

## **A study on price movement of cotton across major markets of Haryana state**

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### **Abstract**

*The goal of the current study was to examine the growth, seasonal variation, and volatility of cotton prices and arrivals in a few key cotton markets in Haryana. The monthly data on cotton arrivals and prices were gathered from 2005–2006 through to 2021–2022. The study employed the Compound Growth Rate, Moving Average technique, and Coefficient of Variation measure. The findings revealed a significant increase in cotton prices for the targeted markets, while arrivals growth was positive but not statistically significant in all markets with the exception of Fatehabad district, which saw negative growth because of a change in cropping patterns. Results of a seasonal analysis revealed that cotton arrivals in the targeted markets were higher during the peak period of months from October to January and showed decreasing trend during the subsequent months from February to May and September. (Lean period). The results also was found inverse relationship between arrivals and price in all the selected markets. The Coefficient of Fluctuation average ranged from 1.11 to 21.47% in the all selected cotton markets, demonstrating the presence of not significantly increased volatility during the study period, although the intra-year prices in those markets remained nearly stable with less than 10% of variation. Through stock management and the use of risk management techniques like crop insurance, futures markets, etc. Farmers should sell their cotton produce in lean period to get better price of cotton.*

**Keywords:** Cotton, Seasonal variation, prices, arrivals, markets. Volatility and coefficient of variation

### **Introduction**

Cotton, commonly referred to as “White Gold,” is a significant commercial crop and is regarded as the “King of Fibers”. It is cultivated for its lint and seed. Many different products in the textile industry use cotton. The major cotton-growing regions in India are the northern zone (Haryana, Punjab, and Rajasthan), the central zone (Gujarat, Madhya Pradesh, and Maharashtra), and the southern zone (Andhra Pradesh, Karnataka, and Tamil Nadu). Cotton cultivation in India typically takes place from October to January. Cotton has an impact on the Indian economy through its production and processing industries as well as through creating direct and indirect employment.

In Haryana total area under cotton was 6.95 lakh hectares producing 20.5 lakh bales with the yield of 500 kgs/ha during the year 2021-22 (Indiastat.com 2021-22). So as we can see that area under cotton has decreased from the previous year, but production and yield per ha has gone up indicating towards better farm practices been undertaken by the farmers.

By guaranteeing steady and lucrative prices for farmers, as well as the creation and use of appropriate technologies, a better cotton output can be attained. In the current competitive economy, the price of the commodities is a crucial marketing signal that informs farmers about the type and quantity of the commodities that should be produced in a certain location at a specific time. Prices have an impact on the inter-sectorial distribution of income and the rate of capital creation in agriculture, as well as on the demand and supply of the product. As a result, developing an effective

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agriculture strategy necessitates examination of pricing and market arrivals across time.

Seasonal variations in prices are a result of seasonality in output. The income of growers varies significantly from year to year due to price fluctuations. It is necessary to conduct a detailed analysis of price behaviour over time in order to determine the most effective strategies for lowering the price volatility of agricultural commodities. When combined with supply and demand data, seasonal price patterns can be utilised as a guide for developing a marketing strategy. For analysing the seasonal effects, time series data on prices and arrivals for the commodity recorded throughout several months or seasons can be used.

Prices and arrival trends have changed over the years and are related to advancements in production technology, input availability, and infrastructure. Prices trends often correlate with economic inflation or deflation as well as population growth, economic expansion, and improvements in purchasing power. We can figure out the overall direction of change in arrivals and pricing in various markets by studying patterns. It is quite helpful in investigating the connection between market arrivals and prices. Large productions and arrivals have a negative impact on the pricing, which ultimately results in their downfall. The country's cotton cultivation is undergoing major improvements that have the potential to bring the current productivity level close to the world average cotton production per hectare in the coming years. In addition to fulfilling the increasing demand from the domestic textile industry, the nation may have enough extra cotton to satisfy the demands of cotton-importing nations.

## Materials and Methods

### Selection of Markets

In order to calculate compound annual growth rate, seasonal indices, and price volatility of cotton in the major markets of Haryana, the current study used time series data on cotton prices and arrivals in the market. AGMARKNET was used to gather monthly information on prices and arrivals for the time period 2005-2006 to 2021-2022. The present study pertains to time series analysis of cotton prices and arrivals, market addition and price instability of cotton in the major markets of Haryana. The most important cotton producing districts i.e. Sirsa, and Fatehabad, were preferred purposely for the study. From each district, two markets were chosen on the basis of arrival of cotton in these markets. Thus Sirsa and Dabwali

market from Sirsa district, Fatehabad and Bhattukalan market from Fatehabad district, were preferred.

