BEHAVIOUR OF MARKET ARRIVALS AND PRICES OF PEARL MILLET IN RAJASTHAN

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The present study was devoted to an analysis of behaviour of market arrivals and prices of pearl millet in Rajasthan. In Nagaur market, the arrivals in the peak period were maximum during last 10 years (2000-01 to 2009-10). These were in the range of about 55.91 (2003-04) to 79.92 per cent (2008-09) of the total arrivals. In Jodhpur market, the arrivals of pearl millet followed more or less the same pattern as in Nagaur. In Jaipur market, the arrivals in peak period were maximum. The maximum arrivals were in the peak period followed by mid-period and lean period. The seasonal indices analysis of arrivals and prices revealed that when major portion of the produce was received in the market, the prices were at the lowest. The correlation between arrivals and price in Jodhpur market was positive and statistically significant. This positive and significant correlation coefficient could be attributed to the off-season supplies of pearl millet which fetch higher prices. Trend analysis of arrivals of pearl millet in the selected markets of the State shows that the trend values of arrivals in Jaipur, Jodhpur and Nagaur showed an increasing trend over the years.

Introduction

Pearl millet is one of the most extensively cultivated cereals in the world after rice, wheat, and sorghum, particularly in arid and semi-arid regions. However, pearl millet accounts for almost half of global millet production. Nearly 60 per cent of world millet area is in Africa. Asian countries occupy 35 per cent of world millet area. The developing countries in Asia and Africa contribute around 93 per cent of total millet production in the world. Asia alone contributes 43 per cent of world millet production. In Asia, millet is restricted almost exclusively to two countries viz. China and India, although Myanmar, Pakistan, and Nepal also produce small quantities. India is the largest producer of pearl millet, both in terms of area (9.1 m ha) and production (7.3

m t), with an average productivity of 780 kg/ha during the last five years. Rajasthan is a major producer of millet in the country. Out of 9.43 million hectares of pearl millet area in India, about 4.38 million hectares are cultivated in Rajasthan with 80 per cent of it being in western Rajasthan. It is a well known fact that Indian agriculture is characterised by wide variations in output of major crops which subsequently lead to wider fluctuation in market arrivals. The extent of fluctuations in market arrivals largely contributed to the price instability of major crops. In order to device the appropriate ways and means for not only reducing the degree of fluctuations in the prices of agricultural products but also increasing the quantity of market arrivals, there is need to have a perfect understanding about the behaviour of prices of

different agricultural products over a period of time. Marketing plays an important role in the economic development as it stimulates production, avoids unnecessary fluctuation in output and prices. The experience of many countries suggests that in the absence of an efficient marketing system strategy for agricultural development cannot go very far to stimulate production (Khalon and George, 1985). The information about behaviour of the price in-terms of price level, trend and fluctuations is the most important factor in determining competitiveness of the commodity in the domestic and international level to draw influence for future prices and to formulate the long-term strategy on trade (Chand Ramesh, 2002). The past trends in market arrivals of commodities are also useful in understanding the present and to forecast the future. Prices play a vital role in predominantly agricultural economies like India. Prices of farm products fluctuate more than that of industrial goods due to heavy dependence on natural factor. Hence, they have enormous human and political implications, especially in developing countries. Prices of farm goods affect income and living standards of farmers, rural labourers and the non-farming population. They also affect the prices of non-farm goods and foreign trade.

Methodology

For the present study, Jaipur, Jodhpur and Nagaur districts of Rajasthan were selected. These districts accounted for about 1.323 lakh hector of the total area and contribute about 0.539 lakh qtl to the pearl millet production in Rajasthan annually. Secondary data in respect of arrivals in different markets and wholesale prices of pearl millet prevailing in these markets were obtained from Directorate of Economics and Statistics, Government of Rajasthan, Jaipur. To study the relationship between market arrivals and wholesale prices of pearl millet in the selected districts, simple correlation coefficient was worked out using the following formula:

$$r = \frac{\sum (X_i - \overline{X}) \cdot (Y_i - \overline{Y})}{\sqrt{\sum (X_i - \overline{X})^2 \cdot \sum (Y_i - \overline{Y})^2}}$$

Where,

r = Simple correlation coefficient between arrivals and prices of pearl millet.

