

An Analysis of Price Behavior of Cotton in Andhra Pradesh

Manne Sri Sandhya^{*1}, P. K. Awasthi² and Shruti Mishra³

Received: 13 Oct 2020 | Revised accepted: 31 Dec 2020 | Published online: 06 Jan 2021

© CARAS (Centre for Advanced Research in Agricultural Sciences) 2021

ABSTRACT

An attempt was made to analyze the price behavior of cotton in Andhra Pradesh, India. The results revealed that in long run all the markets showed an increasing trend in the arrivals and slight decrease in price trend in different markets. The highest increase in market arrivals was of Guntur followed by Kurnool, Prakasam and Krishna markets. The highest increase in price was observed in Kurnool with Rs. 2491.3 per quintal while lowest observed in Guntur followed by Krishna. Peak period of arrivals was observed in January and October in Kurnool and Krishna markets respectively and low during August and February respectively but in Guntur and Prakasam markets it was found in January and the lowest arrivals in August and July respectively whereas cotton prices peaks in the off season. The peak prices were observed during July to September in Kurnool, Krishna and Guntur markets and April and May in Prakasam district. The lowest price was during November and December in maximum of the markets. The month-wise correlation co-efficient between arrivals and prices in cotton was observed positive in all the months in Kurnool market and Krishna market but in Guntur all the months show negative correlation. Prakasam market shows negative correlation in November and other months observed positive.

Key words: Price behaviour, Correlation co-efficient, Trend, Peak arrivals, Off season, Trend

Cotton is one of an important cash crop among the major commercial crops grown in India as well as in Andhra Pradesh. India is the third largest cotton producer in the world followed by China and the United States, accounting for about 25 per cent of the world acreage but only 14 per cent of world production [1]. About seventy percent of the world's cotton requirements come from main four countries including India (twenty two percent). India is a major exporter of cotton. It is second only to the United States of America in terms of export volume and value [2]. The crop is subject to high production and price risks originating from weather vagaries [3]. This study will be helpful in formulating appropriate policy measures to contain both over production as well as forecasting of the remunerative prices for the commodity. The seasonal fluctuations are regularly recurring pattern that are completed once in twelve months. Such seasonality is seen in the arrivals as well as in the prices of farm products [4]. The study is significant as to guide the consumer to purchase his needs at the right time. It also helps the Government to operate its policy measures (procurement and buffer release) at the appropriate time. The trends in arrivals and prices are the changes over years which are associated with changes in technology of production, input supply and infrastructure [5]. The trends of prices are often associated with increase in population, money supply, increased purchasing power and

generally with inflation or deflation in the economy. The study of trends enables us to indicate the general direction of change in arrivals and prices in different markets. Cotton is one of the major commercial crops where 70 per cent of the crop is under rain fed conditions [6]. The pertained study deals with the objective to analyze the variations in prices and arrivals of cotton and their relationship in major markets of cotton in the state of Andhra Pradesh.

MATERIALS AND METHODS

The present study was confined to Andhra Pradesh state. Various cotton producing districts having maximum arrivals i.e., Kurnool, Krishna, Guntur and Prakasam districts were selected for the study. The time series data on monthly arrivals and prices of cotton required for the study was collected from AGMARKNET portal. The data on arrivals and prices of cotton in selected markets of Andhra Pradesh covered a period of more than one decade i.e., 2007-18.

Methods of analysis: Time series decomposition analysis was done to study the variations in monthly prices and arrivals of cotton for the period of 12 years (2007-2018).

Estimation of trend: The method of ascertaining the trend in a series of annual prices involved estimating coefficient or intercept (a) and slope (b) in the linear function form using the linear trend equation:

$$Y = a + bt$$

Where,

Y = Yearly average arrivals/ price per quintal of cotton

T = time (1, 2, 3, 4...N) (in years)

a = intercept

*Manne Sri Sandhya

sweetymanne@gmail.com

¹S. V. Agricultural College, ANGRAU, Tirupati - 517 502, Andhra Pradesh, India

^{2,3}Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur - 482 004, Madhya Pradesh, India

b = slope of the trend line was fitted to the yearly average arrivals and prices of cotton

Arithmetic mean: The purpose of an average was to represent a group of individual value in a simple and concise manner so that the mind can get quick understanding of the general size.

Coefficient of variation (CV): Coefficient of Variation was to measure the magnitude of variability in each of the selected variables for the study period 2007-2018.

