



TRENDS IN ARRIVALS AND PRICES OF MANGO IN APMC, GULTEKADI, PUNE

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Abstract: *Mango is the most important commercially grown fruit crop of the country. In the country, mango accounts for about 48.3 per cent of area and 38.8 per cent of total fruit production. The present study was undertaken to gain insights in to the behaviour of market arrivals and prices of Alphonso and Pairi mango in Gultekadi market, Pune.*

The time series data pertaining to monthly arrivals and prices of selected varieties of mango viz; Alphonso and Pairi covering the period of eight years (2007-08 to 2014-15) were collected from APMC, Pune.

The arrivals of Alphonso mango in APMC, Pune was 57,112 quintals during 2007-08 which increased by 60.91 per cent and reached to 91, 897 quintals during the year 2014-15. The price of Alphonso mango increased from Rs.1010/ qtl to Rs.1457/ qtl. The annual growth rate in prices of Alphonso mango, it was positively significant at 6.57 per cent.

The price index of Alphonso mango, for the month of March was highest (886.38 per cent) followed by April (733.77 per cent). The indices of arrivals in case of pairi mango were lowest in the month of March (7.30 per cent). The magnitude of coefficient of variation in arrivals was 29.17 per cent.

Key words: *Mango, Alphonso, Pairi, Gultekdi, Pune, Price index, Indices, Arrivals.*

Introduction

Fruits occupy a place of importance in the horticultural wealth and economy of the country. Marketing of horticultural crops is complex especially because of perishability, seasonality and bulkiness. Mango fruit is very popular with the masses due to its wide range of adaptability, high nutritive value and richness in variety, delicious taste and excellent flavour. Creation of essential infrastructure for preservation, cold storage, refrigerated transportation, rapid transit, grading, processing, packaging and quality control are the important aspects which needs more attention. Commercialization of agriculture resulted in shifting of cropping pattern from traditional crops to new crops, which had contributed to the increased area and production under Mango.

Mango is the most important commercially grown fruit crop of the country. In the country, mango accounts for about 48.3 per cent of area and 38.8 per cent of total production of fruit (Anonymous, 2002). It occupies an area of 2.14 million hectare with an annual production of 10.50

million tones (Anonymous, 2003).The country has the distinction of being the second largest producer of fruits and vegetables after China.(Pawar *et al*, 2005). Mango is cultivated in almost all the states of India. Nearly 50 different types of mangoes are produced in the country (Srinivasan, 2005). Today, in India, there are 4000 mango varieties (Bhongale, 1995). Though the varietals wealth of mango is quite rich, only 20 varieties are grown on commercial scale in different regions of India.

However, marketing and processing of mango have not picked up commensurate with the level of production. Further, supportive mechanism in the form of agriculture inputs, post-harvest infrastructure set up, such as packaging, pre-cooling, cold storage, pack houses, marketing system and institutional credit have not come up in proportion to the increase in production of mango.

In many locations for fresh fruits regulated markets are the first destination. Growers send their produce daily to these markets for sale and traders and retailers buy them for the consumers. Fruits arrive from far off places follow different marketing

systems. It was also found that the regulated markets benefited farmers in proportion to the effectiveness with which market committees supervise the trading of fruits marketing. Agricultural marketing continued to be plagued by many market imperfections such as inadequate infrastructure, lack of scientific grading system, defective weighing and so on. The basic objective of regulating the marketing of agricultural products was to bring both producer and buyer/trader closer and to the same level of advantage. This would help reduce middlemen and associated costs and margins. Moreover regulated markets are the platform for both producers and buyers to represent their grievances and discuss matters of mutual interest.

