

# A STUDY ON TREND AND GROWTH OF MANGO IN TAMIL NADU

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## Abstract

In this paper analysis Area, Production and Productivity of Mango in Tamil Nadu, Mango is a very delicious and widely liked fruit all over the world. It is called the “King of Fruits” that makes it the most popular fruit than others. Total fruit production of India is about 90 million tonnes of which mango production is about 18 million tonnes sharing 20 % of the total fruit production. Leading mango producing states are Uttar Pradesh, Andhra Pradesh, Telangana, Karnataka, Bihar Gujrat, Maharashtra, and Tamil Nadu. Leading mango exporting states of the country are Maharashtra, Tamil Nadu, Gujrat, West Bengal, Karnataka and Andhra Pradesh.

**Key Words:** Mango, Production, Productivity, Coefficient of Variation (CV), Compound Growth Rate (CAGR) and Linear Growth Rate (LGR).

## Introduction

Mango is a very delicious and widely liked fruit all over the world. It is called the “King of Fruits” that makes it the most popular fruit than others. It is a historical fruit because in ancient days of its cultivation, thousands of years it was cultivated in South Asia. It is available in sweet as well as sour tastes which are used in different ways of consumption. Mango occupies a unique and important place amongst the fruit crops of India. It is now playing vital role in the national economy of the country. Approximately 50% of all tropical fruits produced worldwide are mangoes. With 13.79 million tons, India accounts for almost half of the world production, followed by China, Mexico and Thailand. In fact, the aggregated production of ten countries is responsible for roughly 80% of the entire world mango production.

As per WTO’s Trade Statistics, share of India’s agricultural exports and imports in the world agriculture trade in 2017 was 2.27% and 1.90%, respectively. Even during the difficult time of pandemic lockdown, India took care to not to disturb the world food supply chain and continued to export. The exports of Agri commodities during March 2020 to June 2020 were Rs. 25552.7 Crore against an export of Rs. 20734.8 Crore during the same period in 2019, showing a sharp increase of 23.24%. The agricultural exports as a percentage of India’s agricultural GDP has increased from 9.4 % in 2017-18 to 9.9 % in 2018-19. While the agricultural imports as a percentage of India’s agricultural GDP has declined from 5.7 % to 4.9 % indicating exportable

surplus and decreased dependence on import of agricultural products in India.

## Review of Literature

A large number of research studies have been conducted on growth of mangocultivation both in India and the abroad. The available literature on the selected topic reveals that the research studies of mangoes cultivation back to early forties up to the present period. An attempt is made here to review some of the selected works in this direction.

R.S. Patil<sup>1</sup>, R.G. Deshmukh<sup>1</sup>, K. R. Bhaskar<sup>1</sup> and S.W. Jahagirdar, (2018) in their study entitled, growth and export performance of mango in India with objective of estimation of growth and export performance of mango in India. From study, it was revealed that, positive and significant growth of area, production and productivity of mango was observed. Highest variation was observed in case of production i.e. 15.88 per cent. Highest growth rates in case of area and production were found in Odisha state, where as highest variation in case of area and production was observed in Maharashtra. Highest growth i.e. 23.79 per cent of mango exported from India to Kuwait was observed. It was also observed that, Bangladesh was most stable importer of Indian mango followed by UAE, Baharain and other countries respectively. India produces 50 per cent of total mango produced in the world, but have low export share. Therefore, it is need to more emphasize on export of mango from India.