Analysis of long-term movements (trend): For estimating the long-run trend of arrivals and prices of cotton, the method of least squares estimate was employed. The equation adopted for this purpose was specified as follows:

$$Y_t = a + bX_t + e$$

The value of a and b was obtained by the method of least squares:

$$b = \frac{\sum XY - \frac{(\sum X_t)(\sum Y_t)}{n}}{\sum X_t^2 - \frac{\sum X_t^2}{n}}$$

$$a = \bar{y} - b\bar{x}$$

Where,

Y_t = price/ arrivals in time t

X_t = period (t=1, 2, 3...)

a = intercept parameter

b = slope parameter

\bar{y} = mean of y

\bar{x} = mean of x

$$t \text{ test} = \frac{b (\text{regression coefficient})}{SEb (\text{Standard error of } b)}$$

(OR)

$$t = \frac{r}{\sqrt{1-r^2}} \sqrt{n-2}$$

Annual trends of prices and arrivals for the selected markets were computed and compared. The goodness of fit of trend line to the data was tested by computing the coefficient of multiple determination denoted by R^2 .

Correlation coefficient

The Karl Pearson coefficient was computed to find out the degree of relation between market arrivals and prices of cotton. To measure the seasonal variations in prices and arrivals, seasonal indices were calculated employing twelve months ratio to moving average method.

$$MA = T * I$$

Where,

MA = Moving Average

T = Trend component

I = Irregular component

The monthly average indices were adjusted in such a way that their sum becomes 1200. This was done by working out a correction factor and multiplying the average for each month by this correction factor. The correction factor (K) was worked out as follows.

$$K = 1200 / S$$

Where,

K is correction factor and S is sum of averages indices for 12 months; multiply K with the percentage of moving average for each month to obtain the seasonal indices.

RESULTS AND DISCUSSION

Trends in market arrivals and prices of cotton

The highest increase in the market arrivals was of Guntur with a value of 1000007 quintals followed by Kurnool with 552798 quintals while the lowest being observed in Prakasam with 301629 quintals followed by Krishna with 457419 quintals. Behaviour of market arrivals and prices of cotton in Karimnagar district of Andhra Pradesh [7].

Table 1 Trend in arrivals and prices of cotton Andhra Pradesh (2007-2018)

Name of the district	Trend for	Constant (a)	Coefficient (b)	Growth rate (%)	
				SGR	CGR
Kurnool	Arrivals	95624	552798.00	6.77	10.07
	Prices	269	2491.30**	5.91	6.98
Krishna	Arrivals	214910	454741.00**	6.64	11.30
	Prices	226	2162.90	-0.67	-1.01
Guntur	Arrivals	-402982	1000007	6.50	7.50
	Prices	130.13	1748.30	-1.00	-1.18
Prakasam	Arrivals	17505	301629.00	9.23	13.23
	Prices	140	2450.30	-1.94	-1.86

**Significant at 5% level

Table 2 Variability in the arrivals of cotton in the selected districts of Andhra Pradesh (Mean – Quintals; CV – Percent)

Market	Kurnool		Krishna		Guntur		Prakasam	
	Mean	CV	Mean	CV	Mean	CV	Mean	CV
January	172446	53	148567	43	460689	71	18288	118
February	132583	53	173716	72	594002	75	28387	81
March	128650	65	299633	167	691854	63	25280	98
April	104701	75	59421	82	458784	42	23045	65
May	80493	82	112648	111	831320	53	27755	85
June	47752	93	170905	109	757056	54	35361	57
July	24311	81	224858	68	1452999	59	51569	69
August	19642	63	253027	61	1442065	53	54372	98
September	51954	64	181863	63	1163031	50	52496	71
October	125873	66	63378	77	494576	70	37554	78
November	137292	71	58747	53	705553	50	35564	55
December	148654	62	104889	51	774027	62	33837	71

Trend in arrivals and prices of cotton in Andhra Pradesh (2007-2018)

The highest increase in price is being observed in Kurnool with Rs. 2491.3 per quintal with Rs. 2450.3 per quintal while the lowest being observed in Guntur with a value

of Rs. 1748.3 per quintal followed by Krishna with Rs. 2162.9 per quintal. The highest increase of significantly 13.23 per cent per annum growth rate in market arrivals was increased in Prakasam district. In case of price an increase of 6.98 per cent per annum was observed in Kurnool market [8].

