Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2021; 10(2): 416-419
Received: 11-01-2021
Accepted: 24-02-2021

VB Gholap
Faculties, Dr. D. Y. Patil College of Agriculture Business Management, Akurdi, Pune, Maharashtra, India

SN Patil
Faculties, Dr. D. Y. Patil College of Agriculture Business Management, Akurdi, Pune, Maharashtra, India

SR Benke
Faculties, Dr. D. Y. Patil College of Agriculture Business Management, Akurdi, Pune, Maharashtra, India

Corresponding Author:
VB Gholap
Faculties, Dr. D. Y. Patil College of Agriculture Business Management, Akurdi, Pune, Maharashtra, India

Economic analysis of arrival and price behaviour of tomato in Gultekdi market Pune

VB Gholap, SN Patil and SR Benke

Abstract
Present study was conducted to examine the arrivals and price behavior of tomato in the Gultekdi market Pune which was based on the secondary data from 2009-10 to 2018-19 and computed trends in area, production, productivity, prices and arrivals along with seasonal and cyclical variations. The results revealed that, there was an increasing trend in area, production and productivity of tomato in India during the study period. There was declining trend in area and production of tomato in Maharashtra however; productivity was increased significantly with the growth rate of 2.91 per cent. The monthly seasonal indices for arrivals were higher immediately after harvesting. The price indices were lower during peak arrivals months and vice versa. CV of real prices was found to be more than arrivals. For minimizing the price risk and to protect price security of farming community the long term procurement policy should be adopted to maintain price stability by declaring the MSP.

Keywords: Tomato, trends, price, arrival, index

Introduction
Vegetables are important constituents of Indian agriculture and have proved principle supplementary food crops due to their nutritional richness, better yield, economic viability and ability to generate employment opportunities. Of them tomato ranks at the topmost among the processed vegetables and next to potato in area and production in the world. It is the most important vegetable crop, commercially grown in India. China is world leader in production (31.00%), followed by India (9.70%). The area under tomato cultivation in India is 7.81 lakh hectares with the production of 19.01 lakh tonnes. (National Horticulture Database 2019). Maharashtra is producing about 5.50 per cent of tomatoes in the country with a production of 8, 05,900 Mt from an area of 33,270 ha with a productivity of 24,220 Mt / ha. Nasik and Pune are major tomato producing districts in Maharashtra.

The fluctuations in prices of agricultural commodity like tomato are a common phenomenon due to its seasonal nature of production, uncertain supply and variations in demand.

The variation in prices of tomatoes has been one of the major factors affecting the income levels of tomato cultivators. The knowledge on the inter relations between the arrivals and prices is important for assessing the extent of price fluctuations over time. Keeping this in view the present topic entitled **"**Economic analysis of arrival and price behaviour of tomato in Gultekdi market, Pune" has been taken to examine the trends in area, production and productivity of tomato in India and Maharashtra and the arrivals and price behavior of tomato along with seasonal and cyclical indices in the selected regulated market.

Methodology
The study is based on secondary data of 10 years. The data on arrivals and prices of tomato of Agriculture Produce Market Committee, Gultekdi, Pune were collected. Monthly information of arrivals and prices from 2009 to 2019 years were also collected. The time series data on area, production and productivity of tomato for the period of 2009 to 2019 were collected from Horticulture Statistics website and analyzed.

Estimation of growth rates
Trend analysis was done for area, production and productivity of tomatoes in India and Maharashtra. The quantities were analyzed by using the following linear trend equation.

$$Y = a + bX + e \quad \text{---------- (I)}$$

Where, y = Dependent variable
a = Intercept or constant

b = Regression / Trend coefficient
X = Number of years
e = Error term

The exponential growth rates were worked out using the exponential growth function of the following form

$Y = ab^x e$ ---------- (II)

Where, Y = Dependent variable
A = Intercept or constant
B = Regression / Trend coefficient
X = Number of years
E = Error term

The compound growth rate was estimated by using the semi – logarithmic from of the equation (II) as below
log Y = log a + t log b
Then the per cent compound growth rate (g) was computed using:
g = (Antilog of lob b – 1) × 100
Seasonal variations and cyclical variations were computed by simple monthly average method and multiplicative model of time series.