X_i = Quantity of arrivals of pearl millet in i^{th} month/year (quintals).

$\overline{X}$ = Mean quantity of arrivals of pearl millet (quintals).

Y_i = Price of pearl millet (₹/qtl) in i^{th} month / year.

$\overline{Y}$ = Mean value of prices of pearl millet (₹/qtl).

n = Number of observations.

The correlation between prices of pearl millet in different markets was worked out to study market integration.

Results

The seasonal production of pearl millet renders its arrivals in the market a seasonal phenomenon. After harvest, the market arrivals of pearl millet were invariably the highest in November in a single month although some stocks start arriving in late October. With a view to examining the marketing pattern of pearl millet, the crop year was split up into three periods viz., (i) Peak marketing period (September to December), (ii) Mid-marketing period (January to April) and (iii) Lean marketing period (May to August). Table 1 indicates that in Nagaur market, the arrivals in the peak period were the maximum during last 10 years (2000-01 to 2009-10). These were in the range of about 55.91 (2003-04) to 79.92 per cent (2008-09) of the total arrivals. In the lean period, arrivals ranged between 6.35 to 19.19 per cent.

Table 1: Per cent Arrivals and Prices (₹/Qtl) of Pearl Millet in Nagaur Market

Year	Arrivals in Peak Period (September-December)	Price (₹/Qtl.)	Arrivals in Mid-Period (January-April)	Price (₹/Qtl.)	Arrivals in Lean Period (May-August)	Price (₹/Qtl.)
2000-01	60.89	317.92	23.11	349.70	15.99	416.70
2001-02	54.10	480.00	37.59	500.00	8.31	565.00
2002-03	75.06	450.00	18.58	480.00	6.35	510.00
2003-04	55.91	490.00	24.90	500.00	19.19	520.00
2004-05	56.98	510.00	25.86	520.00	17.16	550.00
2005-06	64.11	680.00	26.26	710.00	9.64	750.00
2007-08	73.12	600.00	19.74	650.00	7.14	740.00
2008-09	79.92	710.00	11.50	725.00	8.58	750.00
2009-10	73.88	890.00	13.80	900.00	12.32	950.00

In Jodhpur market (Table 2), the arrivals of pearl millet followed more or less the same pattern as in Nagaur. The peak period arrivals ranged between 36.53 to 84.61 per cent. In the mid-period, it ranged from 10.26 to 37.97 per cent and in the lean period, the arrivals were in the range of 2.95 to 31.38 per cent.

Table 2: Per cent Arrivals and Prices (₹/Qtl) of Pearl Millet in Jodhpur Market

Year	Arrivals in Peak Period (September-December)	Price (₹/Qtl.)	Arrivals in Mid-Period (January-April)	Price (₹/Qtl.)	Arrivals in Lean Period (May-August)	Price (₹/Qtl.)
2000-01	84.61	400.00	10.26	544.00	5.13	600.00
2001-02	68.52	520.00	20.72	540.00	10.77	570.00
2002-03	68.27	499.98	28.78	594.04	2.95	600.00
2003-04	66.23	500.45	25.34	587.50	8.43	643.71
2004-05	40.70	418.75	34.72	555.35	24.58	668.47
2005-06	36.53	456.24	32.95	568.76	30.51	601.81
2007-08	43.80	483.74	37.97	543.74	18.23	660.26
2008-09	36.38	562.19	32.24	633.33	31.38	768.76
2009-10	51.09	575.00	26.15	642.32	22.74	783.33

Table 3 indicates that in Jaipur market the arrivals in peak period were maximum. These were in the range of 45.19 to 85.05 per cent of the total arrivals. The lean period arrivals varied between 3.69 to 11.89 per cent of the total arrivals in different years. The pattern of arrivals was almost the same in all the markets. The maximum arrivals were in the peak period followed by mid-period and lean period. In most of the years, the prices were higher in the mid-period and lean periods than that of peak period barring few exceptions.

