



RESEARCH ARTICLE

# Trend and Seasonality Analysis in Prices and Arrivals of Selected Agricultural Commodities in India

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## ABSTRACT

The study was conducted to find the fluctuation in the prices and arrival of the selected high value agricultural commodities. The study was conducted for the period 2004-2020 by collecting secondary data from CMIE (Centre for Monitoring Indian Economy) database. The major agricultural commodities were selected purposively on the basis of high price fluctuation and arrivals in the market. The commodities selected for the study include, castor seed, coriander, jeera, soybean and turmeric. The results of the study showed that there is a positive and significant relationship between growth rate and the prices of selected commodities with Jeera showing the highest growth rate of (9.87%) in arrival followed by turmeric (9.05%) and the lowest in coriander (5.06%) as against the prices where it showed all together with a different scenario with highest in case of coriander (7.55%) followed by soybean (7.24%) and lowest in jeera with (5.69%) respectively. The results of the findings revealed that in all the commodities high seasonal indices were observed from March to June indicating high post-harvest arrivals during these months. In the case of soybean and turmeric, the seasonal index for prices is high in April to September, which reveals that there is a lack of storage facilities and the production during these months is very low. This study suggested improvement in the infrastructure, storage, and post-harvest techniques so that the arrivals of these commodities get increased and availability should be throughout the year so that the price fluctuation can be minimized.

**Keywords:** Seasonal indices, Commodities; Growth rate; Arrivals; CMIE database

## INTRODUCTION

There is a very high level of price fluctuation in agricultural commodities because of both biotic and abiotic stress mechanisms. Effective price support mechanism is absent by the government intervention, which makes the farmers reluctant to grow these crops. Efficient marketing of agricultural commodities has become even more critical for the overall development of agriculture and in particular, various sectors of rural economy in general. Pricing signals guide and regulate production, consumption and marketing decisions over time, form, and place (Kohl and Uhl, 1980). Therefore, we estimate the growth trend in prices and arrivals of the selected agricultural commodities. Seasonal price variations resemble a cycle covered in 12 months. The general pattern of seasonal variations in prices, *i.e.*, lower prices during the post-harvest months and higher prices during the pre-harvest or off-season months, is generally reported yearly. Therefore, it is necessary

to study the fluctuations in the monthly average prices and arrivals of the market, which help farmers plan their sales in the period, giving them a better price for their produce.

## MATERIAL AND METHODS

The study was conducted from 2004 to 2020 by collecting secondary data from the CMIE database provided by the Securities and Exchange Board of India. The agricultural commodities for the present study includes castor seeds, coriander, soybean, jeera and turmeric. For castor seeds (Deesa), for coriander (Kota), for soybean (Akola), for jeera (Unjha) and for turmeric (Nizamabad) market was selected. The selection of the markets was made based on the volume of trade.

### Examination of growth rate

To examine the growth of prices and arrivals of selected agricultural commodities over the years,

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Compound Growth rate (CGR) was employed.

$$Y = ab^t$$

Where  $\sqrt[t]{Y}$  the variable for which growth rate is calculated i.e., prices, arrivals

t=time variable taking 1, 2, 3....., n.

a=intercept

b=regression co-efficient of "Y" on t.

Exponential equation can be expressed in log form as,

$$\text{Log}Y = \text{Log}a + t\text{Log}b$$

Or

$$\text{Ln} Y = \alpha + \beta T$$

Where,

Y=time series data of price and arrivals

T= trend term

$\alpha$ = constant coefficient

$\beta$ = slope coefficient measure relative change in Y for a given absolute change in explanatory variable T. If we multiply the relative change in Y by 100, we will get percentage change or growth rate in Y for absolute change in variable T, Compound Growth Rate (CGR) can be calculated by following formula  $\text{CGR} (\%) = (\text{Antilog } \beta - 1) \times 100$ , CGR will be estimated by applying Ordinary Least Square (OLS) method. The t-test will be performed to test the significance of ' $\beta$ '.

### Seasonality analysis

The repetitive and predictable movement around the trend line in a time series data in one year or less. is called seasonal variation. The seasonal variations are due to several factors like climate, production cycle of the crop, custom, climate etc. The seasonal variation can be estimated using the moving average method, harmonic method. The seasonality in prices and arrivals of selected agricultural commodities over the year is calculated using the moving average method. To study the seasonal indices computed by the simple moving average method developed

(Acharya et al. 1995) and calculated through the following steps;

1. Expresses the price of each month as a percentage of the average price for the concerned year.
2. Work out the average (over the years) of percentage for each month computed in (1)

Calculates the sum of 12-month averages(s) as worked out in (b) and multiplied the average of each month by the correction factors ( $k=1200/s$ ) to make a total 1200 or average 100. Seasonal indices of price and arrival of selected agricultural commodities can be worked out separately with ratio to moving average method as suggested (Godara et al. 2006, Tierney et al. 1999).

Seasonal Index (prices) = Actual average prices for the month/Moving average price for the month  $\times$  100

Seasonal Index (arrivals) = Actual average arrivals for the month / Moving average arrivals for the month  $\times$  100.