High perishability, absence of post-harvest facility, lack of standardized supply chain system resulted in loss of about 25 to 30 per cent of the total mango production during post-harvest period. This reduces further availability of fruits for consumption, value addition and export. There are issues such as weak institutional arrangements, limited marketing facilities, lack of coordination among the various organizations that have acted as hindrance to the growth of mango. The price fluctuation of mango is a common phenomenon due to seasonal nature of production and wide ecological imbalances. The market information relating to market prices and arrivals over a period of time help the mango growers to take decisions about the future

production pattern and sale of mango in the market during specific period. Against this backdrop, the present study was undertaken to gain insights in to the behaviour of market arrivals and prices of Alphanso and Pairi mango in Gultekadi market, Pune with following specific objectives to study the variability and correlation between in arrivals and prices of Mango and to estimate the growth rates and seasonal indices in arrivals and prices of Mango.

Methodology

The arrivals of Alphanso and Pairi mangoes are relatively more in Gultekadi market, Pune. About 75,000 and 20,000 metric tons of Alphanso and Pairi mangoes are traded in this market every year from the month of March to June. Hence, this market has been considered for the study. The present study used the data on arrivals and prices of Alphanso and Pairi mangoes in APMC, Gultekadi, Pune for the period of 8 years i.e. from 2007-08 to 2014-15

The time series data pertaining to monthly arrivals and prices of selected varieties of mango viz; Alphanso and Pairi covering the period of eight years (2007-08 to 2014-15) were collected from Agricultural Produce Market Committee, Pune. The collected data were analyzed to compute growth rates, trends, seasonal indices and variability in arrivals and prices.

The compound growth rates of arrivals and prices of selected varieties of mango were worked out by using an exponential form of equation.

$$Y_a = ab^t \quad \text{and} \quad Y_p = ab^t$$

Where,

Y_a and Y_p = Monthly arrivals and prices, respectively

a = Constant

b = Trend coefficient

t = Time period

Annual compound growth rate in percentage is calculated as,

$$\text{CGR (\%)} = (\text{Antilog of } b - 1) \times 100.$$

The seasonal indices of arrivals and prices of selected varieties of mango were worked out by using ratio to moving average method.

The variability in arrivals and prices of selected varieties of mango in APMC, Pune was studied by calculating the coefficient of variation (CV) for period (2007-08 to 2014-15), by using the following formula,

$$CV = \frac{SD}{\text{Mean}} \times 100$$

Where,

- CV = Coefficient of Variation
- SD = Standard deviation
- Mean = $\sum X/N$
- X = Monthly arrivals and prices of selected varieties of mango
- N = Number of years

Results and Discussion

Trends in arrivals and prices of selected varieties of mango

Changes in arrivals and prices of Alphanso mango

All fruits are regulated in the Agricultural Produce Market Committee, Pune during 1973. The peak season for mango is March to June. The dynamics in arrivals and prices of Alphanso mango over the period of eight years 2007-2008 to 2014-2015 are presented in Table 1.

Table 1 Changes in arrivals and prices of Alphanso mango in APMC, Pune

Year	Arrivals (Qtls)	% change over 2007-08	Price (Rs./Qtl.)	% change over 2007-08
2007-2008	57112	----	1010	----
2008-2009	97384	70.51	824	-18.41
2009-2010	84413	47.80	821	-18.71
2010-2011	93170	63.13	751	-25.64
2011-2012	71274	24.80	1059	4.85
2012-2013	35137	-38.48	980	-2.97
2013-2014	62681	9.75	1208	19.60
2014-2015	91897	60.91	1457	44.26

The arrivals of Alphanso mango in APMC, Pune was 57,112 quintals during 2007-08 which increased by 60.91 per cent and reached to 91, 897 quintals during the year 2014-15. The arrivals of Alphanso mango declined during 2011-12, 2012-13 and 2013-14 and the lowest arrivals of 35,137 quintals were observed during the year 2012-13. The price of Alphanso mango increased from Rs.1010/qrtl to Rs.1457/qrtl during the period under study and it has declined during the years 2008-09, 2009-10, 2010-11 and 2012-13. The lowest price was received by Alphanso mango growers in the year 2010-11 and per cent increase in price of Alphanso mango during study period was 44.26 per cent.

