

Short Communication

## Performance of coconut in India: A trend analysis

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### Abstract

Coconut farming plays a vital role in the agrarian economy of Kerala besides its unique place in the socio-cultural fabric of the region. It has an imperative role in terms of cropping area as well as in generating significant share in the agricultural income of the state. In this context this article tries to understand the importance of coconut in the plantation economy of Kerala by looking into the relative importance of coconut in terms of area, production and productivity trends at national and state level from 1980 to 2015. In India, area, production and productivity of coconut showed an increasing trend. As compared to Indian scenario, there was no continuous increasing trend observed in the case of area and production of coconut in Kerala. However, the productivity showed an increasing trend during the same period. The compound growth rate in area, production and productivity of coconut in India as well as in Kerala during the above period was also estimated.

**Keywords:** Compound growth rate, Productivity, Trend.

Coconut is a plantation tree crop cultivated around the world. It exerts a profound influence on the rural economy of India by supporting the livelihoods of more than 10 million people in the country. It also contributes to the national agrarian economy with an annual contribution of Rs. 9000 crores to the GDP and foreign exchange earnings of about Rs. 1200 crores (Chowdappa and Jayasekhar, 2016). India has produced 22167 million nuts from an area of 2.09 million hectares with a productivity of 10614 nuts per hectare in the year 2015-16, and stands third in world area and first in production with the share of 17 per cent and 31 per cent respectively (CDB, 2017). The area under coconut in the country had steadily gone up from 1.08 million hectares in 1980 to 2.09 million hectares in 2015-16 indicating an increasing trend in the long run. Among the major coconut growing states in India, Kerala, the “*land of coconuts*” has the longest history of coconut cultivation. The area and production of coconut in

Kerala is 0.79 million hectares and 5873 million nuts respectively. Even though it has the largest area under coconut (38.5%) in the country, its production and productivity are less than that of other major coconut producing states like Tamil Nadu, Karnataka and Andhra Pradesh (GOK, 2016). Hence, the present study was carried out to analyze the trend and growth in area, production and productivity of coconut in India and Kerala.

Trend in area, production and productivity of coconut was analysed using secondary time series data collected from Coconut Development Board, Kochi. The compound growth rates of area, production and productivity of coconut were worked out by fitting exponential function in the form of,

$$Y_t = ab^t$$

Where,

Y : Area/production/productivity of coconut in

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India/Kerala

- a : Intercept
- b : Regression coefficient
- t : Number of years

Taking logarithms on both sides to transform this equation to log linear form,

$$\ln Y_t = \ln a + t \ln b$$

$$Y_t' = A + Bt$$

Where,

- $Y_t'$  :  $\log Y_t$
- A :  $\log a$
- B :  $\log b$

The method of ordinary least squares was adopted to estimate the co-efficient (b). Compound growth rate in percentage was calculated using the relationship,

$$\text{Compound Growth Rate (CGR)} = (\text{Antilog } B - 1) \times 100$$

The significance of the regression coefficient was tested using the student's t- test as

$$t = b / SE(b)$$

Where,

b = regression co-efficient

SE (b) = standard error of regression co-efficient b

*Trend in area, production and productivity of coconut*

An attempt has been made in this section to analyse the growth pattern of coconut in India and Kerala with respect to area, production and productivity during 1980-2015 and the results are explained under two headings viz., Indian scenario and Kerala scenario.