$$\text{Seasonal Index} = \frac{\text{Actual data for the given month}}{\text{Moving average for that month}} \times 100$$

$$\text{Cyclical Index} = \frac{\text{Original yearly value}}{\text{Estimated trend value}} \times 100$$

Trends in prices and arrivals were computed by least square method
Equation of Straight Line is Y = a + bX

$$a = \frac{\sum Y}{N} \qquad b = \frac{\sum XY}{\sum X^2}$$

Where, Y = Arrivals and prices
X = Year
N= No. of years
a = Constant
b =Slope

Co-efficient of variation in prices and arrivals were computed to see the variation and predict the behaviour of prices and arrivals whether they are stable involving less risk and uncertainty and vice-versa.

Standard deviation $(\sigma) = \sqrt{(\sum x^2/N)}$

Where $x = X - \overline{X}$

$$\text{Coefficient of variation} = \frac{S.D}{\overline{X}} \times 100$$

Results and Discussion

Trends in area, production and productivity of tomato in India

From the table 1 it is clear that, the area under tomato crop was lowest in 2009-10 (6, 34,400 ha) and it was highest in 2017-18 (9, 78,000 ha). There was variation in area under tomato cultivation during the study period due to various reasons such as changes in climatic conditions and availability of inputs including good seeds, fertilizers and irrigation facility etc. The production of tomato was minimum as 1, 24, 33,100 Mt in 2009-10 and maximum as 2, 06, 93,170 Mt in 2016-17. For the same period, the productivity also varies and rises from 19.45Mt to 24.34Mt. The annual compound growth rates of area, production and productivity of tomato in India during 2009-10 to 2018 – 19 shows that, the area under tomato was increased at the growth rate of 0.95 per cent. Similarly, production and productivity was positively and significantly increased with CAGR of 3.33 per cent and 2.36 per cent, respectively during the study period.

Table 1: Trends in area, production and productivity of tomato in India

Year	Area(ha)	Production(Mt)	Productivity
2009 -10	6,34,400	1,24,33,100	19.60
2010 -11	8,65,000	1,68,26,450	19.45
2011 -12	9,07,100	1,86,53,290	20.56
2012 -13	8,79.600	1,82,26,610	20.72
2013 -14	8,82,000	1,87,35,910	21.24
2014 -15	7,67,300	1,63,84,970	21.35
2015 -16	7,73,900	1,87,31,970	24.20
2016 -17	7,97,000	2,06,93,170	25.96
2017 – 18	9,78,000	1,97,45,490	20.19
2018 - 19	7,81,000	1,90,07,000	24.34
CAGR	0.95	3.33**	2.36**

Note: ***& ** significance at 1% and 5% level, respectively.

Trends in area, production and productivity of tomato in Maharashtra

During the study period, the area under tomato crop in Maharashtra was lowest in 2014-15 (35,450 ha) with the production of 7, 62,160 Mt. The lowest production was observed in the year 2010-11 as productivity was also lowest in that year. The lowest productivity in the year 2010-11 might be due to severe attack of pests and unfavorable climate. The highest production (12, 00,000 Mt) was observed in the year 2013-14 with highest productivity of 24.00 Mt/ha during the study period. There was variation in area and production of tomato during the study period due to various reasons such as changes in climatic conditions, attack of pests and diseases and availability of inputs including good seeds, fertilizers etc. The annual compound growth rates of area, production and productivity of tomato in Maharashtra during 2009-10 to 2018 – 19 shows that, the area and production under tomato was declined however, productivity was increased significantly with the growth rate of 2.91 per cent during the study period.