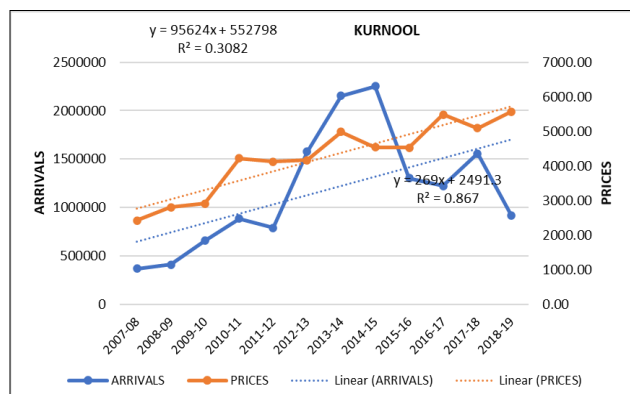


Fig 1 Trend of annual arrivals (qtl) and prices (Rs./qtl) of cotton in Kurnool market

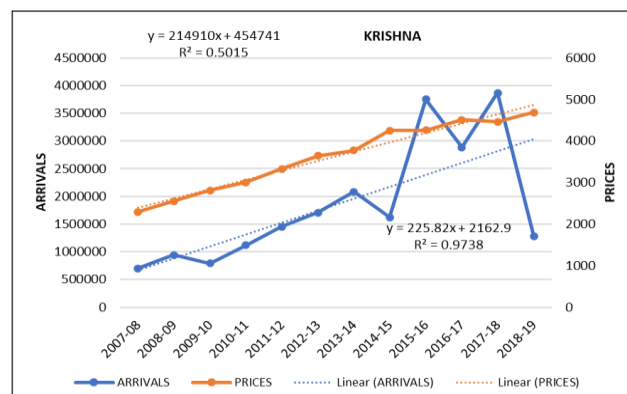


Fig 2 Trend of annual arrivals (qtl) and prices (Rs./qtl) of cotton in Krishna market

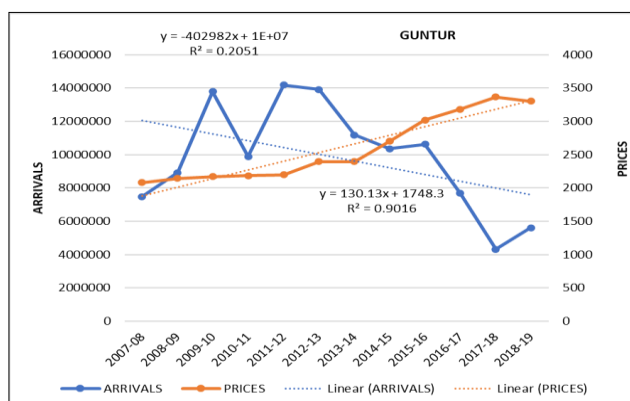


Fig 3 Trend of annual arrivals (quintal) and prices (Rs./quintal) of cotton in Guntur market

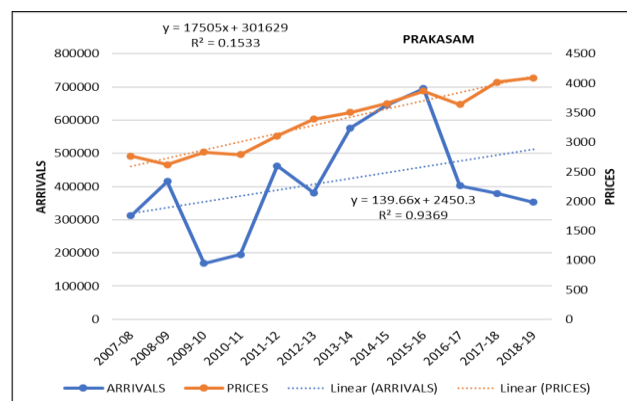


Fig 4 Trend of annual arrivals (quintal) and prices (Rs./quintal) of cotton in Prakasam market

Table 3 Variability in the prices of cotton in the selected districts of Andhra Pradesh

