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Seasonal pattern and change in prices of soybean in Southern Rajasthan

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Abstract
The present investigation was conducted on seasonal Pattern of prices of soybean in selected district of Southern Rajasthan. For workout the Seasonal pattern, secondary data was collected from 2000 to 2014 from publish government sources. Four markets were selected from four selected district namely Pratapgarh, Chittorgarh, Bhilwara and Banswara. Pearson Correlation coefficient (r) was calculated between market arrivals and prices of soybean for different years. The correlation coefficient between monthly arrivals and prices of soybean were negative in all the markets. This reveals that prices of soybean are governed by factors such as presence of processing units and competition prevailing between purchasers etc. in addition to the arrival of the crop. Correlation coefficient for all the markets in the corresponding months were significant at 1 or 5 percent level of significance. Thus, monthly arrivals of soybean and wholesale prices were significantly and negatively correlated in the corresponding months. The pattern of prices of soybean in different seasons showed that farmers got maximum higher price by sale of soybean in lean season over the sale in peak season. Thus, the carrying of soybean to the mid and lean seasons of the year is advantageous for the producer farmers.

Keywords: Price, soybean, market, correlation and arrivals

Introduction
Soybean (*Lysine Max* L.) is one of the important oilseeds as well as a pulse crop. It belongs to family Leguminoseae, sub-family Papilionoideae and genus Glycine. It is mainly grow in Kharif season. Soybean reported to have originated in Eastern Asia or China has been over known for over 5000 years. Soybean contains good quality dietary fibre, which enables the human body to fight against diabetes (Anita *et al.* 2007). Rajasthan is at the third position in area and production of soybean. Rajasthan occupied an area of 1.17 million hectare with the production of 0.97 million tonnes during *kharif* 2014 and productivity was 829 kg ha^{-1} (Agricultural Statistics, 2014).

The arrivals of soybean in the market are not uniform throughout the year. Generally, arrivals are more in the production season in the producing areas and lesser in the other seasons. Its market arrivals and prices exhibit a seasonal pattern. The seasonality in production causes fluctuations in prices from season to season. The fluctuation in prices causes wide variation in the income of soybean growers from season to season and year to year. The objective of present study was to know whether variability in the prices of soybean has intensified over time. If yes, then what were the factors that explain these variations in the prices of the soybean? The study of relationship between market arrivals and prices helps to know the effect of market arrivals on prices of soybean in different seasons of the year. Such a study is useful for the Government in regulating the available supplies, stabilizing the prices of soybean and bringing the stability in the income of soybean growers.

Methodology
The present investigation is based on soybean which is major oilseed crop cultivated in Southern Rajasthan. Southern Rajasthan has seven districts. Four districts out of these selected purposively based on highest area under soybean crop. One regulated market from each district of selected region having the highest arrivals of soybean selected for the study. These markets were Pratapgarh, Nimbahera, Bhilwara and Banswara. Secondary data on monthly arrivals and prices of soybean in Southern Rajasthan were collected from the year 2000 to 2014, from the published records and reports of the Directorate of Economics and Statistics (DES), Directorate of Agriculture (DOA) and Rajasthan State Agricultural Marketing Board (RSAMB) Government of Rajasthan. Time series data on monthly arrivals and wholesale prices of soybean obtained from the offices of the respective regulated markets.

Relationship between market arrivals and prices

1. Monthly and yearly pattern of market arrivals and prices of soybean in selected Krishi Upaj Mandi Samitis were analyzed for the period 2000-01 to 2014-15.
2. Pearson Correlation coefficient (r) was calculated between market arrivals and prices of soybean for different years using the following formula.

$$r = \frac{\sum(Xi - \overline{X}).(Yi - \overline{Y})}{\sqrt{\sum(Xi - \overline{X})^2 . \sum(Yi - \overline{Y})^2}}$$

$$S.E.(r) = \sqrt{\frac{1 - r^2}{n - 2}}$$

For testing the significance of value of correlation coefficient, t test was used at n-2 degree of freedom.

