

## Original Research Article

# Seasonal Pattern and Comparative Study of Market Arrivals of Soybean Crop in Southern Rajasthan, India

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## ABSTRACT

The present investigation was conducted on seasonal pattern of market arrivals of soybean in selected district of Southern Rajasthan. For work out 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. When we compare the monthly arrivals and wholesale prices in subsequent months, then the relationship found significantly only in Nimbahera and Bhilwara markets. The pattern of arrivals of soybean in different seasons indicated that more than 70 per cent of the total arrivals of soybean were found in the peak season i.e. immediately after harvest. Market arrivals decreased subsequently in mid and lean seasons of the year.

### Keywords

Arrivals, Market, Seasonal, Prices and correlation

## Introduction

Soybean (*Lysine Max L.*) is one of the important oilseeds as well as a pulse crop. It belongs to family Leguminosae, 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<sup>-1</sup> (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.

### Materials and Methods

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

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.

Pearson Correlation coefficient (r) was calculated between market arrivals and prices of soybean for different years using the following formula.

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

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

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

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

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

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

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

n = Number of observations

t = t statistic

## **Results and Discussion**

### **Seasonal Pattern of Arrivals of Soybean in Pratapgarh Market**

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing seasons during the study period from 2000 to 2014 in Pratapgarh market are presented in Table 1 and graph is depicted in Fig. 1. The pattern of arrivals of soybean in different seasons indicated that about 77.28 per cent of the total arrivals were in the peak season i.e. immediately after the harvest of the crop within a period of 4 months. Arrivals decreased in the subsequent season's viz., in mid and lean season.

### **Seasonal Pattern of Arrivals of Soybean in Nimbahera Market**

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing season during the study period from 2000 to 2014 in Nimbahera market is presented in Table 2 and graph is depicted in Fig. 2. The pattern of arrivals of soybean in different seasons indicated that on an average about 69.47 per cent of the total arrivals were in the peak season i.e. immediately after the harvest of the crop within a period of 4 months. Arrivals decreased in the subsequent season's viz., in mid (16.10%) and lean seasons (14.43%).

### **Seasonal Pattern of Arrivals of Soybean in Bhilwara Market**

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing seasons during the study period from 2000 to 2014 in Bhilwara market is

given in Table 3 and graph is depicted in Fig. 3. The pattern of arrivals of soybean in different season in Bhilwara market indicated that about 77.25 per cent of the total arrivals were in the peak season i.e. immediately after the harvest of the crop within a period of 4 months. Arrivals decreased in the subsequent seasons viz., in mid (13.6%) and lean seasons (9.15).

### **Seasonal Pattern of Arrivals of Soybean in Banswara Market**

The arrivals of soybean in different seasons of the year viz., peak, mid and lean marketing seasons during the study period from 2000 to 2014 in Banswara market are depicted in Table 4 and graph is depicted in Fig. 4. The pattern of arrivals of soybean in different seasons indicated that about 80.41 per cent of the total arrivals were in the peak season and decreased in the subsequent season's viz., in mid and lean seasons.

### **Comparative Study of Total Arrivals of Soybean in Each Season in Selected Markets during 2000 to 2014**

Season wise total arrivals of soybean in all markets are presented in Table 5. It was observed that in peak season, total arrivals were maximum in Banswara market (80.41 percent) and minimum arrivals occurred in Nimbahera market (69.47 percent).

In case of Banswara market data showed the distress sale by soybean producers due to many reasons. This area comes under the tribes area and situation of farmers is not good on the basis of financial condition, awareness about storage facility and knowledge of market i.e. prices. Nimbahera market area farmer's condition is better than others in case of all situations i.e. price, knowledge, financial condition, awareness and storage facility.