Market	Mean – Rs/q; CV – Percent							
	Kurnool		Krishna		Guntur		Prakasam	
Month	Mean	CV	Mean	CV	Mean	CV	Mean	CV
January	4277	26	3348	25	2382	21	3142	16
February	4365	29	3375	26	2437	19	3142	14
March	4474	29	3833	22	2729	18	3417	11
April	4147	28	3808	21	2796	16	3675	13
May	4077	25	3439	24	2496	20	3550	21
June	4218	27	3427	25	2435	22	3242	18
July	4364	27	3912	22	2812	17	3700	18
August	4415	30	4004	20	2882	16	3508	11
September	4347	27	3748	21	2656	19	3408	17
October	4173	25	3702	21	2662	19	3370	18
November	4054	24	3494	24	2419	23	3075	16
December	3964	25	3478	23	2422	23	3067	18

Variability

The variability in arrivals of cotton in Kurnool market has been observed to be maximum of 93 percent in June and quiet low with 53 percent in January and February. The average volume of cotton received in Kurnool market was maximum 172446 quintals in January and lowest 19642 quintals in August. In comparison to Krishna market the variability in arrivals of cotton in terms of co-efficient of variation was more with a value of 167 percent during the month of March and quiet low 43 percent during the month of

January. The average volume of cotton received in Krishna market was maximum with 299633 quintals during the peak season in the month of March and lowest of 58747 quintals during the month of November. The extent of variability in the arrivals of cotton in Guntur was evident from a relatively small range of coefficient of variation 42 percent in the month of April to 75 percent in the month of February. The mean of cotton varied from 458784 quintals in April to 1452999 quintals in December. So far, as Prakasam market is concerned, the variability in arrivals ranged from 57 percent in

the month of June to 118 percent in the month of January. The mean of the monthly arrivals ranged from 18288 quintals in

the month of July and in the month of December it is observed to be 54372 quintals [9].

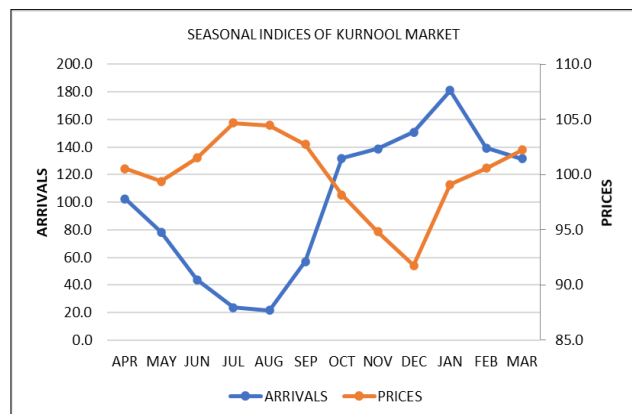


Fig 5 Seasonal indices in market arrivals and prices of cotton in Kurnool market (2007-18)

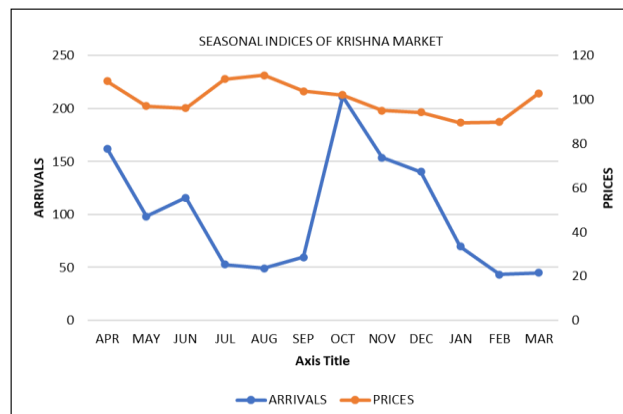


Fig 6 Seasonal indices in market arrivals and prices of cotton in Krishna market (2007-18)

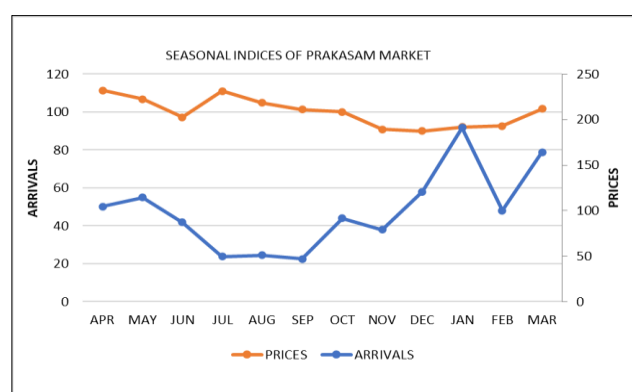


Fig 7 Seasonal indices in market arrivals and prices of cotton in Guntur market (2007-18)