## RESULTS AND DISCUSSION

### Examination of growth in the prices and arrivals of selected commodities

The behavior of prices in response to arrival of various commodities has remained an area of interest to study with the researchers over a period of time, especially with those agricultural commodities which have a lot of export potential. To study this behavior, Compound Growth Rate (CGR) was computed for the selected/ identified agricultural commodities for both prices and arrivals. The results presented in (Table 1) reveal a positive and significant growth rate in prices of agricultural commodities with jeera showing the highest growth rate of (9.87%) in arrivals followed by turmeric (9.05%) and the lowest in coriander (5.06%) as against the prices where it showed all together a different scenario with highest in case of coriander (7.55%) followed by soybean (7.24%) and lowest in jeera with (5.69%) respectively.

**Table 1: Growth rate of prices and arrivals of selected agricultural commodities**

Item	Particulars	Study Period (Jan 2004-July 2020)				
		Castor seed	Coriander	Soybean	Jeera	Turmeric
Prices	F value	51.45*	27.72*	58.31*	51.40*	10.84*
	R <sup>2</sup>	0.77	0.64	0.80	0.77	0.42
	Growth rate	7.15	7.55	7.24	5.69	6.59
Study Period (Jan 2004-July 2020)						
Arrivas	F value	3.76	6.95*	4.38*	16.30*	8.62*
	R <sup>2</sup>	0.20	0.31	0.23	0.52	0.36
	Growth rate	5.57	5.06	6.44	9.87	9.05

\*Significant at 5% level of confidence

### Seasonality analysis of selected commodities

The seasonality in prices and arrivals is a cause of the availability of produce and its demand in various seasons. Therefore, if the arrivals are more, supplies are more and prices are less and vice versa. Thus, it is an inverse relationship between demand and supply in which both the law of demand and the law of supply are in operation. The findings revealed that in all the commodities, high seasonal indices are observed from March to June, indicating high post-harvest arrivals during these months. During the peak season, there is a high post-harvest arrival so prices are low, but in off-seasons the prices are high due to shortage and lack of storage facilities. A reverse relationship between prices and arrivals is observed. But in the case of castor seed, as it is both Kharif and Rabi crop, the prices are high and arrivals

are low in Kharif season and in Rabi season, it is vice-versa. In the months from July to September, the seasonal indices of prices for castor seed as shown in Table 2 is as high as 104.01, while as in the case of arrivals, the seasonal index is high to the extent of 207.13 in April. The highest seasonality index in case arrivals was observed in March and April in the case of Coriander (245.43 and 208.98), Jeera (239.08 and 178.48), and Turmeric (226.03 and 218.02). In the case of soybean and turmeric, the seasonal index for prices is high in the months from April to September, which reveals that there is a lack of storage facilities and the production during these months is very low which needs to be redressed by improving the post-harvest techniques so that the arrivals of these commodities get increased and availability throughout the year is made possible, so that the prices get stabilized.

**Table 2: Seasonality indices of prices and arrivals of selected commodities from Jan 2004 to July 2020**

Months	Castor		Coriander		Soybean		Jeera		Turmeric	
	Prices	Arrivals	Prices	Arrivals	Prices	Arrivals	Prices	Arrivals	Prices	Arrivals
January	98.53	67.89	98.42	50.22	97.80	103.81	101.54	53.96	93.52	50.40
February	98.90	96.37	89.66	107.07	99.06	68.05	97.26	107.35	95.57	140.86
March	97.66	149.94	96.43	245.43	99.77	44.07	94.07	239.08	98.94	226.03
April	98.16	207.13	101.42	208.98	105.50	39.66	94.72	178.48	102.22	218.02
May	96.56	204.00	97.97	150.88	106.97	39.17	95.98	134.79	104.45	159.27
June	97.35	103.97	98.67	92.33	104.47	48.93	96.87	101.10	104.42	97.71
July	102.42	68.86	102.40	55.93	105.04	53.56	102.70	77.55	106.19	66.44
August	104.01	51.27	103.74	41.17	102.08	36.36	104.43	54.20	93.52	51.69
September	103.47	60.73	101.64	63.05	97.16	46.20	101.60	62.33	95.57	45.98
October	99.64	66.43	102.98	56.73	90.50	278.83	102.48	53.75	98.94	36.28
November	101.51	52.85	104.67	59.22	93.88	284.78	105.45	70.53	102.22	38.41
December	102.45	58.18	102.94	55.82	96.59	175.52	103.95	54.85	104.45	52.75

### CONCLUSION

There is a significant degree of change in the prices and arrivals. During the peak season, there are high post-harvest arrivals, so prices are low however, in the off-season, the prices are high due to less supply and the absence of storage facilities. There exists an inverse relation between prices and arrivals. The government ought to guarantee that there should be the accessibility of dependable and reliable information about prices and arrivals regularly for the above said agricultural commodities. The progression of market data should be accelerated as the market data assumes a significant part in connecting the distance markets. Reinforcing a good information network framework at the progression of price information. There should be an improvement in the storage facilities through progress in warehouse structure, storage chambers to improve the maintenance limit of the farmers. It will likewise assist with decreasing post-harvest misfortunes.

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