**Table.1** Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2000 to 2014 in Pratapgarh Market

(Quintals)

| <b>Year</b>  | <b>Peak Season<br/>(October –<br/>January)</b> | <b>Mid-season<br/>(February-<br/>May)</b> | <b>Lean Season<br/>(June –<br/>September)</b> | <b>Total</b>             |
|--------------|--|---|---|--------------------------|
| 2000-01      | 144575<br>(81.05)                              | 16368<br>(9.18)                           | 17431<br>(9.77)                               | 178374<br>(100)          |
| 2001-02      | 173899<br>(79.16)                              | 29502<br>(13.43)                          | 16270<br>(7.41)                               | 219671<br>(100)          |
| 2002-03      | 122286<br>(90.31)                              | 6539<br>(4.83)                            | 6580<br>(4.86)                                | 135405<br>(100)          |
| 2003-04      | 231426<br>(92.18)                              | 13098<br>(5.22)                           | 6541<br>(2.61)                                | 251065<br>(100)          |
| 2004-05      | 152363<br>(94.77)                              | 3662<br>(2.28)                            | 4754<br>(2.96)                                | 160779<br>(100)          |
| 2005-06      | 135874<br>(82.47)                              | 13794<br>(8.37)                           | 15088<br>(9.16)                               | 164756<br>(100)          |
| 2006-07      | 99099<br>(75.88)                               | 15594<br>(11.94)                          | 15905<br>(12.18)                              | 130598<br>(100)          |
| 2007-08      | 204359<br>(89.44)                              | 13707<br>(6.00)                           | 10425<br>(4.56)                               | 228491<br>(100)          |
| 2008-09      | 199519<br>(79.86)                              | 25630<br>(10.26)                          | 24698<br>(9.89)                               | 249847<br>(100)          |
| 2009-10      | 328352<br>(72.79)                              | 53739<br>(11.91)                          | 69011<br>(15.30)                              | 451102<br>(100)          |
| 2010-11      | 195011<br>(64.49)                              | 82993<br>(27.44)                          | 24396<br>(8.07)                               | 302400<br>(100)          |
| 2011-12      | 280450<br>(77.71)                              | 47480<br>(13.16)                          | 32944<br>(9.13)                               | 360874<br>(100)          |
| 2012-13      | 230618<br>(69.86)                              | 58911<br>(17.85)                          | 40579<br>(12.29)                              | 330108<br>(100)          |
| 2013-14      | 219286<br>(63.88)                              | 76102<br>(22.17)                          | 47896<br>(13.95)                              | 343284<br>(100)          |
| 2014-15      | 252323<br>(75.14)                              | 34703<br>(10.33)                          | 48779<br>(14.53)                              | 335805<br>(100)          |
| <b>Total</b> | <b>2969440<br/>(77.28)</b>                     | <b>491822<br/>(12.80)</b>                 | <b>381297<br/>(9.92)</b>                      | <b>3842559<br/>(100)</b> |