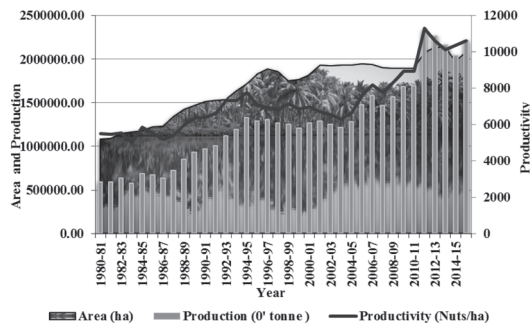


Figure 1. Area, production and productivity of coconut in India

*Indian scenario*

The time series data on area, production and productivity of coconut in India during the period from 1980 to 2015 as presented in Fig. 1 revealed that India has produced 22167 million nuts from an area of 2.09 million hectares with a productivity of 10614 nuts per hectare in the year 2015-16. The area under coconut in India had steadily gone up from 1.08 million hectare in 1980 to 2.09 million hectares in 2015-16 and the production increased from 5942 million nuts to 22167 million nuts during the same period. The productivity had increased from 5485 nuts per hectare to 10614 nuts per hectare for the above period. Peak production of coconut was observed in the year 2011-12 which decreased continuously for three years from 2012 to 2014 and then increased in 2015-16. The area, production and productivity of coconut in India during the period from 1980-81 to 2015-16 as shown in Figs. 2, 3 and 4 showed an increasing trend.

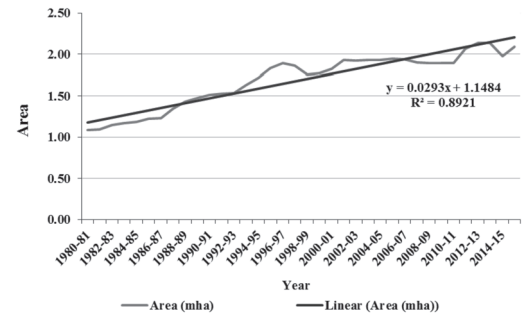


Figure 2. Trend in area under coconut in India

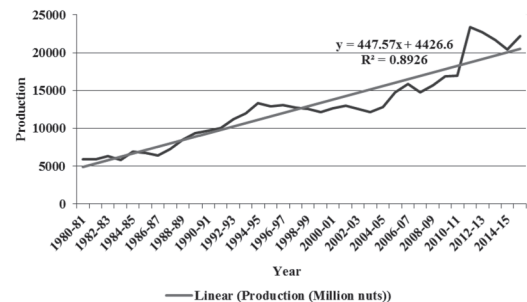


Figure 3. Trend in production of coconut in India

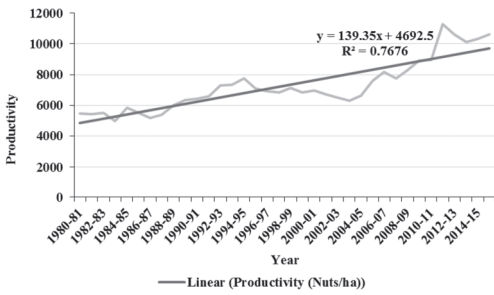


Figure 4. Trend in productivity of coconut in India

The results from the above trend analysis of area, production and productivity of coconut in India were in line with the findings of Thamban et al. (2016) who observed a positive trend in coconut area and production during the period from 2000 to 2015. Gopalakrishnan (2013) also reported a perceptible increase in coconut area and production from 1950 to 2010-11 especially during 1980s when the field level network of Coconut Development Board was widened.

*Kerala scenario*

The trend in area, production and productivity of coconut in Kerala during the period from 1980 to 2015 is presented in Fig. 5. Kerala occupied the first position in area (0.79 million hectares) under coconut and second in production (5873 million nuts) of coconut in the year 2015-16, with a productivity of 7432 nuts per hectare. The maximum area under coconut in Kerala was observed during 2000-01 which was about 0.925 million hectares. Even though the peak production of coconut was observed in the year 2005-06, the productivity was

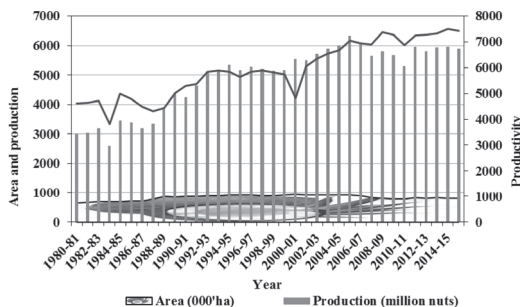


Figure 5. Area, production and productivity of coconut in Kerala

at its maximum during 2014-15. As is clear from Figs. 6, 7 and 8, when compared to Indian scenario, there was no continuous increasing trend in the case of area and production during the period from 1980 to 2015. However, the productivity showed an increasing trend during the same period.