### Compound Growth Rate (CGR)

The Compound growth rate has been worked out to examine the change in inclination of variables to increase, decrease or dormant over a period of time. To inspect the change in prices and influx of cotton in the chosen markets for the period 2005-06 and 2021-22, the compound growth rates were worked out using the subsequent structure of exponential function:

$$Y = ab^t u_t$$

Where,

Y=prices or influx of cotton

t=time in years

u=error term

a and b are constraint to be estimated

$$b=(r+1)$$

r=multiplicative growth rate in per cent annum

Thus,

$$Y = a(r+1)^t u_t$$

$$r = [\text{Antilog of } (\log b) - 1] \times 100$$

The implication of compound growth rate (CGR) was tested by using student 't' test:

$$t = \frac{r}{SE(r)}$$

The standard inaccuracy of CGR is given by:

$$SE(r) = \frac{(100 \times b)}{\log e} SE(\log b)$$

Where,

$$\log e = 0.4323$$

### Seasoned behaviour of price and arrivals

The monthly data on general prices and arrival were used for shaping the seasonal behaviour of price and arrival in the preferred markets. The ratio to moving average method was used to estimation of continuing indices. In markets of Sirsa and Fatehabad districts, the market entrance of cotton had been 9 months in a year i.e. September to May. As a result, 9 months moving average was used to work out the indices.

The ratio to stirring standard method includes the following steps:-

Step 1: The centred 9 months moving average usually were computed from the original data. These centred 9 months data holds the trend and cyclical component.

Step 2: Surplus the original data by the centred moving average data.

$$\frac{Y}{MA} = \frac{T \times S \times C \times 1}{T \times C} = S \times 1$$

Step 3: The irregular component was eliminated by averaging the data for each month over the time as attained the seasonal indices. After averaging the data, they were multiplied by hundred to obtain the seasonal indices,

Step 4: The sum of the recurrent indices should be 900. If not, the figure is accustomed by using a correlation factor i.e.

$$K = \frac{900}{S}$$

Where,

K = correlation factor

S = sum of seasonal indices

#### Price volatility

To inspect variability of prices from its average in the chosen markets over the time period, the coefficient of variation (%) measure has been engaged. It was calculated by using the following method:

$$CV = \frac{SD}{AM} \times 100$$

Where,

CV = coefficient of variation;

SD = standard Deviation of price series

AM = Arithmetic Mean of price series

The price series of overall period (2005-06) to (2021-22) has been distended by moving average and CV has been expected for each respective market, whereas for intra year, original price series data has been taken.

For each separate market, the price series for the entire period (2005-06 to 2021-22) has been detrended using a moving average, and the CV has been approximated. For the individual years, however, the original price series data have been used.

## Results and Discussion

### Compound annual growth rate of wholesale prices and arrivals of cotton in selected markets of Haryana

The compound annual growth rates of cotton prices in the major markets of major cotton growing districts in Haryana are presented in the Table 1. Growth rates are calculated for the time period of 2005-06 to 2021-22. The results revealed that cotton prices in the selected markets were found on the increasing side which ranged from 7.51 to 8.08. The growth rates of all markets are significant at 1 per cent level of significance. The highest growth in prices

was found in Sirsa (8.08%) followed by Bhattukalan (7.53%), Dabwali (7.52%), Fatehabad (7.51%).

Table 1: Compound annual growth rate of cotton prices in Haryana markets for the period 2005-06 to 2021-22

Markets	Growth Rate (r)%	Standard Error of r
Dabwali	7.52**	0.90(8.35)
Sirsa	8.08**	0.95(8.50)
Bhattukalan	7.53*	2.91(2.58)
Fatehabad	7.51**	0.96(7.81)

Parenthesis contains t value. \*Significance at 5% level, \*\*Significance at 1% level

The compound annual growth rates of cotton arrivals in the major markets of cotton in Haryana are presented in the Table 2. Growth rates are calculated for the time period of 2005-06 to 2021-22. The Growth rates in markets were found positive but non-significant i.e. Bhattukalan and Sirsa were 3.50 and 1.90 percent per annum, respectively. Dabwali and Fatehabad markets witnessed significant negative growth rates of 4.00 and 5.51 percent per annum, respectively. This result is in line with the findings of Yadav *et al.* 2017.

Table 2: Compound annual growth rate of cotton arrivals in Haryana markets for the period 2005-06 to 2021-22

Markets	Growth Rate (r)%	Standard Error of r
Dabwali	-4.00NS	2.94(1.36)
Sirsa	1.90 NS	2.07(0.92)
Bhattukalan	3.50 NS	2.37(1.47)
Fatehabad	-5.51**	1.61(3.43)

Parenthesis contains t value.

\*\*1% level and NS- Non significant

### Seasonal Indices of cotton prices and arrivals in major markets of Haryana

The most widely used 'method of moving averages' was used for estimating seasonal indices of cotton prices and arrivals in the major markets of Haryana for the time period (2005-06 to 2021-22). The cotton arrivals in the selected markets were during the months of September to May.

The results indicated the presence of seasonality in prices and arrivals of cotton in the selected markets Sirsa and Fatehabad. The results also revealed that peak period for cotton arrivals in the selected markets was from October to January.