**Table.2** Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2000 to 2014 in Nimbaheera Market

| Years        |                                      |                              |                                  | (Quintals)               |
|--------------|--------------------------------------|------------------------------|----------------------------------|--------------------------|
|              | Peak Season<br>(October-<br>January) | Mid-Season<br>(February-May) | Lean Season (June-<br>September) | Total                    |
| 2000-01      | 110128<br>(68.16)                    | 44829<br>(27.74)             | 6619<br>(4.10)                   | 161576<br>(100)          |
| 2001-02      | 57433<br>(75.15)                     | 6329<br>(8.28)               | 12658<br>(16.56)                 | 76420<br>(100)           |
| 2002-03      | 45769<br>(82.27)                     | 4547<br>(8.17)               | 5316<br>(9.56)                   | 55632<br>(100)           |
| 2004-05      | 88773<br>(92.84)                     | 3487<br>(3.65)               | 3364<br>(3.52)                   | 95624<br>(100)           |
| 2005-06      | 128477<br>(75.21)                    | 16027<br>(9.38)              | 26316<br>(15.41)                 | 170820<br>(100)          |
| 2006-07      | 105131<br>(64.60)                    | 24092<br>(14.80)             | 33517<br>(20.60)                 | 162740<br>(100)          |
| 2007-08      | 202290<br>(71.19)                    | 39028<br>(13.73)             | 42853<br>(15.08)                 | 284171<br>(100)          |
| 2008-09      | 304928<br>(69.27)                    | 101641<br>(23.09)            | 33657<br>(7.65)                  | 440226<br>(100)          |
| 2009-10      | 283722<br>(72.31)                    | 83021<br>(21.16)             | 25609<br>(6.53)                  | 392352<br>(100)          |
| 2010-11      | 316422<br>(58.55)                    | 13765<br>(2.55)              | 210219<br>(38.90)                | 540406<br>(100)          |
| 2011-12      | 342446<br>(78.73)                    | 29807<br>(6.85)              | 62696<br>(14.41)                 | 434949<br>(100)          |
| 2012-13      | 310478<br>(70.81)                    | 92998<br>(21.21)             | 35002<br>(7.98)                  | 438478<br>(100)          |
| 2013-14      | 294820<br>(63.07)                    | 122281<br>(26.16)            | 50345<br>(10.77)                 | 467446<br>(100)          |
| 2014-15      | 293646<br>(62.91)                    | 106954<br>(22.91)            | 66199<br>(14.18)                 | 466799<br>(100)          |
| <b>Total</b> | <b>3001236<br/>(69.47)</b>           | <b>695545<br/>(16.10)</b>    | <b>623165<br/>(14.43)</b>        | <b>4319946<br/>(100)</b> |

Figures in parentheses are percentages of row total

**Table.3** Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2000 to 2014 in Bhilwara Market

| Years        |                                      |                              |                                  | (Quintals)             |
|--------------|--------------------------------------|------------------------------|----------------------------------|------------------------|
|              | Peak Season<br>(October-<br>January) | Mid-Season<br>(February-may) | Lean Season (June-<br>September) | Total                  |
| 2000-01      | 687<br>(65.30)                       | 152<br>(14.45)               | 213<br>(20.25)                   | 1052<br>(100)          |
| 2001-02      | 861<br>(67.64)                       | 165<br>(12.96)               | 247<br>(19.40)                   | 1273<br>(100)          |
| 2002-03      | 632<br>(60.83)                       | 228<br>(21.94)               | 179<br>(17.23)                   | 1039<br>(100)          |
| 2003-04      | 2962<br>(61.77)                      | 1419<br>(29.59)              | 414<br>(8.63)                    | 4795<br>(100)          |
| 2004-05      | 156<br>(53.24)                       | 114<br>(38.91)               | 23<br>(7.85)                     | 293<br>(100)           |
| 2005-06      | 12515<br>(94.95)                     | 254<br>(1.93)                | 412<br>(3.13)                    | 13181<br>(100)         |
| 2006-07      | 8435<br>(69.41)                      | 2218<br>(18.25)              | 1500<br>(12.34)                  | 12153<br>(100)         |
| 2007-08      | 1988<br>(77.08)                      | 245<br>(9.50)                | 346<br>(13.42)                   | 2579<br>(100)          |
| 2008-09      | 1522<br>(70.63)                      | 469<br>(21.76)               | 164<br>(7.61)                    | 2155<br>(100)          |
| 2009-10      | 593<br>(72.14)                       | 182<br>(22.14)               | 47<br>(5.72)                     | 822<br>(100)           |
| 2010-11      | 1095<br>(89.98)                      | 57<br>(4.68)                 | 65<br>(5.34)                     | 1217<br>(100)          |
| 2011-12      | 654<br>(72.35)                       | 131<br>(14.49)               | 119<br>(13.16)                   | 904<br>(100)           |
| 2012-13      | 521<br>(89.83)                       | 42<br>(7.24)                 | 17<br>(2.93)                     | 580<br>(100)           |
| 2013-14      | 193<br>(43.08)                       | 187<br>(41.74)               | 68<br>(15.18)                    | 448<br>(100)           |
| 2014-15      | 1255<br>(78.00)                      | 131<br>(8.14)                | 223<br>(13.86)                   | 1609<br>(100)          |
| <b>Total</b> | <b>34069<br/>(77.25)</b>             | <b>5994<br/>(13.60)</b>      | <b>4037<br/>(9.15)</b>           | <b>44100<br/>(100)</b> |