N.J. Thakor, in his study reveals that (2019), Mango is the fruit referred world over as the peach of

tropics. It is the national fruit of India, Pakistan and Philippines and national tree of Bangladesh. 50 per cent of all the tropical fruits produced worldwide are Mangoes. Mangoes are commercially grown in more than 80 countries. World production of mangoes is around 46 million tonnes and India is the world's biggest grower of mangoes, with a 40 per cent share of total world production. Export of mangoes has amplified significantly and increased by 2.6 times in the last decade. Leading mango exporting countries are India, Thailand, Brazil, Peru, Netherland and Pakistan and leading mango importing countries are United Arab Emirates, US, Saudi Arabia, UK, France, Germany and Malaysia. Only 3.4 percent of the mangoes are traded (1.65 mnT) of the total world mango production (49.1 mnT). Mexico, Thailand and Brazil export more of the mango produced. India's share in the world trade of mango is around 15 per cent, however, it is just 1.5 per cent of its total mango production. Total fruit production of India is about 90 million tonnes of which mango production is about 18 million tonnes sharing 20 % of the total fruit production. Leading mango producing states are Uttar Pradesh, Andhra Pradesh, Telangana, Karnataka, Bihar Gujrat, Maharashtra, and Tamil Nadu. Leading mango exporting states of the country are Maharashtra, Tamil Nadu, Gujrat, West Bengal, Karnataka and Andhra Pradesh.

**Objectives of the Study**

This study is undertaken with the following objectives:

- 1) To study the Area, Production and Productivity of Mango in India level.
- 2) To study the Area, Production and Productivity of Mango in Tamil Nadu level

**Research Methodology**

**Source of Data**

The present study is primarily based on secondary data. The data were collected from FAOSTAT, Horticultural Statistics at a Glance 2018, Horticulture Statistics Division, Department of Agriculture, Cooperation & Farmers Welfare and Websites.

**Statistical Techniques**

To analyze the collected data, various statistical techniques like descriptive, time series analysis are used. That is, as the data are of time series in nature, trend and growth both in compounded terms and linear terms are calculated in addition to general descriptive statistics like mean, standard deviation and coefficient of variation. The statistical significance of compound growth and linear trend is ascertained using student t-test.

The procedures for calculating descriptive statistics such as mean, standard deviation, and also for Compounded annualized growth rate (CAGR) and Linear growth rate (CAGR) are given hereunder:

**Mean ( $\bar{X}$ )**

$$\bar{X} = \frac{\sum X_i}{n}$$

Where,  $X_i$  is ratio of year 'i' and 'n' is number of years.

**Standard Deviation ( $\sigma$ )**

$$\sigma = \sqrt{\frac{\sum X_i^2}{n} - (\bar{X})^2}$$

Where,  $X_i$  is ratio of year 'i', 'n' is number of years and  $\bar{X}$  is mean score.

**Coefficient of Variation (CV)**

$$CV = \left(\frac{\sigma}{\bar{X}}\right) \times 100$$

**Compounded Annualized Growth Rate (CAGR)**

Consider the non-linear relationship between a study variable (Y) and time variable (X) as

$$Y = a b^X \dots (1)$$

By taking logarithms on both sides, it may be written as

$$\text{Log } Y = \text{log } a + \text{log } b X$$

Or simply say  $Y = A + BX$

The least square estimates of A and B are given by

$$\hat{\beta} = \left( \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}} \right)$$

$$\hat{A} = \bar{Y} - \hat{B}\bar{X}$$

Where,  $\bar{Y} = \frac{\sum y}{n}$  and  $\bar{X} = \frac{\sum x}{n}$

Here, n is number of time periods (years), an estimate of 'b' is given by  $\hat{b} = \text{Antilog}(\hat{B})$

Now, an estimate of Compounded Annualized Growth Rate (CAGR) =  $[\hat{b} - 1] \times 100$

### Linear Growth Rate (LGR)

Consider a linear relationship between a study variable (Y) and time variable (X) as

$$Y = a + b X$$

The Linear Growth Rate ( $\hat{b}$ ) is given by

$$\hat{b} = \left( \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}} \right)$$

The statistical significance of the growth and trend are ascertained using Student t-test.