The similar results were found by Banerjee (2011). He studied arrivals and Prices of Kesar Mangoes during 2004 to 2006 in Aurangabad. There was substantial increase in the modal prices. It

ranged from Rs.591 to 1077 Rs per quintal. In case of Arrivals, it varies from 13 metric ton to 141 metric ton.

Changes in arrivals and prices of Pairi mango in APMC, Pune

The year wise per cent changes in arrivals and prices of Pairi mango in APMC, Pune during the period from 2007-08 to 2014-15 were estimated and presented in Table 2.

The arrivals of Pairi mango have declined continuously since 2008-09 with varied magnitudes. The lowest arrivals of Pairi mango i.e. 3687 quintals were noticed during the year 2014-15. As regard to prices, they decreased in the year 2008-09 and increased steadily over the period and recorded highest 25.53 per cent change during the year 2014-15.

Table 2 Changes in arrivals and prices of Pairi mango in APMC, Pune

Year	Arrivals (Qtls)	% change over 2007-08	Price (Rs./Qtl.)	% change over 2007-08
2007-2008	37713	----	141	----
2008-2009	39639	5.11	102	-27.65
2009-2010	10128	-73.14	105	-25.53
2010-2011	26098	-30.79	117	-17.02
2011-2012	14217	-62.30	113	-19.85
2012-2013	6021	-84.03	111	-21.27
2013-2014	8328	-77.91	151	7.09
2014-2015	3687	-90.22	177	25.53

The similar results were found by Srikanth et al (2015). Arrivals of the mango were maximum during the year 2008-09 which accounted for 922862 quintals. This is because of on season period, increased acreage under mango over the years and excess production of mango in the study area which may be due to favorable agro climatic conditions and less on farm or pre-harvest sales by respondents. Arrivals of the mango were minimum during the year 2007-08 which accounted for 226112 quintals; it is due to of off-season period which has led to less production of mango. Model prices of mango in the APMC was maximum during the month of June which recorded rupees 1000 per quintal which may be due to heavy competition in purchasing of mango by traders and processors from different parts of country.

Compound growth rates of annual arrivals and prices of selected varieties of mango

The compound growth rates in annual arrivals and prices of Alphanso and Pairi mango in

APMC, Pune were estimated and are presented in Table 3.1 and Table 3.2, respectively.

Alphanso

It can be revealed from the table that, the annual compound growth rate of arrivals in case of Alphanso mango was negative (2.08 per cent) indicating thereby the arrivals of Alphanso mango decreased by 2.08 per cent per annum during the period under study. The annual compound growth rate of arrivals in the months of March, April and June was negative but non significant. However, positive growth rate was recorded in arrivals of Alphanso mango during May month. As regards the annual growth rate in prices of Alphanso mango, it was positively significant at 6.57 per cent. The positive increase in prices of Alphanso mango in all four months was observed and it was relatively at higher magnitudes and significant in the March and April months.

Table 3.1 Annual compound growth rates of arrivals and prices of Alphanso mango

Month	Arrivals	Prices
March	- 8.57	9.57*
April	- 4.35	10.87*
May	0.93	1.32
June	- 9.36	9.65
Annual	- 2.08	6.57*

(* , ** and ‘***’ indicates significant at 10, 5 and 1 per cent level of significance)

Pairi

The annual compound growth rate of arrivals in case of Pairi mango was negative and significant indicating that the prices decreased by 26.83 per cent per annum during the study period. The arrivals were

declined in all four months but significant decline with higher magnitudes was noticed in April, March and May months. The prices of Pairi mango in Gultekadi market, Pune has increased at the annual growth rate of 4.50 per cent but it is not statistically

significant. The significant increase in price was recorded only in April month.

