The Pharma Innovation Journal 2022; SP-11(9): 1765-1767

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(9): 1765-1767

www.thepharmajournal.com
Received: 27-07-2022
Accepted: 29-08-2022

Harshita Laxkar
Ph.D. Scholar, Department of Agricultural Economics & Farm Management, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Dr. AK Sarawgi
Professor, Department of Agricultural Economics & Farm Management, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Corresponding Author:
Harshita Laxkar
Ph.D. Scholar, Department of Agricultural Economics & Farm Management, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Growth and seasonality of arrivals and prices of tomato: A case of Indore district of Madhya Pradesh in India

Harshita Laxkar and Dr. AK Sarawgi

Abstract
Aim: To estimate the compound growth rate and seasonal behaviour of arrivals and prices of tomato crop in Indore market of Madhya Pradesh.
Study and design: A retrospective observational study to estimate the trend and seasonality analysis for the period of 17 years (2005-2021).
Methodology: Study area- Indore market from Indore district of Madhya Pradesh in India.
Method of analysis: The exponential trend equation was used to estimate the compound growth rate (CGR in %). The seasonality in prices and arrivals of tomatoes over the year was calculated by using the Ratio to Moving Average method. The variation in arrivals and prices was calculated using the coefficient of variation (CV in %).
Results: The CGR of arrivals and prices for tomato was 1% and 6.01% respectively. The results of the findings revealed that high seasonal indices in arrivals were observed from July to October.
Conclusion: The results of the study revealed that the trend and growth rate of arrivals and prices of tomatoes was positive and significant. The highest seasonal indices in arrivals were observed from July to September indicating high post-harvest arrivals during these months. The seasonal index for prices is high in May-June which reveals that there is a lack of storage facilities and the production during these months.

Keywords: SI-seasonality indices, CGR- Compound growth rate, seasonality, MP-Madhya Pradesh, CV-coefficient of variation

Introduction
Vegetable production is an important agribusiness in MP. MP is the second largest producer of tomatoes in India which contributes 12.91% share of total production in India with a production of 2655.29 thousand tons (monthly report on tomato, 2020, dept. of agriculture and farmers welfare). The diverse topographic features and climatic conditions in MP allow the successful production of tomatoes. Producers have moved towards commercial tomato production in green houses and poly-houses as they are less risky, fast-growing, and the best source of income in comparison to other cereal crops and fruits. Off-season production technologies for tomato have been extensively practiced by the producers for two season production. The MP government has shortlisted 11 districts in the state under the one-district-one-product scheme to grow tomatoes.
Indore is an important wholesale market where wholesalers, retailers and consumers get their bulk supplies. Nevertheless, the fluctuation in market arrival and prices of tomatoes in Indore wholesale market has been an important concern in recent years. During the main productive season, tomato arrival is comparatively high, which reflects negatively on the price of produce. Besides this, the decision of arrival and price are not rational due to the lack of market intelligence. Fluctuations in market arrival largely contribute to the price instability of the horticultural commodity. Prices of horticultural commodities follow a typical seasonal pattern of movement during the crop year. The general pattern of the price movement is lower prices during the post-harvest months and higher prices during the off season and pre-harvest months in a year. In general, the major factors that influence the price movement are arrivals of the crop, area and production estimates, perishability of the commodity, the cost of storage, availability of storage facilities, trader's stock limits and minimum export price (P.G. Chengappa, 2012). Therefore, there is a need to have a perfect understanding of the market arrivals and pricing situation over time and space. In light of these issues, an attempt has been made to examine the situation of arrivals and prices of tomatoes in Indore market.

Materials and Methods

Selection of study area: The research area was carried out in Indore district of MP, where the market consists of the maximum arrivals of the commodity in MP.

Data type and Period of study: The secondary data was collected from Agmarknet (Govt. Website) and monthly report on tomato released by Dept of agriculture and farmers welfare for the period of 16 years from 2005 to 2021.

Objectives: The objectives of the study is

1. To estimate the compound growth rate of arrivals and prices of tomato.
2. To analyse the seasonality of arrivals and prices of tomato on Indore market of M.P.
3. To estimate the variability in arrivals and prices during different seasons of the crop.

Method of analysis: To estimate the growth of prices and arrivals of selected agricultural commodities over the years, Compound annual growth rate (CAGR) was calculated using the following equation:

CGR (%) = [Antilog b – 1] * 100

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 tomatoes over the year was calculated using the ratio to moving average method.