The above result of trend analysis of area, production and productivity of coconut in Kerala was in line with the findings of Gopalakrishnan (2013) and Thamban et al. (2016), who reported that Kerala’s share in the total area under coconut in the country (2013-14) had declined to 38 per cent

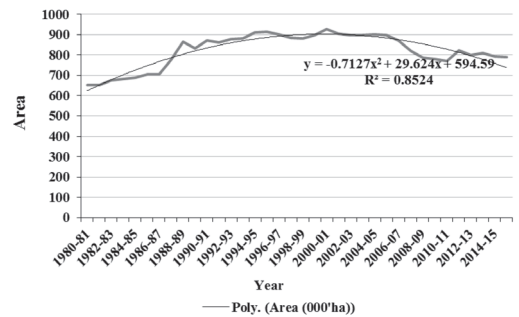


Figure 6. Trend in area under coconut in Kerala

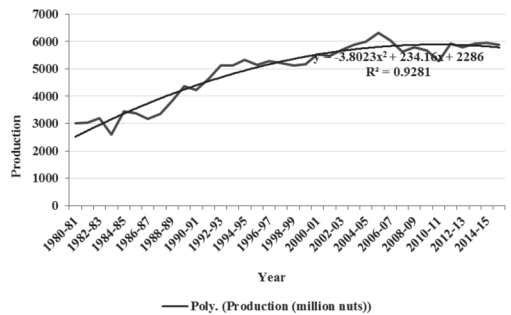


Figure 7. Trend in production of coconut in Kerala

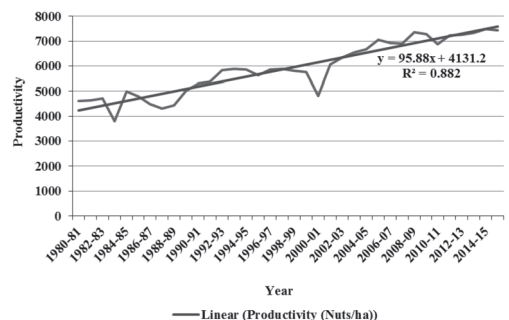


Figure 8. Trend in productivity of coconut in Kerala

from 62 per cent in 1950-51. The decline in area and production of coconut could be attributed to more than one reason. Incidence of pests and diseases, especially root (wilt) disease, fragmentation of land holdings to uneconomic levels and lack of adoption of technology were the major reasons attributed to the declining trend of coconut economy of Kerala as opined by Aravindakshan (1995) and Thamban et al. (2016).

#### *Growth rates of area, production and productivity of coconut*

The results of trend analysis have provided an overview of the changes in area, production and productivity of coconut in India and Kerala. In order to incorporate the year to year variation in area, production and productivity, its compound growth rate has been computed.

Growth rate of a variable may be defined as the rate of change per unit of time, usually a year. Here, exponential growth model was fitted to the time series data on area, production and productivity of coconut and the results are discussed under two headings *viz.*, India and Kerala. The entire period (1980-2015) has been divided into two sub periods namely Period I (1980-1995) and Period II (1996-2015). For the two sub-periods as well as for the entire period, the compound growth rates in area, production and productivity of coconut were estimated.

#### *India*

The estimated growth rate of area, production and productivity of coconut in India for the entire period and sub-periods using exponential model is shown in Table 1.