$$t_{n-2} = \frac{r}{S.E.(r)}$$

Where,

$S.E.(r)$ = Standard error of correlation coefficient

r = Pearson correlation coefficient between arrivals and prices of soybean

$\underline{X_i}$ = Quantity of arrivals in i^{th} month /year, where i = 1…….n

$\overline{X}$ = Mean value of quantity of arrivals

$\underline{Y_i}$ = Price of soybean per quintal in i^{th} month / year

$\overline{Y}$ = Mean value of prices of soybean

n = Number of observations

t = t statistic

Results and Discussion

Seasonal pattern in prices of soybean in pratapgarh market

The average seasonal prices and the percentage change over the seasons in Pratapgarh market is presented in Table 1. According to Solanke *et al.* (2003) [7] Overall, prices were higher in the mid season over the peak season by 5.02 per cent. Prices were higher in the lean season over the mid season by only 2.53 per cent. Over all prices were higher in the lean season over the peak season by 7.69 per cent.

Table 1: Pattern of Prices of Soybean in Different Season of the Year during 2000 to 2014 in Pratapgarh Market (Rs/Quintal)

Year	Peak Season (October-January)	Mid season (February- May)	Change in price in Mid season over peak season	Lean season (June-September)	Change in price in Lean season over Mid season	Change in price in Lean season over Peak season
2000-01	944	865	-8.32	951	9.91	0.76
2001-02	950	970	2.15	1010	4.12	6.37
2002-03	1193	1048	-12.13	1297	23.74	8.72
2003-04	1325	1442	8.84	1220	-15.40	-7.92
2004-05	1270	1663	30.90	1669	0.39	31.41
2005-06	1105	1214	9.86	1195	-1.54	8.61
2006-07	1202	1143	-4.86	1148	0.37	-4.51
2007-08	1587	1401	-11.69	1461	4.22	-7.96
2008-09	1730	2100	21.38	2315	10.21	33.78
2009-10	2208	2338	5.85	2138	-8.55	0.19
2010-11	2122	1924	-9.30	1889	-1.85	-10.99
2011-12	2123	2216	4.34	2144	-3.24	0.74
2012-13	2937	2841	-3.26	3933	38.46	33.93
2013-14	3438	3576	4.00	3439	-3.81	0.04
2014-15	3247	4015	23.65	3678	-8.40	13.26
Average	1825	1917	(5.02)	1966	(2.53)	7.69

Seasonal pattern in prices of soybean in nimbahera market

The average seasonal prices and the percentage change over the seasons in Nimbahera market are presented in Table 2. Overall, prices were higher in the mid season over the peak season by 7.91 per cent. Overall, prices were higher in the lean season over the mid season by only 2.03 per cent. Over all prices were higher in the lean season over the peak season by 10.11 per cent.

Table 2: Pattern of Prices of Soybean in Different Season of the Year during 2000 to 2014 in Nimbahera Market (Rs/Quintal)

Year	Peak Season (October-January)	Mid season (February-May)	Change in Price in Mid Season over Peak Season	Lean season (June-September)	Change in Price in Lean Season over Mid Season	Change in Price in Lean Season over Peak Season
2000-01	871	850	-2.40	974	14.57	11.82
2001-02	934	996	6.71	1025	2.88	9.80
2002-03	1153	1039	-9.88	1148	10.57	-0.36
2003-04	1348	1498	11.08	1288	-14.04	-4.52
2004-065	1282	1619	26.29	1668	3.05	30.15
2005-06	1124	1228	9.24	1197	-2.55	6.46
2006-07	1229	1152	-6.23	1260	9.34	2.53
2007-08	1650	1395	-15.45	1466	5.12	-11.12
2008-09	1762	2106	19.52	2401	14.02	36.29
2009-10	2230	2350	5.36	2120	-9.78	-4.94
2010-11	2174	2068	-4.91	1909	-7.67	-12.21
2011-12	2141	2160	0.86	2153	-0.30	0.56
2012-13	2797	2733	-2.31	3630	32.84	29.77