Seasonal indices of arrivals and price and can be worked out separately by Ratio to Moving Average method as suggested (Godara *et al*. 2006, Tierney *et al*. 1999) [6, 7]. The sum of 12-month average(s) as worked out and multiplied to the average of each month by the correction factors (k=1200/s) to make a total 1200.

Seasonal Index (prices) = Actual average prices for the month/Moving average price for the month × 100

The Coefficient of Variation (CV): To measure the magnitude of variability in each of the selected variables ie. arrivals and prices was calculated using the formula:

$$CV\ (\%) = \frac{SD(\sigma) * 100}{Mean(\bar{X})}$$

Results and Discussion

Compound annual growth rate in the prices and arrivals:

The behaviour 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 the behaviour, Compound Growth Rate (CGR) was computed for tomato in Indore market of MP for both prices and arrivals. The results presented in (Table 1) reveal a positive and highly significant growth rate in prices with growth rate of 6.01 percent. While the growth rate of arrivals was also positive and significant with 1 percent.

Table 1: Growth rate of prices and arrivals of tomato in Indore market

(Study period 2005-2021)		
Particulars	**b value**	**CGR**
Arrivals	2055.572* (2024.521)	1%
Prices	55.18792** (12.95658)	6.01%

*significant at 5% level, ** significant at 1% level of significance
Values in parentheses show SE of regression coefficient (b)

Seasonality analysis

The seasonality in prices and arrivals is due to the availability of produce and its demand in different seasons. Therefore, if the arrivals are more, supply is more and prices are less and vice versa. Thus, there is an inverse relationship between demand and supply in which both the law of demand and the law of supply are in operation. During the study it was observed that in tomato, high seasonal indices was observed from August to September (Table2), indicating high post-harvest arrivals during these months. During the peak season, the post-harvest arrivals are high thus prices are low (Fig1). While in off-seasons the prices are high due to shortage and lack of storage facilities. Thus a negative relationship between prices and arrivals was observed. The seasonal index for arrivals in July, August and September was 152.47, 193.06, 231.67respectively. Inversely the SI for prices was highest from April to May followed by June with SI 143.64, 121.04, 127.60 respectively. The seasonal index for prices is high in the months from April to June, 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 management, marketing and processing facilities 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 tomato from January 2005 to December 2021

Months	Arrivals	Prices
Jan	71.27528	70.52007
Feb	67.06135	58.70504
March	54.7003	62.81714
April	60.01582	143.6426
May	134.5787	121.0411
June	137.032	127.6023
July	152.4752	121.7645
August	193.0607	102.0536
Sep	231.6729	82.22234
Oct	100.8373	116.8843
Nov	70.91964	128.6839
Dec	70.50651	89.64321

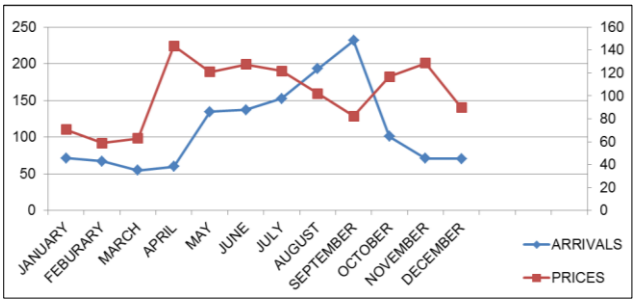

Fig 1: Seasonal indices of monthly arrivals and prices of tomato in Indore market (2005-2021)

Market arrivals and price variability in tomato

The market arrivals and price variability analysis in tomato across different months have been calculated in Table 3. The variability in market arrival of tomato was highest (CV = 128.0% and 100%) in March and April and the lowest (CV = 60% and 70%) in May and June. The price variability in tomato was high (CV = 73%) during the winter and (CV= 62%) spring season. The results of the present study can be correlated with Kumar *et al*. (2005) [8], where the price variability in tomato was high during the winter period in the Delhi, Bangalore, and Mumbai markets. The magnitude of price variability in tomato ranged from 40.3% in February to 73.9% in November. The mean market price started increasing in summer (April) 1395.403rs/q and reached to 1250.08Rs/q in autumn (November); these start decreasing from pre-winter as the tomato in plateau starts coming in the market and reaches the lowest price in winter (February= 570 Rs/q).

