



A STUDY ON GROWTH AND PRODUCTION PERFORMANCE OF COCONUT INDUSTRY IN TAMIL NADU

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Abstract

In this paper study the trend and growth of coconut production in Tamil Nadu during the period from 2010-11 to 2019-20. Indonesia is the highest coconut producing country in the world. India accounts for 22.34 per cent of the world's coconut production and is one of the major players in the world's coconut trade. The Karnataka is the highest coconut production 30.83 share of percentage in India level. Coimbatore got the first rank in coconut production in Tamil Nadu level. Status of Tamil Nadu, it is understood that year on year increase of 0.70 per cent when measured in terms of compound rate of 2,966.30 area in hectare in terms of absolute values on the average in area was significant for coconut. But from the coefficient of variation values, it is apparent that the trend and growth in productivity (CV = 16.05) and production (CV = 14.44) is highly inconsistent compared to that of area (CV = 2.21) in coconut. As increase in area was not proportionate to an increase in production, there had been a notable decline

(CAGR = -3.13, $t = -2.57$, $p = < 0.01$) and productivity (CAGR = -3.81, $t = -3.09$, $p = < 0.05$) during the study period.

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

INTRODUCTION

In the Pacific, coconuts likely were first cultivated on islands in Southeast Asia, meaning the Philippines, Malaysia, Indonesia, and perhaps the continent as well. In the Indian Ocean, the likely center of cultivation was the southern periphery of India, including Sri Lanka, the Maldives and the Laccadives. In Portuguese, 'coco' means 'grinning face' or 'monkey face' – (derived from the Portuguese for monkey – 'macaco') because that's what the three dark circles on the shell resembled. Hence the Latin name for the palm: *Cocos Nucifera* ('nucifera' means nut-bearing). Today, the main producers in the world are Indonesia, the Philippines and India. Increase In Demand (2022) : At 7.3% CAGR, The “Coconut Market” Size is expected to grow from 11680 million USD In 2020, to reach 19230 Million USD by 2026, The base year considered for the study is 2021, and the forecast period is between 2022 and 2026. Now the coconut economy of India is in a convenient status. India accounts for 22.34 per cent of the world's coconut production and is one of the major players in the world's coconut trade. Currently the crop is grown in 1.91 million ha with an annual production of nearly 13000 million nuts.

REVIEW OF LITERATURES

M. Lathika and C.E. Ajith Kumar (2005), in their study area effect continues to assume greater role in output growth by almost all coconut regions of the country, though some States like Kerala and Orissa recently showed signs of a productivity-based growth of output. Being a crop with a long gestation period, prudence should prevail before displacing other crops and a relative assessment of consequent gains and losses of this crop against other stake holding crops of the respective regions may prove worthwhile in the long run. Though some States like Andhra Pradesh and Karnataka are already on the path of vast area expansion, some other regions, particularly, Kerala, Tamil Nadu, Andaman and Nicobar islands, which reportedly experience severe land pressures, have registered a retarded growth in area recently. Avenues of re-planting or dense-planting of the crop should be explored vigorously in some of the traditionally coconut-growing regions like Goa, Andaman and Nicobar Islands etc., where the current yield level is abysmally low with practically no growth in the second phase and a substantial share of the net sown area was already claimed by the crop. Generally, in phase II, high area-growth with low-area-instability was a more prevalent phenomenon among Indian States than high-yield-growth with low-yield-instability. Although area expansion of the crop is still a viable option for certain regions of the country, it emerges that the problem of growth stability in yield had been trickier to tackle with than the problem of stability in area growth and it warrants urgent attention.

Muyengiet al. (2015) assessed the production of coconuts and factors affecting the production of coconut and to advise suitable research and development areas in coconut sub-sector in Tanzania. Data were analyzed using descriptive statistics and Multiple Regression Model. Results showed that palm population was 50 tree/ha which is below the recommended by 60.8%.