Figures in parentheses are percentages of row total

**Table.4** Pattern of Market Arrival of Soybean in Different Seasons of the Year during 2000 to 2014 in Banswara Market

| Years        | Peak Season (October-January)  | Mid-Season (February-May)      | Lean Season (June-September) | Total                        |
|--------------|--------------------------------|--------------------------------|------------------------------|------------------------------|
| 2000-01      | 1106<br>(71.40)                | 337<br>(21.76)                 | 106<br>(6.84)                | 1549<br>(100)                |
| 2001-02      | 1620<br>(73.67)                | 349<br>(15.87)                 | 230<br>(10.46)               | 2199<br>(100)                |
| 2002-03      | 1719<br>(74.58)                | 396<br>(17.18)                 | 190<br>(8.24)                | 2305<br>(100)                |
| 2003-04      | 1590<br>(69.25)                | 490<br>(21.34)                 | 216<br>(9.41)                | 2296<br>(100)                |
| 2004-05      | 1014<br>(50.98)                | 762<br>(38.31)                 | 213<br>(10.71)               | 1989<br>(100)                |
| 2005-06      | 1334<br>(69.48)                | 329<br>(17.14)                 | 257<br>(13.39)               | 1920<br>(100)                |
| 2006-07      | 1536<br>(67.34)                | 439<br>(19.25)                 | 306<br>(13.42)               | 2281<br>(100)                |
| 2007-08      | 3398<br>(65.25)                | 1253<br>(24.06)                | 557<br>(10.70)               | 5208<br>(100)                |
| 2008-09      | 14214<br>(78.48)               | 2731<br>(15.08)                | 1166<br>(6.44)               | 18111<br>(100)               |
| 2009-10      | 5704<br>(73.26)                | 1693<br>(21.74)                | 389<br>(5.00)                | 7786<br>(100)                |
| 2010-11      | 6701<br>(89.29)                | 285<br>(3.80)                  | 519<br>(6.92)                | 7505<br>(100)                |
| 2011-12      | 3096<br>(87.41)                | 155<br>(4.38)                  | 291<br>(8.22)                | 3542<br>(100)                |
| 2012-13      | 1270<br>(80.99)                | 72<br>(4.59)                   | 226<br>(14.41)               | 1568<br>(100)                |
| 2013-14      | 14730<br>(91.54)               | 575<br>(3.57)                  | 786<br>(4.88)                | 16091<br>(100)               |
| 2014-15      | 10087<br>(86.87)               | 499<br>(4.30)                  | 1026<br>(8.84)               | 11612<br>(100)               |
| <b>Total</b> | <b>69119</b><br><b>(80.41)</b> | <b>10365</b><br><b>(12.06)</b> | <b>6478</b><br><b>(7.53)</b> | <b>85962</b><br><b>(100)</b> |

Figures in parentheses are percentages of row total

**Table.5** Comparative Study of Market Arrivals of Soybean in Each Season in Selected Markets

| Regulated Markets | Peak season        | Mid-season        | Lean season       | Total            |
|-------------------|--------------------|-------------------|-------------------|------------------|
| Pratapgarh        | 2969440<br>(77.28) | 491822<br>(12.80) | 381297<br>(9.92)  | 3842559<br>(100) |
| Nimbahera         | 3001236<br>(69.47) | 695545<br>(16.10) | 623165<br>(14.43) | 4319946<br>(100) |
| Bhilwara          | 34069<br>(77.25)   | 5994<br>(13.60)   | 4037<br>(9.15)    | 44100<br>(100)   |
| Banswara          | 69119<br>(80.41)   | 10365<br>(12.06)  | 6478<br>(7.53)    | 85962<br>(100)   |