2013-14	3032	3480	14.74	3332	-4.23	9.89
2014-15	2947	4113	39.54	3800	-7.60	28.92
Average	1778	1919	7.91	1958	2.03	10.11

Seasonal pattern in prices of soybean in bhilwara market

The average seasonal prices and the percentage change over the seasons in Bhilwara market are presented in Table 3. Overall, prices were higher in the mid season over the peak season by 5.53 per cent. Overall, prices were higher in the lean season over the mid season by only 2.64 per cent. Over all prices were higher in the lean season over the peak season by 8.33 per cent.

Table 3: Pattern of Prices of Soybean in Different Season of the Year during 2000 to 2014 in Bhilwara Market (Rs/Quintal)

Year	Peak Season (October-January)	Mid season (February-May)	Change in Price in Mid Season over Peak Season	Lean season (June-September)	Change in Price in Lean Season over Mid Season	Change in Price in Lean Season over Peak Season
2000-01	819	844	3.06	944	11.84	14.66
2001-02	872	873	0.09	1013	16.01	16.12
2002-03	1059	981	-7.34	1175	19.74	10.94
2003-04	1200	1321	10.09	1306	-1.11	8.86
2004-05	1243	1503	20.98	1554	3.40	25.09
2005-06	1055	1191	12.83	1149	-3.47	8.91
2006-07	1186	1102	-7.07	1164	5.56	-1.90
2007-08	1275	1346	5.55	1325	-1.57	3.89
2008-09	1678	1966	17.17	2169	10.33	29.28
2009-10	2055	2050	-0.24	1900	-7.29	-7.52
2010-11	2001	1855	-7.29	1799	-2.99	10.07
2011-12	1994	2144	7.49	1978	-7.75	-0.83
2012-13	2789	2888	3.55	3039	5.23	8.96
2013-14	3397	3429	0.94	3418	-0.31	0.64
2014-15	2984	3532	18.35	3806	7.75	27.52
Average	1707	1802	5.53	1849	2.64	8.33

Seasonal pattern in prices of soybean in banswara market

The average seasonal prices of soybean and the percentage change over the seasons in Banswara market are presented in Table 4. Overall, prices were higher in the mid season over the peak season by 5.02 per cent. Overall, prices were higher in the lean season over the mid season by only 4.31 per cent. Over all prices were higher in the lean season over the peak season by 9.56 per cent.

Table 4: Pattern of Prices of Soybean in Different Season of the Year during 2000-01 to 2014-2015 in Banswara Market (Rs/Quintal)

Year	Peak Season (October-January)	Mid season (February-May)	Change in Price in Mid Season over Peak Season	Lean Season (June-September)	Change in Price in Lean Season over Mid Season	Change in Price in Lean Season over Peak Season
2000-01	910	905	-0.58	914	1.03	0.45
2001-02	942	934	-0.81	957	2.50	1.67
2002-03	1200	975	-18.78	1236	26.86	3.02
2003-04	1281	1372	7.13	1259	-8.24	-1.69
2004-05	1369	1515	10.67	1578	4.17	15.28
2005-06	1318	1230	-6.71	1312	6.68	-0.47
2006-07	1298	1203	-7.34	1319	9.63	1.59
2007-08	1452	1355	-6.67	1411	4.15	-2.80
2008-09	1680	1961	16.74	2201	12.26	31.05
2009-10	2094	2130	1.72	2084	-2.16	-0.47
2010-11	1978	1936	-2.14	2005	3.59	1.36
2011-12	1991	2360	18.51	2311	-2.08	16.04
2012-13	2845	2678	-5.88	3574	33.47	25.62
2013-14	3150	3569	13.31	3461	-3.02	9.88
2014-15	3139	3863	23.06	3570	-7.58	13.73
Average	1776	1866	5.02	1946	4.32	9.56

Relationship between monthly arrivals and wholesale prices of soybean

The correlation coefficients were worked out firstly between wholesale prices and arrivals of the soybean in the corresponding months and secondly between wholesale prices and arrivals of the soybean in the subsequent months. The correlation coefficients between average wholesale prices and market arrivals in the corresponding months and also between the prices and arrivals in the subsequent months has been presented in Table 5.