Kishore& Murthy (2016) were estimated the growth in area, production and productivity of coconut in Karnataka and its districts using compounded annual growth rate analysis. The necessary secondary data was collected for a period of fifteen years from 2000-2001 to 2014-15. Growth rates in area, production and productivity of coconut in Karnataka state was positive and significant

J. Nehru Naik(2017), the present study seeks to examine the growth trends in area, production and productivity in major coconut growing countries. It focuses on the performance of different countries in coconut production and also observed magnitude of variations in production trend. The study is based on secondary data obtained from reports of Food and Agriculture Organization of the United Nations. The time period considered for this study is span of 15 years from 2005-06 to 2014-15 and out of the 97 coconut producing countries, 15 countries are selected as sample of the study. The study used average, coefficient of variation, Instability, Compound Annual growth and Semi-Log function for analyzing the data. The results reveal that the leading coconut producing countries in world, viz. Brazil, Malaysia, Vanuatu, Ghana, Papua New Guinea. Among the countries of the world, the coconuts productivity in the Ghana had increased highest followed by Papua New Guinea, India, Vanuatu, Malaysia, Sri Lanka and Myanmar

Raghavi. MD , Sakthi Balaa. M , Surender. S , Lokesh. P & Kalidas. K (2019) ,Coconut plays an important role in contributing to India's GDP of about 15,000 crore rupees and 72% of world's total production is from India and productivity is also high in India. In India, Tamil Nadu tops the list in the productivity of coconut, but production is high in Karnataka and Kerala tops in the area. In Tamil Nadu, Cuddalore district ranks first in productivity of coconut followed by Krishnagiri and Theni. Production wise, Tiruppur and Thanjavur rank first. Coconut, a versatile crop being used for various uses, but in India, almost 70 % of the coconut is used for the edible purpose.

STATEMENT OF THE PROBLEM

The problems of low income from the coconut holdings due to price fluctuations, decline in the prices of coconut and its products which necessitated the need for the development of appropriate coconut based farming systems to enhance the farm level income. The stiff import duties imposed on the edible oils and restricted import of the coconut products played an important role in keeping the domestic price high. Hence the structural rigidities in the coconut industry have been keeping a hold on its performance. The industry has not been able to unleash its true potential mainly because of its oil driven market. However by realizing the imperative need to become competitive, the industry is now undergoing modernization, product diversification and byproduct utilization and restructuring process. Consumer demands for varied high value coconut products are tremendously increasing and hence the domestic industries have become vibrant. This in turn would help make the industry globally competitive.

OBJECTIVES OF THE STUDY

This study is undertaken with the following objectives:

- 1) To study the growth of Coconut Production in India
- 2) To study the growth of Coconut Production in Tamil Nadu
- 3) To study the growth of Coconut Production in Tiruvannamalai District.

RESEARCH METHODOLOGY**Research Design**

The Purposive sampling techniques has been adopted in this article.

Source of Data

The present study is primarily based on secondary data. The data were collected from Horticulture Division, Department of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Government of India and various websites.

Period of the study

The present study covers a period of 10 years from 2010-11 to 2019-20.

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 (σ)

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

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

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

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

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

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

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

Leading Key Players in the Global Coconut Market 2022:

Pepsico, Yeshu, Coca-Cola (Zico), KKP Industry, Viva Labs, Dutch Plantin, Theppadungporn Coconut, COCO and CO, Renuka Holdings PLC, Coconut Dream, Radha, Dangfoods, Maverick Brands, Molivera Organics, PT. Global Coconut, So Delicious, Coconut Organics, Premium Nature, Creative Snacks, Eco Biscuits etc.

RESULTS AND DISCUSSION

TABLE - 1
Country – Wise Coconut Production during the year 2020

Country	(In Million Metric Tonnes)	Rank
Indonesia	16.82	1
India	14.7	2
Philippines	14.49	3
Brazil	2.46	4
Sri Lanka	2.23	5
Vietnam	1.72	6
Papua New Cuinea	1.22	7
Mexico	0.9	8
Thailand	0.83	9
Malaysia	0.56	10
Total	55.93	

Source: <https://www.statista.com/statistics/1040499/world-coconut-production-by-leading-producers/>

The above table exhibits that the rank wise coconut production of countries in the world. Indonesia is the highest coconut producing country in the world because this country stood as first place among the different countries in the world followed by the India, Philippines, Brazil, Sri Lanka, Vietnam, Papua New Cuinea, Mexico, Thailand , Malaysia and so on. However India got 2nd rank of coconut production in the world. The above scenario is presented in bar diagram under Figure -1