### RESULTS AND DISCUSSION

**Table No.1**

**Area, Production and Productivity of Mango of different countries in the world during the year 2016**

Country	Area (Million HA)	Production (MT)	Yield (T/HA)
India	2.24	18.78	8.39
China	0.59	4.77	8.14
Thailand	0.41	3.43	8.36
Mexico	0.21	2.2	10.64
Indonesia	0.17	2.18	13.02
Pakistan	0.17	1.61	9.57
Brazil	0.08	1.42	17.95
Egypt	0.11	1.28	11.3
Bangladesh	0.15	1.16	7.59
Nigeria	0.13	0.92	6.87
Others	1.07	8.87	8.29
World	5.43	46.51	8.57

Source: FAOSTAT Website (<http://faostat3.fao.org/home/E>) accessed on 4<sup>th</sup> June, 2018

The above table exhibits that the cultivation of Mango in area and production in Million Tons level

stood at first place among the different countries. India yield mango in 8.39 (T/Ha) level.

**Table No.2**

**All India Area, Production and Productivity of Mango during the year from 2008-09 to 2017-18**

Year	Area (in '000 Ha)	Production( in '000MT)	Productivity (in MT / Ha)
2008-09	2309.00	12750.00	5.50
2009-10	2312.30	15026.70	6.50
2010-11	2297.00	15188.00	6.60
2011-12	2378.10	16196.40	6.80
2012-13	2500.00	18002.40	7.20
2013-14	2516.00	18431.30	7.30
2014-15	2163.50	18527.00	8.50
2015-16	2208.60	18642.50	8.40
2016-17	2212.20	19506.20	8.80
2017-18	2258.10	21822.30	9.70
<b>Total</b>	<b>23154.80</b>	<b>174092.80</b>	<b>75.30</b>
<b>Mean</b>	<b>2315.48</b>	<b>17409.28</b>	<b>7.53</b>
<b>SD</b>	<b>118.81</b>	<b>2621.05</b>	<b>1.28</b>
<b>CV</b>	<b>5.13</b>	<b>15.06</b>	<b>17.01</b>
<b>CAGR</b>	<b>-0.59</b> <b>(-1.08)</b>	<b>5.04***</b> <b>(9.22)</b>	<b>5.68***</b> <b>(12.66)</b>
<b>LGR</b>	<b>-13.51</b> <b>(-1.04)</b>	<b>834.55***</b> <b>(10.26)</b>	<b>0.41***</b> <b>(12.60)</b>

t-table value for 8 d.f @10% = 1.85; @5% = 2.30 @1% = 3.35.

\*Significant at 10% level; \*\*Significant at 5% level; \*\*\*Significant at 1% level.

**Source:** Horticultural Statistics at a Glance 2018

The trend and growth in area, production and productivity for mango in India are analyzed and the results of the analysis are reported in Table No.2. It is understood from the table that the area and production of mango with average of 2315.48 in thousand hectare and 17409.28 in thousand hectare have reached to 2258.10 in thousand hectare and 21822.30 thousand hectare after testing at as high as 2516.00 area in thousand hectare in 2013-14 and 21822.30 production in thousand million tons in the year 2017-18, in 2008-09 from 2309.00 area in thousand hectare and 12750.00 production in thousand million tons in 2008-09. In area level, negative compound growth rate of 0.59 per cent (CAGR = -0.59,  $t = -1.08$ ), in production level, significant compound

growth rate of 5.04 per cent (CAGR = 5.04,  $t = 9.22$ ,  $P < 0.01$ ) with crisscross movements respectively. In absolute value, the rate of negative growth is 13.51 area in thousand hectare LGR = -13.51,  $t = -1.04$ ), then significant growth is 834.55 production in thousand million tons (LGR = 834.55,  $t = 10.26$ ,  $P < 0.01$ ) on an average every year for area and production of mango in India level. In the case of productivity of mango, there has been a continuous uptrend to reach 9.70 in million tons / hectare in the end year from 5.50 million tons/hectare in the beginning year with significant compound growth rate of 5.68 in million tons/hectare on an average every year when measured in absolute value respectively.