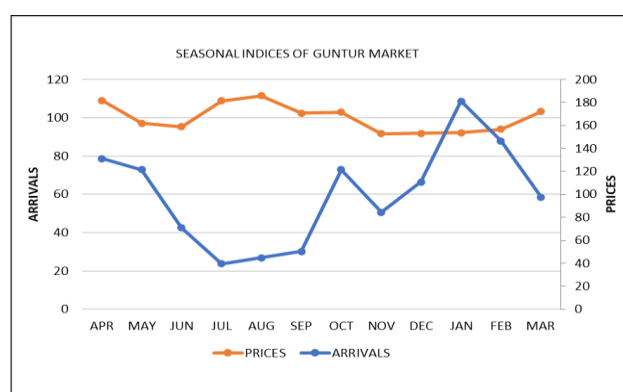


Fig 8 Seasonal indices in market arrivals and prices of cotton in Prakasam market (2007-18)

Table 4 Seasonal indices in market arrivals of cotton indifferent districts of Andhra Pradesh (in per cent)

Markets	Kurnool	Krishna	Guntur	Prakasam
Month				
April	102	162	131	104
May	78	97	121	114
June	44	115	71	87
July	24	52	39	49
August	22	49	44	50
September	57	59	50	47
October	132	211	121	91
November	138	153	84	78
December	150	140	110	120
January	180	69	181	191
February	139	43	146	100
March	131	44	97	164

Cotton prices

In case of prices, the extent of monthly price variability in different markets for cotton has been shown in (Table 3). The price variability measured in terms of coefficient of variation in Kurnool market has found to be 30 percent in the month of August and the lower value with 24 percent during the month of November. When compared to Krishna market, the price variability was found to be 26 percent in the month of February and 20 percent in the month of August. In Guntur market the prices remained quiet volatile with coefficient of variation ranging from 23 percent in the months of November and December to 16 percent in the months of April and August. In Prakasam market the variability was high with 21

per cent in the month of May and 13 percent in the month of April.

Seasonal variations in market arrivals and prices of cotton in Andhra Pradesh

The peak season for arrivals in Kurnool and Krishna market was observed to be in the months of January and October (180 and 211) respectively and low during the months of August and February (22 and 43) respectively where as in Guntur and Prakasam markets it was found be in the month of January (181 and 191) respectively and the lowest arrivals in the months of August and July (44 and 49) respectively. Normally the prices of storable produce are lower at harvest time and then rise as the season progresses, reaching their peak just prior to the next harvest. The highest values of price indices were observed during lean period i.e., the period of lowest arrivals. Cotton prices peaks in the off-season months i.e., when the commodity is scarce in the market and reaches its bottom level during the peak season months in which commodity is available comparatively high in the market. The maximum peak prices were observed during July to September in Kurnool Krishna and Guntur markets and April and May months in Prakasam district. The maximum lowest price is found to be during the months of November and December in maximum of the markets [10].

The (Table 4) represents the existence of seasonal variations in the arrivals of cotton in all the selected markets. The peak season for arrivals in Kurnool and Krishna market was observed to be in the months of January and October (180 and 211) respectively and low during the months of August

and February (22 and 43) respectively where as in Guntur and Prakasam markets it was found be in the month of January (181 and 191) respectively and the lowest arrivals in the months of August and July (44 and 49) respectively.

Table 5 Seasonal indices in market prices of cotton indifferent districts of Andhra Pradesh (in per cent)

Month \ Markets	Kurnool	Krishna	Guntur	Prakasam
April	100	108	109	111
May	99	97	97	107
June	101	96	95	97
July	105	109	109	110
August	104	111	111	104
September	103	103	102	101
October	98	102	103	100
November	95	95	91	91
December	92	94	91	90
January	99	89	92	92
February	100	90	94	93
March	102	103	104	101

Relationship between arrivals and prices of cotton in selected districts of Andhra Pradesh year wise (2007-18)

The month-wise correlation co-efficient between arrivals and prices in cotton was observed positive in all the months in Kurnool market and Krishna market but in case of Guntur market all the months show negative correlation. Prakasam market shows the negative correlation in the month of November and other months being observed positive. However, across different months there have been several instances of positive relationship between market arrivals and prices of cotton in different markets. Normally the prices of storable produce are lower at harvest time and then rise as the season progresses, reaching their peak just prior to the next harvest. The highest values of price indices were observed during lean period i.e., the period of lowest arrivals as shown in (Table 5). As shown in (Table 5) cotton prices peak in the off-season months i.e., when the commodity is scarce in the market and reaches its bottom level during the peak season months in which commodity is available comparatively high in the market. The maximum peak prices were observed

during July to September in Kurnool Krishna and Guntur markets and April and May months in Prakasam district. The maximum lowest price is found to be during the months of November and December in maximum of the markets [11].