Table 3.2 Annual compound growth rates of arrivals and prices of Pairi mango

Month	Arrivals	Prices
March	- 38.13*	0.06
April	- 41.55***	8.51*
May	- 26.53***	4.53
June	- 15.70	3.57
Annual	- 26.83**	4.50

(* ***) indicates significant at 1 per cent level of significance)

Seasonal indices of arrivals and prices of selected varieties of mango

The seasonal indices of arrivals and prices of Alphanso and Pairi mango were estimated over a period of 8 years from 2007-08 to 2014-15 and are presented in Table 4.1 and Table 4.2, respectively.

Alphanso

The results of analysis revealed that the peak arrivals of Alphanso mango were concentrated in

months of April and May. The indices of arrivals were lowest during the month of March (16.10 per cent). The seasonal indices regarding prices revealed that, there were wide fluctuations in prices as it ranged between 292.89 to 886.38 per cent. The price index for the month of March was highest (886.38 per cent) followed by April (733.77 per cent). It was lowest (292.89 per cent) in the month of June.

Table 4.1 Seasonal indices of arrivals and prices of Alphanso mango in APMC, Pune

Month	Arrivals		Prices	
	Mean	Seasonal Index	Mean	Seasonal Index
March	2387.50	16.10	1796.88	886.38
April	22119.63	149.19	1487.50	733.77
May	40369.13	272.27	868.75	428.55
June	9257.25	62.44	593.75	292.89

The similar results were found by Srikanth et al (2015).The peak season is from May 15th to June 15th, less quantity arrivals observed in the end of the season (August). The model price for quintal of mango was maximum during the year 2009-10 which accounted for Rs. 800. This is because of less arrivals of mango to the APMC which led to the increase in the prices of mango. Demand for mango was more than supply of mango; therefore the prices were increased for mango. The model price for quintal of mango was minimum during the year 2006-07 which accounted for Rs.300 per quintal followed by 2005-06 (Rs. 350) and 2008-09 (Rs. 380). This is because of more arrivals of mango to the APMC which led to

the reduction in the prices of mango. It may be due to supply of mango was more than the demand for mango and also favorable agro-climatic conditions.

Pairi

The seasonal indices of arrivals of Pairi mango were found higher during the month of May (289.59 per cent) and June (108.23 per cent). The indices of arrivals were lowest in the month of March (7.30 per cent) followed by April (94.87 per cent). In the case of prices, maximum price index was noticed in the month of March (736.54 per cent) followed by April (579.80 per cent) and minimum in the month of May (488.90 per cent).

Table 4.2 Seasonal indices of arrivals and prices of Pairi mango in APMC, Pune

Month	Arrivals		Prices	
	Mean	Seasonal Index	Mean	Seasonal Index
March	266.25	7.30	187.38	736.54
April	3458.88	94.87	147.50	579.80
May	10557.88	289.59	124.38	488.90
June	3945.88	108.23	129.38	508.55

Relationship between market arrivals and prices

The phenomenon of inverse relationship between market arrivals and prices is well known. The degree of relationship between market arrivals and prices of selected varieties of mango in APMC,

Pune was studied for four months over the period from 2007-08 to 2014-15 by computing correlation coefficients. The results of correlation analysis are depicted in Table 5.

Table 5 Correlation between arrivals and prices of mango in APMC, Pune

Month	Alphanso	Pairi
March	- 0.5537	0.1725
April	- 0.4219	- 0.7540
May	- 0.1262	0.0030
June	- 0.5389	- 0.5652
Annual	- 0.1271	- 0.3249

It can be revealed from the table that, there exists a negative relationship between market arrivals and prices of Alphanso mango in APMC, Pune for all months as well as for annual average arrivals and prices. This implies that, arrivals and prices of Alphanso mango have moved in opposite direction in APMC, Pune during the period under study. This might be due to heavy demand of Alphanso mango. In the case of Pairi mango, the correlation coefficients were negative during April and June months as well as for annual average arrivals and prices indicating that during these months increased arrivals resulted into decrease in prices of Pairi mango. The positive correlation coefficients were noticed in the month of March and May. This implies that, arrivals and prices of Pairi mango have moved in same direction in APMC, Pune during these two months.