**Table No.3**

**State wise Area, Production and Productivity of Mango in India during the year 2017-18.**

S.No	State/Uts	Area(in '000 Ha)	Production(in '000 MT)	Productivity(in MT/ Ha)
1	Andhra Pradesh	363.00	4,373.61	12.05
2	Arunachal Pradesh	-	-	-
3	Assam	4.68	48.44	10.34
4	Bihar	149.28	2,443.47	16.37
5	Chhatisgarh	77.03	461.73	5.99
6	Gujarat	162.77	1,207.78	7.42

7	Haryana	9.35	98.60	10.54
8	Himachal Pradesh	41.99	31.35	0.75
9	Jammu & Kashmir	12.96	30.35	2.34
10	Jharkhand	54.53	435.86	7.99
11	Karnataka	183.23	1,760.60	9.61
12	Kerala	83.12	439.20	5.28
13	Madhya Pradesh	45.52	654.79	14.38
14	Maharashtra	166.76	791.36	4.75
15	Mizoram	0.91	4.19	4.60
16	Nagaland	0.64	4.24	6.61
17	Odisha	199.08	805.77	4.05
18	Punjab	6.90	116.52	16.90
19	Rajasthan	4.97	87.37	17.58
20	Tamil Nadu	152.57	1,234.00	8.09
21	Telangana	115.99	1,080.14	9.31
22	Tripura	10.33	54.93	5.32
23	Uttar Pradesh	265.62	4,551.83	17.14
24	Uttarakhand	36.48	152.71	4.19
25	West Bengal	103.25	918.35	8.89
26	Others	7.17	35.14	4.90
	<b>Total</b>	<b>2,258.13</b>	<b>21,822.32</b>	<b>9.66</b>

*Source:* Horticulture Statistics Division, Department of Agriculture, Coopen & Farmers Welfare.

### State Wise - Area Level:

The cultivated area of Mango is high in Andhra Pradesh with 363.00 Thousand Hectare followed by Uttar Pradesh (265.62 Thousand Hectare) and Odisha (199.08 Thousand Hectare). Next to these states, the cultivated area of mango was at substantial level in Karnataka (182.23 Thousand Hectare) Maharashtra (166.76 Thousand Hectare) and Gujarat (162.77 Thousand Hectare). The total area of Mango was 2,258.13 Thousand Hectare during the year 2017-18.

### State Wise - Production Level:

The above table shows that the production of Mango is high in Uttar Pradesh with 4,551.83 Thousand Million Tons followed by Andhra Pradesh (4,373.61 Thousand Million Tons) and Bihar (2,443.47 Thousand Million Tons). Next to these states, the production of

Mango was at sufficient level in Karnataka (1,760.60 Thousand Million Tons) Tamil Nadu (1234.00 Thousand Million Tons) and Gujarat (1,207.78 Thousand Million Tons) and rest of the states, the production of Mango was increased at significant level. The total production of Mango was 21,822.32 Thousand Million Tons during the year 2017-18.

### State Wise - Productivity Level:

The above table exhibits that the productivity of Mango is high in Rajasthan with 17.58 in MT/ Ha followed by Uttar Pradesh (17.14 in MT/ Ha) and Punjab (16.90 in MT/ Ha). Next to these states, the productivity of Mango in Bihar (16.37 in MT/ Ha), Madhya Pradesh (14.38 in MT/ Ha) and Andhra Pradesh (12.05 in MT/ Ha) are increased at significant level, and rest of the state, the productivity of Mango was crisscross movement. The total productivity of Mango was 9.66 in MT/ Ha during the year 2017-18.

**Table No.4**  
**District-Wise Area, Production and Productivity of Mango in Tamil Nadu during the year 2018-19 (Final Estimates - Provisional)**