CONCLUSIONS

The pattern of trend in arrivals and prices of cotton is similar in almost all the markets. The results revealed that in the long run all the markets showed an increasing trend in the arrivals and there was a slight decrease in the trend in different markets. The highest increase in the market arrivals was of Guntur with a quantum of 1000007 quintals followed by Kurnool, Prakasam and Krishna markets. The highest increase in price is being observed in Kurnool with Rs. 2491.3 per quintal while the lowest being observed in Guntur followed by Krishna market. The study of seasonal variation of arrivals and prices indicate that the peak period of arrivals is being observed in the months of January and October in Kurnool and Krishna markets respectively and low season during the months of August and February respectively where as in Guntur and Prakasam markets it was found be in the month of January and the lowest arrivals in the months of August and July respectively whereas cotton prices peaks in the off season months i.e., when the commodity is scarce in the market and reaches its bottom level during the peak season months in which commodity is available comparatively high in the market. The maximum peak prices were observed during July to September in Kurnool, Krishna and Guntur markets and April and May months in Prakasam district. The maximum lowest price is found to be during the months of November and December in maximum of the markets. The correlation coefficient between market arrivals and prices of cotton was observed positive relationship during 2009-2011 and again in 2016 in Kurnool market while Krishna market experienced the positive relationship from 2008-2018. When the Guntur market is studied, it shows the positive relationship from 2008-2017 while negative relationship was being observed in 2007 and 2018. The relationship in Prakasam market observed shows negative relationship mostly in the years 2007-08, 2010-12, 2016 and 2018.

LITERATURE CITED

1. Anonymous. 2001. United States Department of Agriculture.
2. Gosh S. 2017. Forecasting cotton exports in India using the ARIMA model. *Amity Journal of Economics* 2(2): 36-52.
3. Ramarao CA, Srinivasarao, Mathukumalli, Naraiah P, Reddy YVR. 2007. Profitability of cotton on a pest management continuum in Guntur district of Andhra Pradesh. *Agricultural Economics Research Review*. 20.
4. Nahatkar SB, Kiradiya BS, Sharma HO. 1998. Price variation of cotton: A case study of Kukshi regulated market of Dhar district of Madhya Pradesh. *Indian Journal of Agricultural Marketing* 53(3): 414-421.
5. Hosamani SB, Gummagolmath KC, Savadatti PM. 2001. Trends in arrivals and prices of groundnut and cotton in Dharwad market. (Eds) K.H. Vedini. *Agricultural marketing - Intervention and Innovation. MANAGE*. pp 215-223.
6. Samuel J, Basavaraja H, Pushpanjali, Rejani R. 2015. Production, growth and export competitiveness of raw cotton in India-An economic analysis. *Agricultural Research and Technology* 1(1): 1-5.
7. Naidu MG. 2014. A statistical study on arrivals and prices of cotton in Karimnagar district of Andhra Pradesh. *International Journal of Agricultural Statistical Sciences* 10(2): 321-324.
8. Mahesh V, Grover R, Geetha RS. 2018. Market arrival and price behaviour of cotton in Haryana. *Asian Journal of Agricultural Extension, Economics and Sociology* 28(4): 1-9.
9. Kumari RV, Panasa V, Gundu R, Kaviraju S. 2017. Price behaviour and forecasting of cotton in Telangana. *International Journal of Pure and Applied Bioscience* 5 (5): 863-871.
10. Ge Y, Wang HH, Ahn SK. 2008. Implication of cotton price behavior on market integration. *Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management*. doi 10.22004/ag.econ.37623.
11. Singh DP, Sekhon MK. 2017. A study on behaviour of arrivals and prices of cotton in different markets of Punjab. *Indian Journal of Economics and Development* 13(1): 171-176.