Growth rate in area, production and productivity of coconut in India showed that, during the entire period under study there was significant and positive growth in area (1.92 per cent), production (3.77 per cent) and productivity (1.92 per cent). It was observed that the combined influence of growth in area and productivity resulted in significant and positive growth in production during the same

*Table 1.* Compound growth rate of area, production and productivity of coconut in India

Particulars	Growth rate (%)	t value	R <sup>2</sup>
<b>Whole period (1980-2015)</b>			
Area	1.92*	14.69	0.86
Production	3.77*	19.72	0.92
Productivity	1.92*	11.81	0.80
<b>Period I (1980-1995)</b>			
Area	3.56*	25.35	0.98
Production	6.08*	15.79	0.94
Productivity	2.43*	6.93	0.87
<b>Period II (1996-2015)</b>			
Area	0.80*	5.34	0.63
Production	3.98*	9.66	0.85
Productivity	3.15*	8.36	0.80

\* Significance at five per cent level

period. During period I, the growth in area, production and productivity was 3.56 per cent, 6.08 per cent and 2.43 per cent respectively which revealed that the higher growth in production was due to the combined contribution of both area and productivity. In contrast to period I, even with a high growth rate in productivity of 3.15 per cent, in period II, the production growth was low (3.98 per cent) due to stagnant growth in area (0.8 per cent). The above analysis on the growth performance of coconut in India revealed that area, production and productivity of coconut had shown an increasing trend with an exception of growth in area and production during Period I, while in period II, the growth rate was lower for production due to stagnant growth in area in spite of a higher productivity. However, the overall growth in area, production and productivity during the entire period under study was significant and positive. It may be noted that coconut being a perennial crop with long gestation period, the influence of changes in area would be reflected on production only after a time lag.

The above result was in conformity with the findings of Lathika and Kumar (2005) who had reported increasing growth in area, production and productivity of coconut in India. The reports of Gopalakrishnan (2013) who estimated a higher growth rate in area (2.64 per cent) production (3.88 per cent) and productivity (1.21 per cent) during the twenty year period from 1980 to 2000 also substantiated the above findings.

### Kerala

In case of Kerala, the growth rate of area, production and productivity of coconut was 0.4 per cent, 2.12 per cent and 1.71 per cent respectively (Table 2) during the entire period, in which the higher growth in productivity contributed much to production rather than area growth. In the period wise analysis, growth rate in area (2.63 per cent) and productivity (2.02 per cent) was positive and significant during period I. The combined influence of positive growth rates in area and yield resulted in significant and high growth in production (4.71 per cent) during the above mentioned period. In contrast to period I, Period II showed stagnant production (0.6 per cent) due to the combined influence of a significant negative growth rate in area (-0.89 per cent) and significant and positive growth rate in productivity (1.71 per cent). But the productivity growth was lower in Period II as compared to that of Period I. The above results on the trend in growth of area, production and productivity of coconut in Kerala were in line with the findings of Thamban et al. (2016) who reported lower growth in area during the period from 2000-01 to 2013-14, with a compound growth rate of -0.96 per cent and revealed that productivity effect had greater role in coconut production compared to area. Lathika and Kumar (2005) also reported lower growth in both area (1.56 per cent) and production (1.21) of coconut in Kerala and thus revealed that even though area effect continues to assume a greater role in output growth in almost all coconut growing regions of the country,

Table 2. Compound growth rate of area, production and productivity of coconut in Kerala

Particulars	Growth rate (%)	t value	R <sup>2</sup>
<b>Whole period (1980-2015)</b>			
Area	0.40*	2.804	0.18
Production	2.12*	10.87	0.78
Productivity	1.71*	14.32	0.86
<b>Period I (1980-1995)</b>			
Area	2.63*	12.86	0.92
Production	4.71*	10.03	0.88
Productivity	2.02*	4.43	0.58
<b>Period II (1996-2015)</b>			
Area	-0.89*	-6.56	0.71
Production	0.60*	3.202	0.36
Productivity	1.71*	6.81	0.72

\* Significance at five per cent level

some states like Kerala recently showed signs of productivity-based growth of output. So it may be concluded that the growth in production of coconut in Kerala was mainly by the contribution of productivity rather than area. As mentioned already, the decline in the yield growth of coconut in Kerala is one of the major constraints faced by the coconut economy of the state in this regard.

The present study revealed that even though Kerala has the largest area under coconut in the country, its production and productivity are less than that of other major coconut producing states like Tamil Nadu, Karnataka and Andhra Pradesh. Hence, strategies emphasizing implementation of programmes for enhancing productivity through better technology intervention, value addition and product diversification are needed.

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