Table 2: Trends in area, production and productivity of tomato in Maharashtra

Year	Area(ha)	Production(Mt)	Productivity
2009 -10	50,000	11,12,500	22.25
2010 -11	52,000	7,38,000	14.19
2011 -12	48,000	10,07,000	20.98
2012 -13	50,000	10,50,000	21.00
2013 -14	50,000	12,00,000	24.00
2014 -15	35,450	7,62,160	21.50
2015 -16	44,240	9,76,580	22.07
2016 -17	50,720	11,24,890	22.18
2017 – 18	45,500	10,86,560	23.88
2018 – 19	33,267	8,05,899	24.23
CAGR	-3.01**	-0.19	2.91**

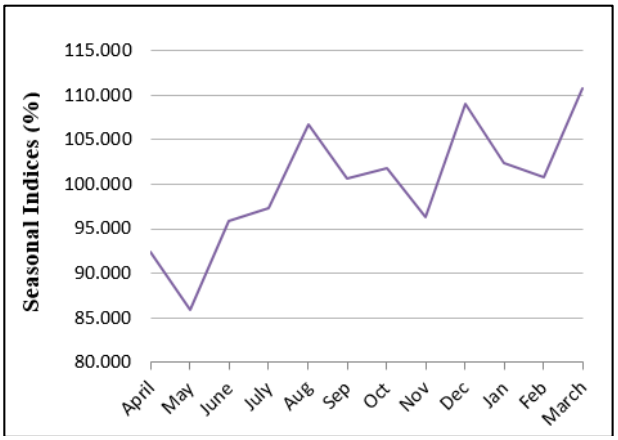
Note: ***& ** significance at 1% and 5% level, respectively.

Seasonal Indices of monthly arrivals of tomato

The seasonal index of arrivals showed that tomato arrivals start rising from May it reaches to maximum in August. Thereafter arrivals declined till November. The maximum arrivals of tomato were observed in the month of March. The maximum arrivals were observed 37805.70, 37232.50, and 36447.00 Quintals in March, December and August months respectively. The lowest arrivals are observed in pre harvest months of May, November and February.

Table 3: Seasonal Indices of monthly arrivals of tomato

Months	Arrivals	
	Monthly Avg.	Seasonal Index
April	31539.30	92.39
May	29336.20	85.94
June	32740.60	95.91
July	33222.20	97.32
Aug	36447.00	106.77
Sep	34342.00	100.60
Oct	34738.90	101.76
Nov	32875.70	96.31
Dec	37232.50	109.07
Jan	34953.60	102.39
Feb	34405.10	100.79
March	37805.70	110.75

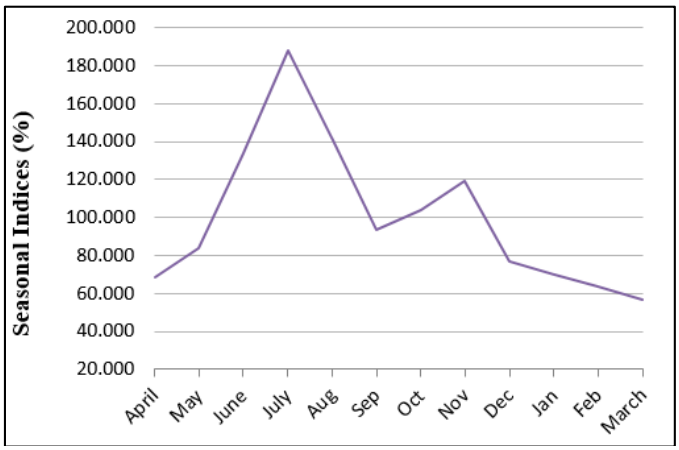


Seasonal Indices of monthly Prices of tomato

The prices of tomato were highest in the month of July and lowest in the month of March in Gultekdi market Pune. The maximum prices were observed 1994, 1510, 1420 and 1265 in July, August, June and November months respectively. In post-harvest period the prices are considerably at lower side whereas in the lean season theses are quite high. Thus from the farmers point of view they have denied of reasonable prices for their produce during post – harvest period on the consumer's side they have to pay high prices during lean season.