Table 3: Seasonal indices of cotton prices and arrival in major markets of Hisar and Sirsa district

S. No.	Month	Dabwali		Sirsa		Bhattukalan		Fatehabad	
		Arrival	Price	Arrival	Price	Arrival	Price	Arrival	Price
1	September	45.78	92.90	41.75	89.62	19.77	84.85	26.60	84.88
2	October	148.77	96.12	141.26	94.78	112.06	96.99	131.59	97.81
3	November	149.93	93.72	185.30	97.50	204.89	97.69	157.54	98.67
4	December	205.00	99.63	208.93	96.69	222.08	98.00	266.31	98.77
5	January	168.57	101.13	112.57	101.37	118.24	102.35	129.14	103.24
6	February	105.19	105.05	80.86	102.40	86.75	102.89	88.39	106.34
7	March	47.82	106.30	74.13	103.97	73.36	105.70	64.03	109.52
8	April	22.34	100.95	35.23	101.35	42.15	100.74	26.57	91.94
9	May	6.60	104.20	19.98	112.32	20.70	110.80	9.83	108.84
	Total	900	900	900.00	900	900	900	900	900.00

However, maximum arrivals were observed in the months of November, December and January irrespective of markets. Results also revealed that the price indices of cotton in the selected markets was lesser during the peak arrivals (i.e. less than 100) and higher during lean period (i.e. more than 100) with few exceptions. Thus, the inverse relationship existed between price and arrivals in the selected markets.

The price indices varied from 92.90 to 104.20, 89.62 to 112.32, 84.85 to 110.80 and 84.88 to 109.52 in Dabwali, Sirsa, Bhattukalan and Fatehabad markets, respectively in presented in table 3, whereas the arrival indices varied from 6.60 to 205.00, 19.98 to 208.93, 19.77 to 222.08 and 9.83 to 266.31 in the Dabwali, Sirsa, Bhattukalan and Fatehabad markets, respectively. The price indices was highest in the month of May (Sirsa, Bhattukalan and Fatehabad) markets and March for Dabwali market. In case of arrival was found highest in the month of December for the Dabwali, Sirsa, Bhattukalan and Fatehabad markets. The results were in conformity with Verma *et al.* 2018 and Bhat *et al.* 2014.

#### Price Volatility

The volatility of cotton prices in the selected markets of Haryana was measured by the simplest measure i.e. Coefficient of variation (CV). It measure the instability or fluctuations around the central value in price series data of the selected markets are presented in the Table 4. The results showed that the CV values of cotton prices for the overall period i.e. 2005-06 to 2021-22 in the selected markets ranged from 1.08 to 40.94 per cent. The CV value was the highest in the Fatehabad market (40.94 %) indicating

the presence of relatively higher volatility in cotton prices, followed by Sirsa (24.20 %), Bhattukalan (23.43 %), Dabwali (17.39 %).

Table 4: Co-efficient of variation (CV) in cotton prices in Haryana markets for the period 2005-06 to 2021-22

Particulars	Sirsa	Dabwali	Fatehabad	Bhattukalana
2005-06	8.77	7.11	6.03	4.52
2006-07	10.95	10.54	11.91	6.37
2007-08	12.41	9.87	11.74	10.04
2008-09	3.16	5.28	3.99	3.96
2009-10	5.06	8.08	9.22	4.34
2010-11	24.20	17.39	22.96	23.43
2011-12	7.05	6.50	7.19	6.37
2012-13	6.29	8.08	7.01	6.20
2013-14	4.40	2.56	4.50	3.88
2014-15	6.02	4.03	5.98	5.67
2015-16	4.39	1.81	3.71	2.74
2016-17	8.92	8.97	7.59	9.90
2017-18	4.78	5.66	8.17	6.01
2018-19	5.30	1.08	5.00	6.93
2019-20	3.63	3.37	8.95	2.41
2020-21	6.58	7.14	40.94	4.60
2021-22	20.70	16.16	15.59	15.63

The Table 4 revealed that volatility in cotton prices of selected markets was relatively higher in the year 2010-11 with CV ranging from 17.39 to 24.20 per cent, whereas volatility in cotton prices was found lower in the year 2015-16 with CV ranging from 1.81 to 4.39 per cent. The results also revealed that the volatility of cotton prices in Haryana was higher in the years of 2006-07 to 2010-11 (except 2008-09) compared to years of 2011-12 to 2021-22. Thus the results of the study clearly show that the intra-year

cotton prices in the selected markets have been almost stable over years. The result is similar to the research conducted by Paul *et al.* (2020).

### Conclusions

Cotton price values were positive and considerable for all of the markets that were chosen from 2005–2006 to 2021–2022. As a result, over the course of the study, cotton prices significantly increased in a number of markets. The growth and trend values for cotton arrivals were negative and statistically significant for the markets of Fatehabad, while they were positive but not statistically for the markets of Sirsa and Bhattukalan. The growth of arrivals in the markets has been impacted by the state's unpredictable cotton production area and yield. In particular markets, cotton arrivals peaked from October to January and dipped from February to May and September. In the chosen markets, there was inverse relationship between price and arrivals. Over the study period, there was less than 10% volatility in the intra-annual pricing of cotton in the targeted Haryana markets. The commodity's production and demand are unclear, which contributes to the volatility.

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