S.No	District	Area in Ha	Production in MT	Productivity in MT/Ha
1	Ariyalur	530.00	4,240.00	8.00
2	Coimbatore	2,462.22	14,770.00	6.00
3	Cuddalore	522.00	4,150.00	7.95
4	Dharmapuri	18,388.00	169,270.00	9.21
5	Dindigul	15,742.00	143,031.45	9.09
6	Erode	781.00	6,370.09	8.16
7	Kanchipuram	3,998.00	39,980.00	10.00
8	Kanniyakumari	1,319.00	7,251.50	5.50
9	Karur	822.00	4,110.00	5.00
10	Krishnagiri	33,679.00	151,555.50	4.50
11	Madurai	6,253.15	35,830.53	5.73
12	Nagapattinam	3,165.00	25,320.00	8.00
13	Namakkal	2,393.00	15,322.90	6.40
14	Perambalur	150.00	975.00	6.50
15	Pudukkottai	1,562.00	15,620.00	10.00
16	Ramanathapuram	393.00	2,550.00	6.49
17	Salem	6,262.90	37,577.40	6.00
18	Sivagangai	2,218.00	26,616.00	12.00
19	Thanjavur	780.00	5,012.00	6.43
20	Theni	9,640.00	81,940.00	8.50
21	Nilgiris	17.03	72.38	4.25
22	Thiruvallur	11,057.67	121,634.00	11.00
23	Tiruvannamalai	1,009.67	8,072.00	8.00
24	Thiruvarur	325.00	2,350.00	7.23
25	Tututorin	695.15	6,951.50	10.00
26	Tiruppur	1,568.05	10,079.42	6.43
27	Tiruchirappalli	2,239.00	16,119.00	7.20
28	Tirunelveli	5,933.00	77,810.50	13.11
29	Vellore	12,319.00	160,147.00	13.00
30	Villupuram	1,387.26	8,808.77	6.35
31	Virudhunagar	3,335.00	14,200.00	4.26

	<b>Total</b>	<b>150,945.43</b>	<b>1,217,736.94</b>	<b>8.07</b>
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**Source:** Horticulture and Plantation Crops – Tamil Nadu

### District Wise - Area Level:

The cultivated area of Mango is high in Krishnagiri (18,388.00 Thousand Hectare) followed by Dharmapuri (12,319.00 Thousand Hectare) Thiruvallur (11,057.67 Thousand Hectare) and Theni (9,640.00 Thousand Hectare). The total area of Mango was 150,945.43 Thousand Hectare during the year 2018-19.

### District Wise - Production Level:

The above table shows that the production of Mango is high in Dharmapuri with 169,270.00 Thousand Million Tons followed by Vellore (160,147.00 Thousand Million Tons) and Krishnagiri (151,555.50 Thousand Million Tons). Next to these districts, the production of Mango was at sufficient level in Dindigul (143,031.45 Thousand Million Tons) Thiruvallur (121,634.00 Thousand Million Tons) and Theni (81,940.00 Thousand Million Tons) and rest of the districts, the production of Mango was increased at significant level. The total production of Mango was 1,217,736.94 Thousand Million Tons during the year 2018-19..

### District Wise - Productivity Level:

The above table exhibits that the productivity of Mango is high in Tirunelveli with 13.11 in MT/ Ha followed by Vellore (13.00 in MT/ Ha) and Sivagangai (12.00 in MT/ Ha). Next to these districts, the productivity of Mango in Thiruvallur (11.00 in MT/ Ha), Madhya Pradesh (14.38 in MT/ Ha) and Kancheepuram&Tutorin (10.00 in MT/ Ha) are increased at significant level, and rest of the districts, the productivity of Mango was crisscross movement. The total productivity of Mango was 8.07in MT/ Ha during the year 2018-19.

### Conclusion

The mango fruit's nutritional value, aesthetic and gustatory appeal have assured its growing importance in non-traditional markets since the late 1950s, as it has been introduced to consumers previously unacquainted with it. Furthermore, the migration of large populations from South-east Asia and other regions where this fruit is a traditional crop to metropolitan centres where it has not been well known has created a permanent demand for it in these new markets. Mangoes

from the state of Kerala accounted for over six billion Indian rupees in the Indian economy in fiscal year 2018.

This value was slightly higher than the previous year's

contribution of mangoes from the state. Uttar Pradesh was the largest contributor to the agricultural gross value added for mangoes amongst other states in the south Asian country, followed by Andhra Pradesh.

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