The value of correlation coefficient between monthly wholesale prices and arrivals of soybean in Pratapgarh, Nimbahera, Bhilwara and Banswara markets in the corresponding months were -0.54, -0.68, -0.71, -0.57 and in the subsequent months were -0.38, -0.70, -0.74, -0.47, respectively.

Correlation coefficient for all the markets in the corresponding months were significant at 1 or 5 percent, Thus, monthly arrivals of soybean and wholesale prices of it were significantly and negatively correlated in the corresponding months. When we compare the monthly

arrivals and wholesale prices in subsequent months, then the relationship found significant only in Nimbahera and Bhilwara markets.

Table 5: Correlation Co-efficient Between Monthly Arrivals and Wholesale Prices of Soybean in Selected Markets: during 2000 to 2014

S. No	Particulars	Correlation Co-efficient (r)			
		Pratapgarh	Nimbhara	Bhilwara	Banswara
1	Correlation co-efficient between wholesale prices and monthly arrivals of soybean in the corresponding months	-0.54*	-0.68**	-0.71**	-0.57*
2	Correlation co-efficient between wholesale prices and monthly arrivals of soybean in the subsequent months	-0.38 NS	-0.70**	-0.74**	-0.47 NS

** Correlation is significant at the 0.01 level
* Correlation is significant at the 0.05 level
NS – Non-significant

Figures

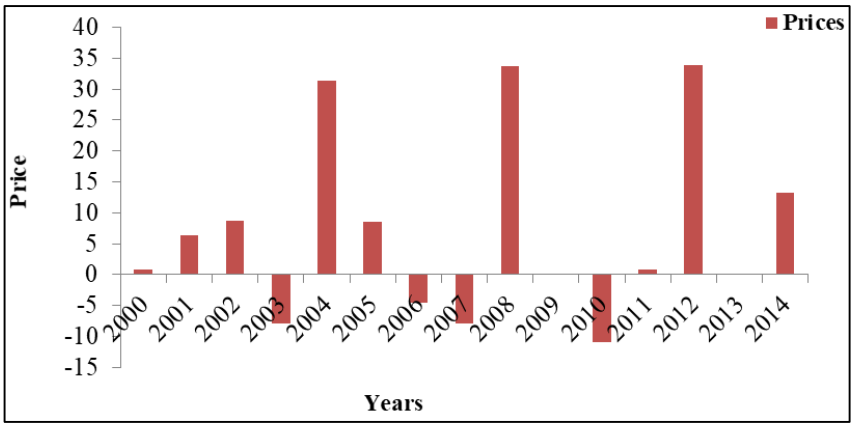

Fig. 1: Change in Price of soybean in lean season over peak season in pratapgarh market during 2000 to 2014

