp. 154 - 164), Rajasthan Agricultural University, Bikaner, Campus- Jobner.

Spices Board India. (2009). Major state wise area and production of spices in India. Retrieved from http://www.indianspices.com/pdf/state_wise_production_2013.pdf

Vekariya, S.B., Khant, K.A., & Gajupara, H.M., (2006). Price behaviour of major vegetables in Gujarat state. *Indian Journal of Agricultural Marketing, 20* (1), 28-37.

Vijay, R. (1992). *Marketing of coriander in Kota district of Rajasthan* (Unpublished M. Sc Thesis, pp. 88-92). Rajasthan Agricultural University, Campus-Jobner.