Country – Wise Coconut Production during the year 2020

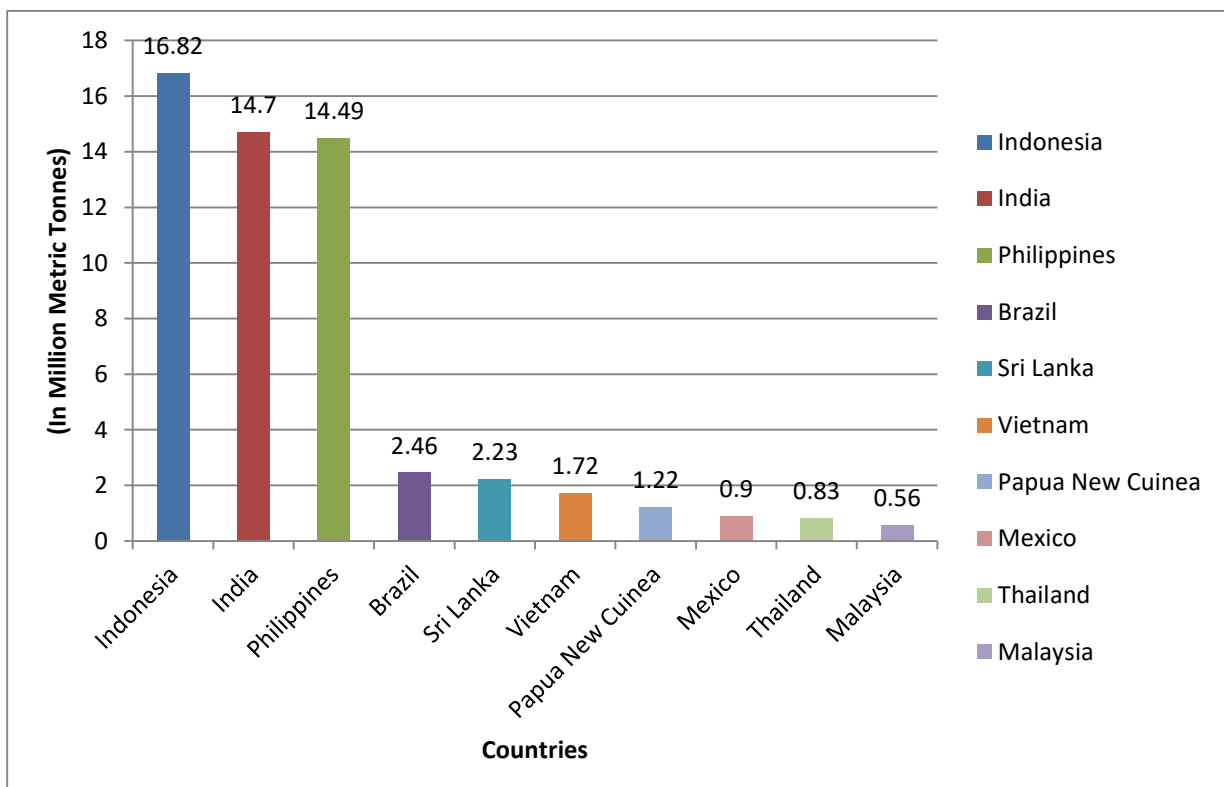


TABLE - 2
Area, Production and Productivity of Coconut in India during the year
from 2010-11 to 2019-20

year	Area ('000 Ha)	Production (Million Nuts)	Productivity (Nuts Per Ha)
2010-11	1895.90	16942.92	8937
2011-12	2070.70	23351.22	11277
2012-13	2136.67	22680.03	10615
2013-14	2140.50	21665.19	10122
2014-15	1975.81	20439.60	10345
2015-16	2088.47	22167.45	10614
2016-17	2082.11	23904.10	11481
2017-18	2096.72	23798.23	11350
2018-19	2150.89	21288.24	9897
2019-20	2173.28	20308.70	9345
Total	20811.05	216545.68	103983
Mean	2081.11	21654.57	10398.3
SD	85.49	2094.18	851.07
CV	4.12	9.67	8.18
CAGR	0.84	0.97	0.137
P Value (Calculated Value)	0.067	0.423	0.891
Table Value	2.116	0.844	0.141
Significant / Insignificant	Significant	Significant	Insignificant

Source: Horticulture Division, Dept. of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Govt. of India.

The trend and growth in coconut area in thousand hectares and production in million nuts and productivity in nuts / per hectare for India are analyzed and the results of the analysis are reported in Table – 2. It is understood from the table that the area and production of the coconut in India with the average of 2081.11 area in thousand hectare and 21,654.57 in production in million nuts have reached to 2,173.28 area in thousand hectare and 20,308.70 production in million nuts after testing at as high as 2,173.28 area in thousand hectare in 2019-20 and 23,904.10 production in million nuts in 2016-17 from 1,895.90 area in thousand hectare and 16,942.92 production in million nuts in 2010-11. The compound growth rate is significant for the segments like coconut area (0.84 per cent), coconut production (0.97 per cent) respectively. Productivity of the compound annual growth rate is 0.137 per cent and also insignificant growth during the study period.