Table 4: Seasonal Indices of monthly Prices of tomato

Months	Prices	
	Monthly Avg.	Seasonal Index
April	730	68.78
May	890	83.85
June	1420	133.78
July	1994	187.86
Aug	1510	142.26
Sep	990	93.27
Oct	1100	103.64
Nov	1265	119.18
Dec	813	76.60
Jan	744	70.09
Feb	676	63.69
March	605	57.00

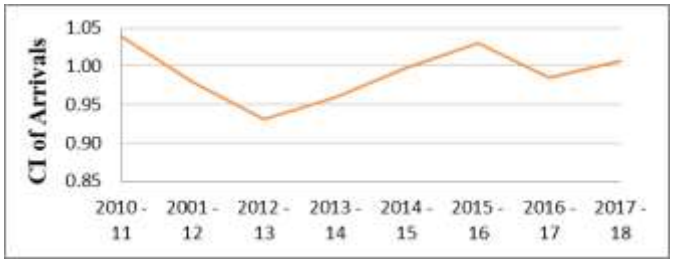


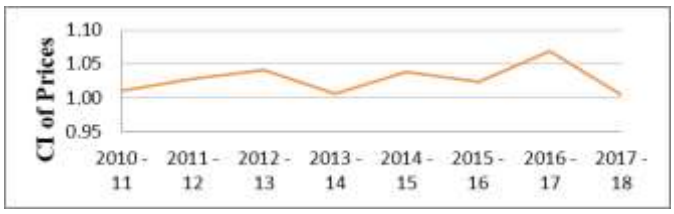
Cyclical indices of arrival and prices of tomato

In Pune market arrival cycle was observed peak from 2013 - 14 to 2016 – 17. However, as regards prices it can be seen that peaked from 2011 - 12 to 2013 - 14 and 2013 - 14 to 2016 – 17.

Table 5: Cyclical indices of arrival and prices of tomato

Years	Prices	
	Arrivals	Prices
2010 -11	1.04	1.01
2011 – 12	0.98	1.03
2012 – 13	0.93	1.04
2013 – 14	0.96	1.01
2014 – 15	1.00	1.04
2015 – 16	1.03	1.02
2016 -17	0.99	1.07
2017 -18	1.01	1.00





Trends in arrivals and prices of tomato.

Table 6: Trends in arrivals of tomato

Year	Arrivals	Trend
2009 -10	302466	285891
2010 -11	339017	313391
2011 – 12	332901	340890
2012 – 13	324549	368390
2013 – 14	370033	395889
2014 – 15	449655	423389
2015 – 16	449257	450888
2016 -17	493238	478387
2017 -18	470077	505887
2018 – 19	565195	533386

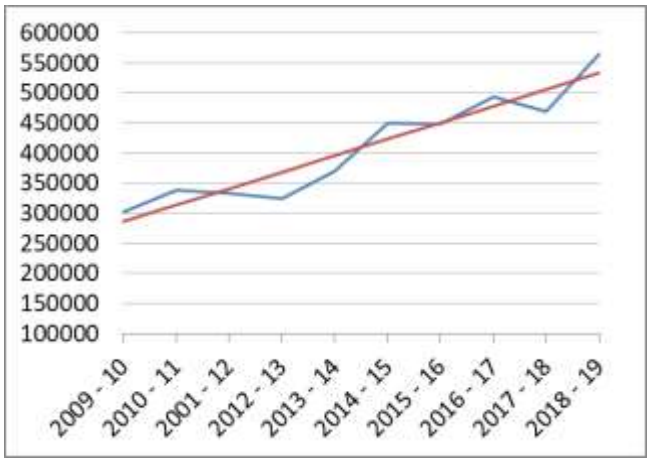
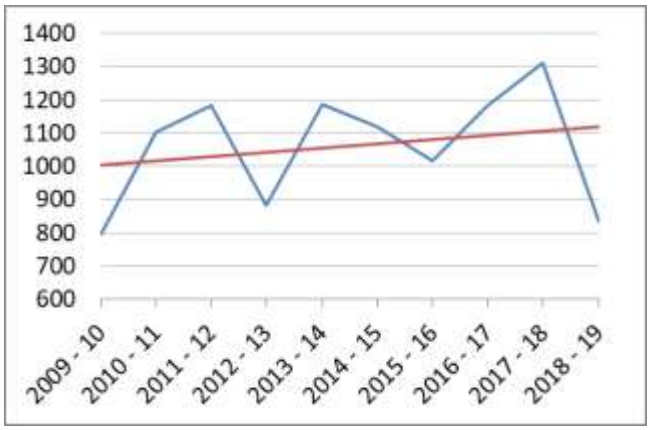