Table 3: Per cent Arrivals and Prices (₹/Qtl) of Pearl Millet in Jaipur Market

Year	Arrivals in Peak Period (September-December)	Price (₹/Qtl.)	Arrivals in Mid-Period (January-April)	Price (₹/Qtl.)	Arrivals in Lean Period (May-August)	Price (₹/Qtl.)
2000-01	82.08	299.75	10.83	310.00	7.09	350.00
2001-02	45.19	450.00	44.39	480.00	10.42	510.00
2002-03	81.93	420.00	13.42	565.58	4.65	638.78
2003-04	64.37	470.85	26.12	569.27	9.51	635.40
2004-05	70.33	460.30	24.32	556.73	5.36	620.10
2005-06	85.05	446.52	11.26	560.44	3.69	638.04
2007-08	72.11	478.69	22.16	517.64	5.73	636.75
2008-09	73.42	476.00	14.69	610.94	11.89	728.55
2009-10	75.52	620.00	20.57	670.00	3.91	842.09

Seasonal Variations in Arrivals of Pearl Millet in Selected Markets

In order to ascertain the long run seasonal variation in the arrivals of pearl millet in the selected markets, seasonal indices for arrivals were calculated, by taking 12 months moving averages. The seasonal indices of monthly arrivals of pearl millet in the selected markets are presented in Table 4. The result clearly indicates the existence of seasonality in arrivals of pearl millet in all the markets. Highest arrival of pearl millet in Jaipur market was observed during the month of October (385). The range of arrivals was 19 to 256 during other months of the year. The higher market arrival indices (more than 100) in Jodhpur market was observed during the months of October, November, December and January and highest was observed in November (181). Arrivals reached the peak during November (221) in Nagaur market and decreased to 38 in August.

Table 4: Seasonal Indices of Arrivals of Pearl Millet in Different Markets

(Per cent)

| Month | Markets | | |
	Jaipur	Jodhpur	Nagaur
January	98	144	84
February	36	64	56
March	66	75	86
April	33	53	75
May	26	85	54
June	20	98	70
July	21	81	40
August	19	62	38
September	104	82	93
October	385	109	188
November	256	181	221
December	135	164	193

Seasonal Variations in Prices of Pearl Millet in Selected Markets

In order to analyse the long run seasonal variation in the prices of pearl millet in the selected markets, season indices for prices was computed by adopting 12 month moving average method. The seasonal indices of monthly prices of pearl millet in the selected markets are presented in Table 5. In all markets, the price was found to be high during the months when the arrivals were low and was low during the months of high arrivals. The higher seasonal price indices observed in Jaipur market were in the months of May, September and July and August with values of 132, 111, 104 and 104, respectively. Lower seasonal price indices were observed during the months of November. Jodhpur market witnessed the peak in seasonal price index during April. Nagaur market witnessed the highest seasonal price index in February (152). Large the seasonal index showed the stability during the remaining months of the year during the study period.

The variation in the price of pearl millet in the peak season and lean season in the selected markets does not appear to be significantly large because pearl millet is grown in rainfed conditions and it is staple food of the people in the study area. The farmers are not sure of next harvest because of climatic reasons. Therefore, they retain pearl millet for food security till they get the next harvest of pearl millet.