TABLE -3

State – Wise Coconut Production in India during the year 2021-22

Sl No.	State	Production (000 Tonnes)	Share (%)
1	Karnataka	4,210.87	30.83
2	Tamil Nadu	3,751.26	27.47
3	Kerala	3,307.78	24.22
4	Andhra Pradesh	1,127.27	8.25
5	West Bengal	278.73	2.04
6	Orissa	273.32	2.00
7	Maharashtra	153.44	1.12
8	Gujarat	147.26	1.08
9	Assam	107.94	0.79
10	Bihar	54.06	0.40
11	Tripura	12.72	0.09
12	Chattisgarh	9.35	0.07
13	Nagaland	6.16	0.05
14	Telangana	6.06	0.04
15	Arunachal Pradesh	0.21	0.00
16	Mizoram	0.10	0.00
17	Others	210.85	1.54
Page Total		13,657.38	

Source: National Horticulture Board (NHB)
2021-22 (1st Adv. Estimate)

The above table explains that the State – Wise Coconut Production in India during the year 2021-22. The Karnataka is the highest coconut production 30.83 share of percentage followed by the Tamil Nadu, Kerala and so on.

TABLE - 4

Area, Production and Productivity of Coconut in Tamil Nadu during the year from 2010-11 to 2019-20

year	Area (Ha)	Production (Lakh Nuts)	Productivity (Nuts / Ha)
2010-11	410149	58942	14371
2011-12	419400	62009	14785
2012-13	424121	50747	11965
2013-14	428538	46680	10893
2014-15	427842	49890	11661
2015-16	434875	59626	13711
2016-17	435673	47064	10803
2017-18	436022	41765	9579
2018-19	439746	40929	9307
2019-20	438935	49474	11271
Total	4295301	507126	118346
Mean	429530.1	50712.6	11834.6
SD	9502.063	7320.78	1898.86
CV	2.21	14.44	16.05
CAGR	0.70	-3.13	-3.81
t-Value	(7.97)***	(-2.57)***	(-3.09)**
LGR	2966.30	-1616.93	-463.01
t-Value	(8.18)***	(-2.54)***	(-3.10)**

t – table value for 9 d.f @10%=1.833; @5% = 2.262; @1% = 3.250

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

Source: <http://www.coconutboard.gov.in/presentation/statistics/statistics.aspx>

It is observed from the table – 4, which shows the status of coconut in area, production and productivity of Tamil Nadu during the year from 2010-11 to 2019-20. It is understood that year on year increase of 0.70 per cent when measured in terms of compound rate of 2,966.30 area in hectare in terms of absolute values on the average in area was significant for coconut. But from the coefficient of variation values, it is apparent that the trend and growth in productivity (CV = 16.05) and production (CV = 14.44) is highly inconsistent compared to that of area (CV = 2.21) in coconut. As increase in area was not proportionate to an increase in production, there had been a notable decline (CAGR = -3.13, $t = -2.57$, $p = < 0.01$) and productivity (CAGR = -3.81, $t = -3.09$, $p = < 0.05$) during the study period.

TABLE – 5
Rank – Wise Area, Production and Productivity of Coconut in Tamil Nadu on 2019-20

Sl.No.	Districts	Area (Ha)	Rank	Production (Lakh Nuts)	Rank	Productivity (Nuts/Ha)	Rank
1	The Nilgiris	51	37	4	37	7843	22
2	Chennai	61	36	6	36	9836	15
3	Kallakurichi	245	35	18	35	7347	23
4	Ariyalur	320	34	20	34	6250	27
5	Kancheepuram	559	33	31	32	5546	29
6	Thiruvallur	591	31	66	29	11168	12
7	Thiruvannamalai	591	31	40	31	6768	25
8	Perambalur	663	30	28	33	4223	33
9	Ranipet	915	29	41	30	4481	31
10	Villupuram	1522	28	109	27	7162	24
11	Cuddalore	1648	27	191	25	11590	10
12	Chengalpattu	1905	26	76	28	3990	35
13	Nagapattanam	3088	25	200	24	6477	26
14	Thirunelveli	5090	24	276	21	5422	30
15	Thiruchy	5123	23	212	23	4138	34
16	Thiruvavur	5737	22	686	16	11957	9
17	Thoothukudi	6191	21	264	22	4264	32
18	Karur	6735	20	602	19	8938	17
19	Sivagangai	7372	19	605	18	8207	19
20	Ramanathapuram	7401	18	146	26	1973	37
21	Dharmapuri	7619	17	612	17	8033	20
22	Vellore	8114	16	1114	12	13729	5
23	Namakkal	9064	15	1339	11	14773	3
24	Virudhunagar	10020	14	594	20	5928	28
25	Pudukkottai	10021	13	797	15	7953	21
26	Madurai	10388	12	1652	8	15903	2
27	Tirupattur	11351	11	1492	9	13144	7
28	Tenkasi	11618	10	1050	13	9038	16