Figures in parentheses are percentages of row total

**Table.6** Correlation Co-efficient Between Monthly Arrivals and Wholesale Prices of Soybean in Selected Markets: during 2000 to 2014

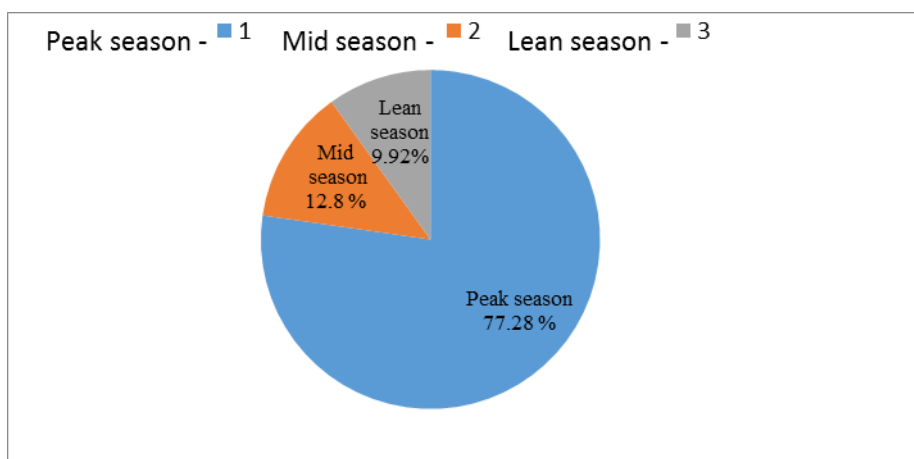
| S. No. | Particulars   | Correlation Co-efficient (r) |          |          |          |
|--------|---|------------------------------|----------|----------|----------|
|        |   | Pratapgarh                   | Nimbhara | Bhilwara | Banswara |
| 1      | Correlation co-efficient between wholesale 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

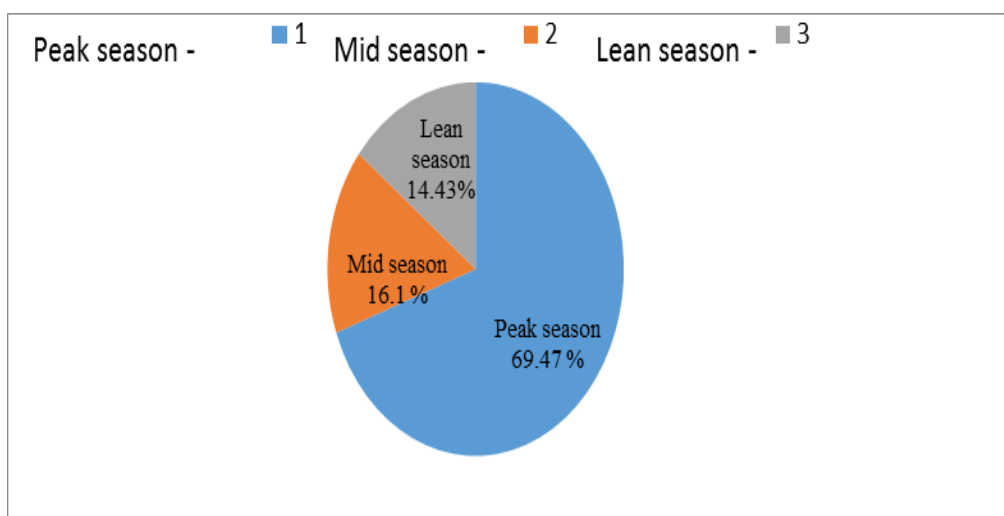
\* Correlation is significant at the 0.05 level