Relationship Between Market Arrivals and Prices

The degree of relationship between market arrivals and prices of pearl millet was studied by computing correlation coefficients. The results of correlation analysis, given in Table 11, reveal the negative correlation between prices and arrivals in Jaipur and Nagaur market. However, these correlation coefficients were statistically non-significant. However, in Jodhpur market, the correlation between arrivals and

Table 5: Seasonal Indices of Prices of Pearl Millet in Different Markets

(Per cent)

Month	Markets		
	Jaipur	Jodhpur	Nagaur
January	106	105	102
February	88	66	152
March	106	119	104
April	89	125	110
May	132	103	105
June	97	100	99
July	104	105	88
August	104	97	93
September	111	112	98
October	103	107	98
November	67	73	64
December	93	88	87

price was positive and statistically significant. This positive and significant correlation coefficient could be attributed to the off-season supplies of pearl millet which fetch higher prices.

Table 6: Prices and Arrivals Correlation of Pearl Millet in the Selected Markets

Market	Correlation
Jaipur	-0.028[NS]
Jodhpur	0.230*
Nagaur	-0.061 [NS]

*significant at 5 per cent level of significance.

Trends in Arrivals and Prices of Pearl Millet in the Selected Market

Trend analysis of arrivals of pearl millet in Jaipur, Jodhpur and Nagaur markets is presented in Table 7. The Table reveals that trend values of arrivals in Jaipur, Jodhpur and Nagaur showed an increasing trend over the year. However, the increasing trend in these markets was not statistically significant.

Table 7: Trends in Pearl Millet Arrivals

Name of the Market	Period	Form of Function	Equation Fitted
Jaipur	2001-2009	Linear	Y= 50699.20+39917.90t (92575.30)
Jodhpur	2001-2009	Linear	Y= 130896+1121.47t (81166.47)
Nagaur	2001-2009	Linear	Y= 52030.10+10034.20t (55325.31)

*Figures in parentheses are standard errors of regression coefficient.

The price trend equations were worked out for these markets and these equations are given in Table 8. For Jaipur, Jodhpur, Nagaur and Merta City markets, the trend in prices was positive and non-significant.

Table 8: Trends in Prices of Pearl Millet

Name of the Market	Period	Form of Function	Equation Fitted
Jaipur	2001-2009	Linear	Y= 316.60+49.76t (78.40)
Jodhpur	2001-2009	Linear	Y=409.30+52.51t (76.05)
Nagaur	2001-2009	Linear	Y= 359.36+55.11t (80.40)

*Figures in parentheses are standard errors of regression coefficient.

Market Integration

Market integration implies the relationship among the spatially separated markets. Markets differ in the extent of integration and, therefore, there may be a variation in their degree of efficiency. The extent by which prices of a commodity move together over a period of time in different markets located at varied distances from each other is an indicator of market integration for the commodity. In integrated marketing system, price of a commodity in one market is responsive to price change in another market and as such, price differences between the markets should not exceed the transportation and handling costs. The analysis of movement in prices of a commodity in different markets helps in ascertaining as to what extent the marketing system is efficient in respect of that commodity. The market integration was studied by making zero order correlation matrix. The correlation between prices of pearl millet in different markets was studied and is presented in Table 9. The Table reveals that prices of pearl millet in Jodhpur and Jaipur markets had high and significant correlation in prices (0.542).

Table 9: Correlation Between Prices of Pearl Millet in Different Markets

Market	Nagaur	Jodhpur	Jaipur
Nagaur	1	0.084	0.123
Jodhpur		1	0.542*
Jaipur			1

*Significant at 5 per cent level of significance.

Conclusion

The study reveals that during peak period, the prices of pearl millet are depressed. Therefore, government should enhance efforts in procurement of pearl millet at MSP in the peak period. Due to passage of Food Security Bill in Parliament, the government agency needs to procure pearl millet for its supply through PDS. Farmers should also avail of marketing loans to withhold their produce for sometime so that they can get remunerative price during mid-period and lean period. Credit facilities should also be given to farmers under Gramin Bhandaran Yojana to have scientific storage facilities at village level.

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