Banerjee (2011) studied Relationship between Arrivals and Prices of Mango in Maharashtra and found that there was inverse relationship between

arrivals and prices. In the event of more arrival, there was a fall in market price. Farmers try to disperse supply and realize higher prices in different markets.

Variability in arrivals and the prices of selected varieties of mango

The pattern of market arrivals and price variability of selected varieties of mango viz., Alphanso and Pairi during the period 2007-08 to 2014-15 was examined by using the coefficient of variation for each of the four months and the details are depicted in Table 6.1 and Table 6.2, respectively.

Variability in arrivals of Alphanso and Pairi mango

The annual arrivals of Alphanso mango in APMC, Pune were 74,133 quintals and magnitude of coefficient of variation in arrivals was 29.17 per cent. The maximum variability was noticed during the month of March (73.30 per cent) followed by June (51.04 per cent). The maximum arrivals of Alphanso mango were noticed during the month of May and the lowest during March.

Table 6.1 Variability in arrivals of selected varieties of mango in APMC, Pune

Month	Alphanso		Pairi	
	Mean (qtls)	CV (%)	Mean (qtls)	CV (%)
March	2387.50	73.30	266.25	213.43
April	22119.63	45.50	3458.88	141.30
May	40369.13	36.67	10557.88	79.29
June	9257.25	51.04	3945.88	65.62
Annual	74133.50	29.17	18228.88	78.68

In the case of arrivals of Pairi mango, the variation ranged between 65.62 (June) to 213.43 per cent (March). The mean arrivals of Pairi mango were the highest during month of May (10,557 quintals) and lowest during the month of March (266 qtls). The moderate variation was noticed over the years during study period. The coefficient of variation of arrivals was highest (213.43 per cent) during March followed by

April (141.30 per cent) whereas, lowest variation was noticed during the month of June (65.62 per cent).

6.2 Variability in prices of Alphanso and Pairi mango

The price variability in Alphanso mango was maximum during the month of June (40.30 per cent). The price variability was lowest during month of May (24.01 per cent). The mean prices of Alphanso mango ranged between Rs.593 (June) to Rs.1796 (March).

Table 6.2 Variability prices of selected varieties of mango in APMC, Pune

Month	Alphanso		Pairi	
	Mean (Rs/Qtl)	CV (%)	Mean (Rs/Qtl)	CV (%)
March	1796.88	28.32	187.38	29.19
April	1487.50	33.84	147.50	28.47
May	868.75	24.01	124.38	24.63
June	593.75	40.30	129.38	26.96
Annual	1013.62	22.96	127.17	21.08

The prices of Pairi mango ranged between Rs.124.38 (May) to Rs.187.38 (March) with variability 24.63 per cent (May) to 29.19 per cent (March) for period under study. In case of Pairi mango, the highest prices were received (Rs. 187.38) during March and whereas, the lowest during the month May (Rs. 124.38). The magnitudes of coefficient of variation were between 24.63 to 29.19 per cent indicated that prices of wheat remain stable during the period under study.

purchases of mango made by licence holders in Pune district other than APMC, Pune. Also, some private traders purchase the mango in the major producing area like Konkan region of Maharashtra and selling it to the consumers in Pune city. The efforts were made to know at what prices they are purchasing the mango and to what extent they are selling the mango and accordingly the necessary information is collected from office of Maharashtra State Marketing Board, Pune and presented in Table 7.