29	Salem	12659	9	1689	6	13342	6
30	Erode	14686	8	1446	10	9846	14
31	Krishnagiri	14767	7	1668	7	11295	11
32	Theni	21318	6	2167	5	10165	13
33	Kanniyakumari	24429	5	942	14	3856	36
34	Dindigul	28657	4	3722	4	12988	8
35	Thanjavur	38777	3	5528	2	14256	4
36	Tiruppur	61890	2	5159	3	8336	18
37	Coimbatore	87749.2	1	14882	1	16960	1
	Total	438935.2		49474		327125	

Source: <http://www.coconutboard.gov.in/presentation/statistics/statistics.aspx>

The above table reveals that rank – wise area, production and productivity of coconut in Tamil Nadu during the year 2019-20. It may be observed that Coimbatore District was the leading area of coconut followed by the Triuppur, Thanjavur, Dindigul, Kanniyakumari, Theni, Krishnagiri, Erode, Salem, Tenkasi and so on. The Nilgiri District got last rank area in coconut in Tamil Nadu, on the other hand, in the coconut production, Coimbatore District was the first rank followed by the Thanjavur, Tiruppur, Dindigul, Theni, Salem, Krishnagiri, Madurai, Tirupattur, Erode and so on. The Nilgiri also got last rank in coconut production in Tamil Nadu. In productivity level, Coimbatore District was the first rank followed by the Madurai, Namakkal, Thanjavur, Vellore, Salem, Tirupattur, Dindigul, Thiruvarur, Cuddalore and so on. Ramanathapuram District got last rank in productivity of coconut in Tamil Nadu.

TABLE - 6

Area, Production and Productivity of Coconut in Tiruvannamalai District during the year from 2010-11 to 2019-20

year	Area (Ha)	Production (Lakh Nuts)	Productivity(Nuts / Ha)
2010-11	719	106	14743
2011-12	803	134	16687
2012-13	688	79	11483
2013-14	624	50	8013
2014-15	442	46	10407
2015-16	479	31	6472
2016-17	431	31	7193
2017-18	493	42	8519
2018-19	504	33	6548
2019-20	591	40	6768
Total	5774	592	96833
Mean	577.4	59.2	9683.3
SD	128.017	35.56	3611.77
CV	22.17	60.06	37.30
CAGR	-4.57 (-2.43)**	-13.31 (-4.19)*	-9.16 (-4.5)*
LGR	-28.86 (-2.64)**	-9.44 (-3.82)*	-993.72 (-4.26)*

t – table value for 9 d.f @10%=1.833; @5% = 2.262; @1% = 3.250

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

Source: <http://www.coconutboard.gov.in/presentation/statistics/statistics.aspx>

The above table shows that area, production and productivity of coconut in Tamil Nadu and also all over negative growth throughout the study period.

CONCLUSION

Coconut plays a significant role in the agrarian economy of India. The coconut tree provides food, fuel, cosmetics, and folk medicine and building materials, among many other uses. The inner flesh of the mature seed, as well as the coconut milk extracted from it, form a regular part of the diets of many people in the tropics and subtropics. Under the aegis of the Ministry of Agriculture and Farmers Welfare, the Coconut Board of India has implemented many programs to develop the coconut industry in the country. Some of the schemes include production and distribution of quality planting material, expansion of area under cultivation, technology demonstration and improvement, replanting and rejuvenation, support exporters for participating in international events, training for market promotion of export specific products, developing market for coconut products globally by creating opportunities, etc. Other schemes such as Coconut Palm Insurance Mission and Kera Suraksha Insurance Scheme help protect the farmers from natural calamities and losses.

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