NS – Non-significant

**Fig.1** Overall Arrivals of Soybean in Different Seasons in Pratapgarh Market during 2000 to 2014

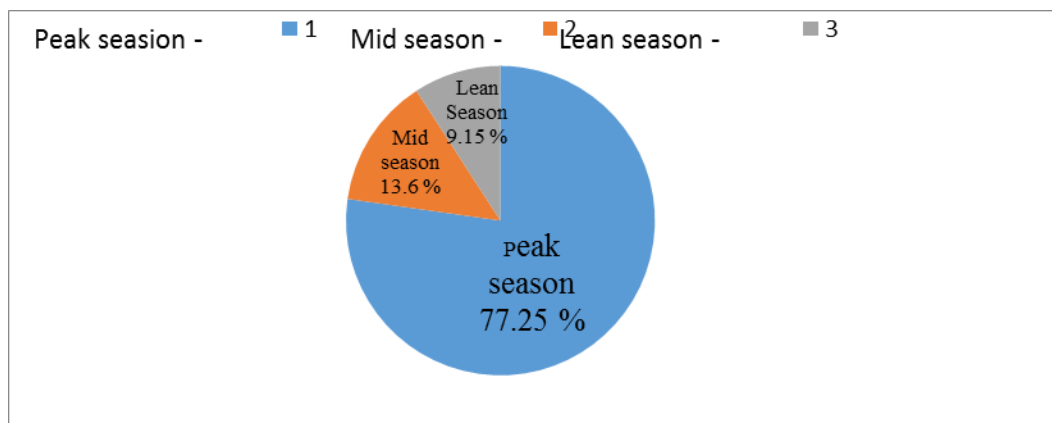


**Fig.2** Overall Arrivals of Soybean in Different Seasons in Nimbahera Market during 2000 to 2014

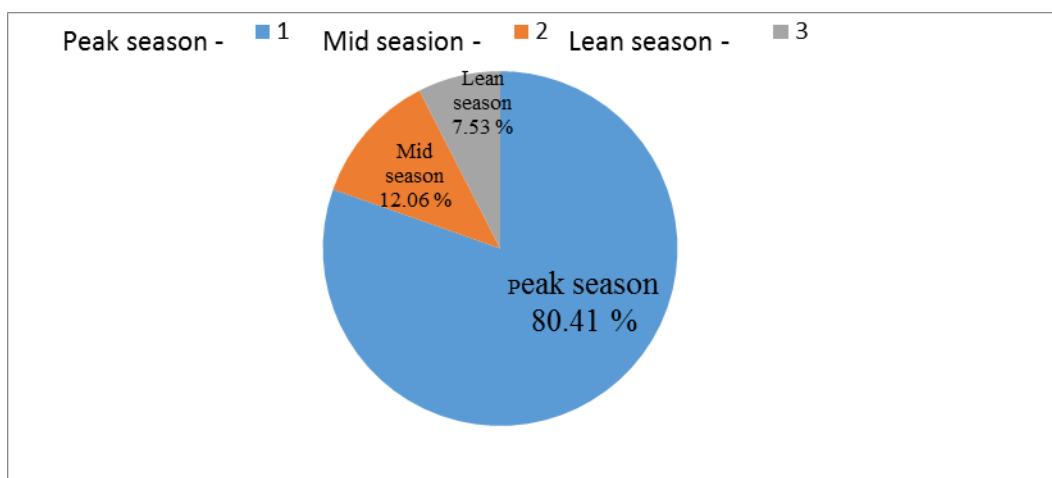




**Fig.3** Overall Arrivals of Soybean in Different Seasons in Bhilwara Market during 2000 to 2014



**Fig.4** Overall Arrivals of Soybean in Different Seasons in Banswara Market during 2000 to 2014



**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 6. 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.

A clear seasonal pattern in arrivals of soybean was observed. The highest arrivals were in peak season (October-January) and after that, there was subsequent decrease in arrivals. The reason for low market arrivals in mid and lean season was because of lack of proper storage facility with the farmers. The correlation coefficient between monthly arrivals and prices of soybean were negative in all the markets. Wholesale prices of corresponding month was more closely related to soybean market arrivals than the wholesale prices of subsequent months.

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