Arrivals of mango in Pune district other than APMC, Pune: The mango arrives directly through the

Table 7 Direct Purchases of mango by licence holders in APMC areas in Pune district

Year	Month	APMC Area	Purchases in Qtls	Value in Rs	Price/Qtl
2013	April	Manchar	61.86	497156	8037
	May	Manchar	71.3	455166	6384
	June	Manchar	43.57	232207	5330
	May	Khed	0.82	6616	8068
	May	Shirur	2.28	9273	4067
	Total			179.83	12,00,418
2014	March	Manchar	1.49	14927	10018
	March	Manchar	6.42	113980	17754

	April	Manchar	52.79	549166	10403
	May	Manchar	78.42	588448	7504
	June	Manchar	59.44	361948	6089
	July	Manchar	26.85	147543	5495
	August	Manchar	0.34	2580	7588
	August	Manchar	0.18	1260	7000
	May	Pune	9.67	44338	4585
	June	Pune	11.28	40608	3600
	June	Khed	0.05	2369	47380
	Total		246.93	18,67,167	7562
2015	March	Manchar	18.06	302368	16742
	April	Manchar	61.65	737580	11964
	May	Manchar	144.95	1125942	7768
	June	Manchar	8.71	42482	4877
	June	Junnar	3.12	9984	3200
	Total		236.49	22,18,356	9380

The direct purchases of mango made by licence holders were 179, 246 and 236 quintals during the years 2013, 2014 and 2015, respectively. The per quintal purchase prices were Rs. 6675, Rs.7562 and Rs.9380 during the years 2013, 2014 and 2015, respectively.

Conclusions

1. The significant decrease in arrivals of Alphanso and Pairi mango was noticed in APMC, Pune during the period from 2007-2008 to 2014-15 and it was 2.08 and 26.83 per cent per annum, respectively.
2. The prices of Alphanso and Pairi mango increased significantly at the rate of 6.57 and 4.50 per cent per annum, respectively during the period under study in APMC, Pune
3. An inverse relationship between arrivals and prices was noticed for Alphanso and Pairi mango which indicated that increase in arrivals lowered the prices of these commodities.

4. The higher prices were observed during March month and lowest during June month for Alphanso and Pairi mango in APMC, Pune.

5. The more variability was observed in prices of selected varieties of mango due to fluctuations in demand but comparatively low variability was observed in arrivals for selected varieties of mango.

Suggestions

1. The study suggested that the Alphanso and Pairi mango growers shall bring mango for sell in the APMC, Pune during the months of March and April in order to get the good prices for the produce.
2. The annual increase in prices of Alphanso and Pairi mango was 6.57 and 4.50 per cent, respectively which is satisfactory and thus Alphanso and Pairi mango growers may prefer APMC, Pune for selling the mango.

References

1. Anonymous (2001) - Report on "Agril. Export Zone for Mango in Maharashtra" prepared by Mahindra Acres Consulting Engineers Ltd. New Delhi.
2. Anonymous (2002) - National Horticulture Board, Year Book,; page no. 10 - 12.
3. Anonymous (2003). Horticultural Statistics. Financing Agriculture, 35(6): page no. 30 - 32.
4. Banerjee, G. D. (2011), "Economics of Mango Cultivation" Occasional Paper – 58, page no. 57, 60
5. Bhongale and Sudheer (1995) - Sheti Israyalchi (marathi) Rajhans Publication, Pune,; page no. 93-95.
6. Pawar, N.D., K.V. Deshmukh and S.N. Kulkarni (2005) - Export scenario of horticultural products in the context of WTO. In abstract of National Seminar on "Capacity building of Agri.
7. Srinivasan, N. (2005) - Development initiatives by NABARD for promotion of mango export. A Report of workshop on "Mango export projects of Indian Mangoes" held on 23rd February, 2005 at Mumbai.
8. Srikanth H.S., T.N. Venkata Reddy, P.S. Prasanna Kumar and G. Ranganath (2015) - " Study on arrival pattern of mango in APMC and direction of trade from Srinivasapura taluka of Kolar district," International Journal of Commerce and Business Management Volume 8, Issue 1, April, 2015, 75-80.