Table 7: Trends in prices of tomato

Year	Price	Trend
2009 -10	795.00	1002.67
2010 -11	1102.50	1015.72
2011 – 12	1183.33	1028.78
2012 – 13	881.67	1041.83
2013 – 14	1185.83	1054.89
2014 – 15	1120.00	1067.94
2015 – 16	1016.67	1081.00
2016 -17	1183.33	1094.06
2017 -18	1312.50	1107.11
2018 – 19	833.33	1120.17



The general trends of arrivals and prices indicated that, the arrivals and prices were inversely related to each other. This confirms the finding of law of demand and supply. In case of arrivals trend it was highest as compared to prices trend. This clearly indicated a higher impact of arrivals on prices in Gultekdi market Pune.

Variation in arrivals and prices of tomato

Coefficient of Variation is 59.76 % in prices of tomato which is more than arrivals i. e. 26.15 %. It is observed that, there were maximum variations in monthly prices per quintals as compared to monthly arrivals of tomato in Gultekhdi Market. This high degree variation in prices introduces an element of uncertainty and is not very conducive to rational management decision of the farmers. Thus, the necessity of farming right plan by the farmers to lessen the risk is necessary to stabilize prices.

Table 8: Coefficient of Variations

Crop	Arrivals		Prices	
	SD	CV (%)	SD	CV (%)
Tomato	8926.12	26.15	634.31	59.76

Conclusions

- The tomato is one of the important vegetable crops in many countries. There was variation in area under tomato cultivation of India during the study period. The area under tomato in India was increased at the growth rate of 0.95 per cent. Similarly, production and productivity was positively and significantly increased with CAGR of 3.33 per cent and 2.36 per cent, respectively during the study period indicated that, there was an increasing trend in area, production and productivity of tomato in India.
- There was variation in area and production of tomato in Maharashtra during the study period. The annual compound growth rates of area, production and productivity of tomato in Maharashtra during 2009-10 to 2018 – 19 shows that, the area and production under tomato was declined however, productivity was increased significantly with the growth rate of 2.91 per cent during the study period.
- The prices of tomato were higher during the months of July in selected market. The higher prices were recorded during the year 2017 – 18 and 2018 -19. The peak arrivals of tomato in the selected market were in March, December and August. The higher arrivals were recorded during the years 2017 – 18 and 2018 -19. The monthly seasonal indices for arrivals were higher immediately after harvest in selected market. The price indices were lower during peak arrivals months and vice versa.
- Coefficient of variation of real prices was found to be more than arrivals. In order to minimize the price risk and to protect price security of farming community for tomato crop of Pune district which is very volatile commodity in terms of market prices, it is suggested that the long term procurement policy should be adopted to maintain price stability throughout the year by declaring the MSP and procurement by nodal agencies at least for major markets of the state.

References

1. Benke SR, Gholap VB, Gade PV. An economic analysis of green gram arrivals and price behavior in Akola district (Akola APMC) of Maharashtra. Int. Re. J of Agril. Econ. Stat. 2016;7(2):198-202.
2. Gholap VB, Benke SR, Gade PV. Economic analysis of arrival and price behavior of rose and gerbera flowers in Gultekhadi market Pune. Int. Re. J of Agril. Econ. Stat. 2016;7(2):149-152.
3. Girish K Jha, Suresh A, Bhoopesh Puneras, Supriya P. Growth of horticulture sector in India: trends and prospects. Indian J of Agril. Sci. 2019;89(2):314-21.
4. Schreinemachers P, Simmons EB, Wopereis MCS. Tappimg the economic and nutritional power of vegetables. Global Food Secu 2018;16:36-45.
5. Patil SN, Sonnad JS, Mahajanshethi SB, Kiresur VR, Hosamani RM. Growth and Instability in Area, Production and Export of flowers in India. Int. J Curr. Microbiol. App. Sci. 2020;9(08):2429.
6. www.nhb.gov.in