Table 3: Market arrival and price variability of tomato in Indore market

Month	Variability in market arrivals		Variability in prices	
	Mean	CV	Mean	CV
April	3518.905882	100%	1395.403	62.2%
May	7890.747059	60%	1175.843	50.6%
June	8034.594118	71%	1239.581	47.9%
July	8940.076471	84%	1182.87	52.7%
Aug	11319.72353	68%	991.391	56.5%
Sep	13583.67059	73%	798.7416	43.9%
Oct	5912.388235	75%	1135.462	61.7%
Nov	4158.229412	91%	1250.088	73.9%
Dec	4134.005882	109%	870.8309	61.5%
Jan	4712.741176	115%	700.576	57.2%
Feb	3932.005882	102%	570.2849	40.3%
March	3207.241176	128%	610.2315	40.0%

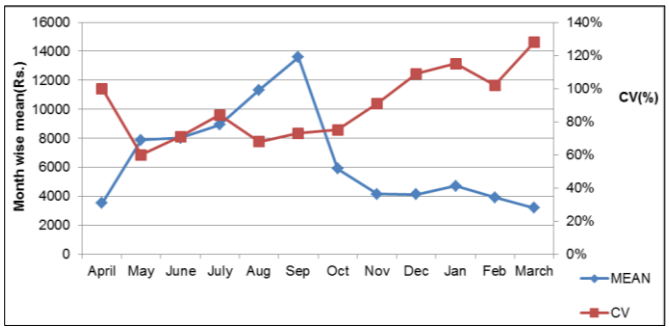

Fig 2: Month-wise mean (Rs) and CV (%) of tomato in Indore market of M.P. (2005-2021)

Conclusion

The results of the study concluded that the trend and growth rate of arrivals and prices of tomato was positive and significant. The degree of change in the prices and arrivals of tomato in Indore market is significant. During the peak season, there were high post-harvest arrivals, so prices were low however, in the off-season the prices were high due to less supply and the absence of storage facilities. There exists an inverse relation between prices and arrivals. The results found from this research showed high inconstancy in the market arrival and prices. However, the extent of variability in the market arrivals of tomato across different months was not so high, because of its all-round production throughout the year. The study revealed that, although there was a steady increase in market arrival and prices over time, their fluctuation from year to year was very high.

Thus the study suggested that there should be improvements in the infrastructure, storage, processing and preservation 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.

Acknowledgement

The authors would like to their gratitude towards the tomato growers of Indore district who provided valuable information about the arrivals, prices and their marketable surplus. The authors would like to thank the wholesalers and retailers of the fruit and vegetable market Indore who have taken part in this research with sharing important information about the arrivals and seasonal variations.

References

1. Asmatoddin MOHD, Satpute TG, Maske VS. Arrival and price behaviour of important oilseeds crops in Parbhani district. International Journal of Agricultural Sciences. 2009;5(2):349-350.
2. Agmarknet. data retrieved from https://agmarknet.gov.in/price/price/arrivals
3. Mohammad Mubashir Kachroo, Nageena Nazir. Trend and Seasonality Analysis in Prices and Arrivals of Selected Agricultural Commodities in India. Madras Agric. J. 2021. https://doi.org/10.29321/MAJ.10.000552.
4. Nirmal Timilsina, Thaneshwar Bhandari. Study On Arrivals And Pricing Situation Of Major Vegetables In Pokhara Wholesale Market, Nepal. Food & Agribusiness Management (FABM) 2020;1(1):16-25.
5. Agmarknet. Data retrieved from https://agmarknet.gov.in/price/price/arrivals
6. Godara R, Marwah S, Karwasra RK, Goel R, Sen J, Singh R. Spontaneous transmural migration of surgical sponges. Asian Journal of Surgery. 2006 Jan 1;29(1):44-5.
7. Tierney P, Farmer SM, Graen GB. An examination of leadership and employee creativity: The relevance of traits and relationships. Personnel psychology. 1999 Sep;52(3):591-620.
8. Kumar K, Gupta SC, Baidoo SK, Chander Y, Rosen CJ. Antibiotic uptake by plants from soil fertilized with animal manure. Journal of environmental quality. 2005 Nov;34(6):2082-5.