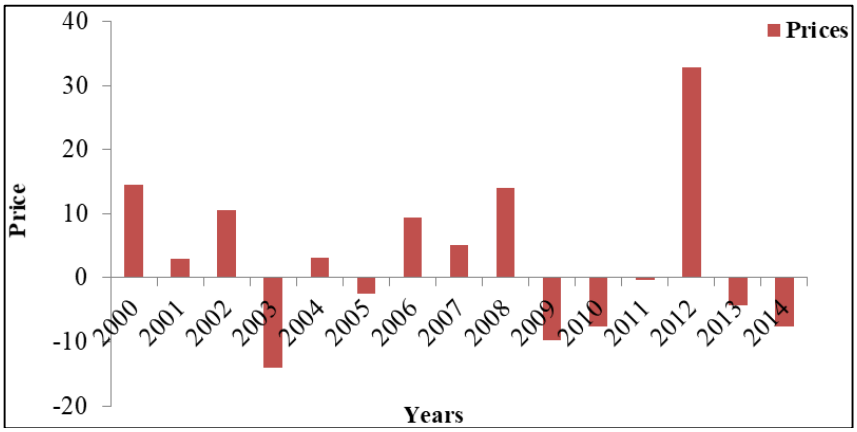

Fig 2: Change in Price of Soybean in Lean Season over Mid Season in Nimbahera Market 2000 t0 2014

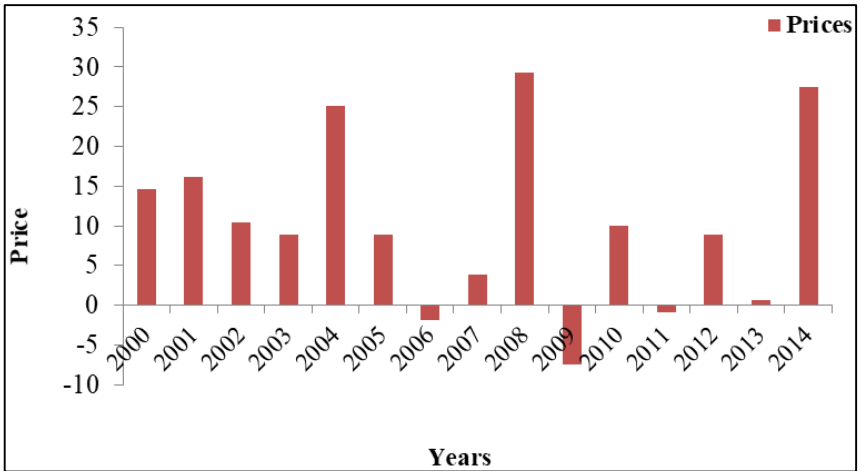

Fig 3: Change in Price of Soybean in Lean Season Over Peak Season in Bhilwara Market 2000 to 2014

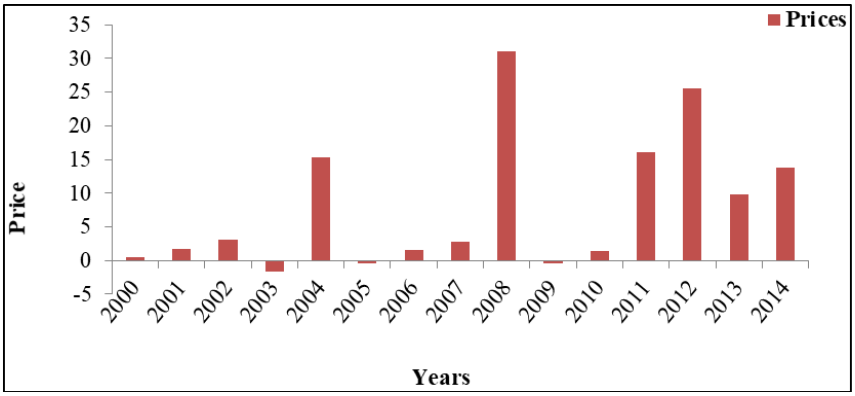

Fig 4: Change in Price of Soybean in Lean Season Over Peak Season in Banswara Market during 2000 to 2014

Conclusions

The pattern of prices of soybean in different seasons showed that farmers got maximum higher price by sale of soybean in lean season over the sale in peak season. Thus, the carrying of soybean to the mid and lean seasons of the year is advantageous for the producer farmers. Wholesale prices of corresponding month was more closely related to soybean market arrivals than the wholesale prices of subsequent months. The correlation coefficient between monthly arrivals and prices of soybean were negative in all the markets.

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