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Growth prospects of India's plantation crops: Insights from simple growth rate analysis

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Abstract

This study provides insights on the growth trends of Coconut, areca-nut and cashew-nut which are major plantation crops in India. These plantation crops provide employment opportunities, bring foreign invest and boost the agrarian economy. Simple growth rate was used to estimate the growth pattern of area, production and yield of the selected plantation crops from 1965-2022. Coconut exhibited moderate growth in production (5.307%) but lower improvement in area (2.71%) and yield (1.004%). Areca-nut had slow growth in yield but exhibit high growth in area (10.08%) and production (18.11%) and for Cashew-nut showcased slow growth for yield (1.29%), moderate growth for area (6.82%) and high growth for production (11.24%). The findings underscore the importance of yield enhancement and policy interventions in sustaining plantation industry.

Keywords: Plantation crops, coconut, areca-nut, cashew-nut, measure of central tendency, simple growth rate (SGR%), India

Introduction

Plantation crops play a significant role in agrarian economy, rural employment, export, socio-economic development of rural communities ^[1]. The key plantation crops selected are coconut (*Cocos nucifera* L.), areca-nut (*Areca catechu* L.), and cashew-nut (*Anacardium occidentale* L.) because of their intensive cultivation in southern and northern eastern states of India. Coconut is also as "tree of heaven" in India because it is used for consumption, exports and even textile like coir-based industries ^[2]. India is the world largest producer and consumption of areca-nut in the world used for medicinal and chewing purposes. Indian cashew-nut has a huge demand in the world, contributing to 15% of total cashew-nut export share. Despite the economic significance, the growth dynamics, area expansion and yield efficiencies remain unutilized and under explored ^[3].

India is the 1st, 2nd and 3rd largest producer of areca-nut, cashew-nut and coconut respectively ^[4]. In 2023, Indian coconut production was accounted to 13.5 million metric tons, for Areca-nut the production was around 1.66 million metric tonnes which accounted for 60% of worlds total Areca-nut production and for cashew-nut production in 2023 was 810 thousand tonnes but the export registered a 2.98% decline in 2023 compared to 2022^[5].

Multiple plantation crops analysis is more suitable for long term national growth, trend pattern identification and policy development. Simple growth rate helps in the assessment of find the growth and trend pattern over a period of time ^[6]. The main objective of the study to examine the performance

of area, production and yield of coconut, areca-nut and cashew-nut with the help of simple growth rate, identification of disparities and to provide policy insights for enhancing efficiency and sustainable practices.

Materials and Methods

Data Source

Secondary data from (1965-2022) was taken from indiatat.com for area, production and yield for coconut, areca-nut and cashew-nut

Average Mean

Arithmetic mean or simple mean is a measure of central tendency. It helps in the summarization of data and identification of overall level of trend ^[7]. The formula for calculation of the arithmetic mean was ^[8]:

$$X = \frac{1}{n} \sum_{i=1}^n x_i$$

where, X = mean

N = total number of years

x_i = individual observations

Standard Deviation

It is the more accurate and detailed estimate of dispersion because its helps in estimation of confidence intervals,

hypothesis testing and regression analysis^[9]. The formula for Standard Deviation estimation was^[10]:

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{N}}$$

where, x_i = individual observations

$\bar{x}$ = individual observations

N = total number of years

Simple Growth Rate

It estimates the total percentage change over a period of time^[11]. The formula used for estimation was^[12]:

$$SGR\% = \frac{X_t - X_0}{X_0 \times n} \times 100$$

where, X_t = Ending value

X_0 = Initial value

N = total number of observations

Results and Discussion

1. Performance of Coconut in India

According to the table 1, high standard deviation for production (6085.914) and yield (1865.469) suggested various factors like temperature fluctuations, technological advancements and more. Coconut production (5.307%) has increased significantly compared to area (2.71%) and yield (1.004%) which are growing steadily.

Table 1: Performance of area, production and yield of Coconut in India during 1965-2022

Descriptive Statistics	Area (ha)	Production ('000' ton)	Yield (kg/h.)
Mean	1577.014	11972.05	7128.621
Standard Error	57.99486	799.1197	244.9481
Standard Deviation	441.6757	6085.914	1865.469
Variance	195077.4	37038349	3479974
Minimum	883.7	23904.1	6498
Maximum	2277.18	694378.8	11481
SGR%	2.71%	5.307%	1.004%

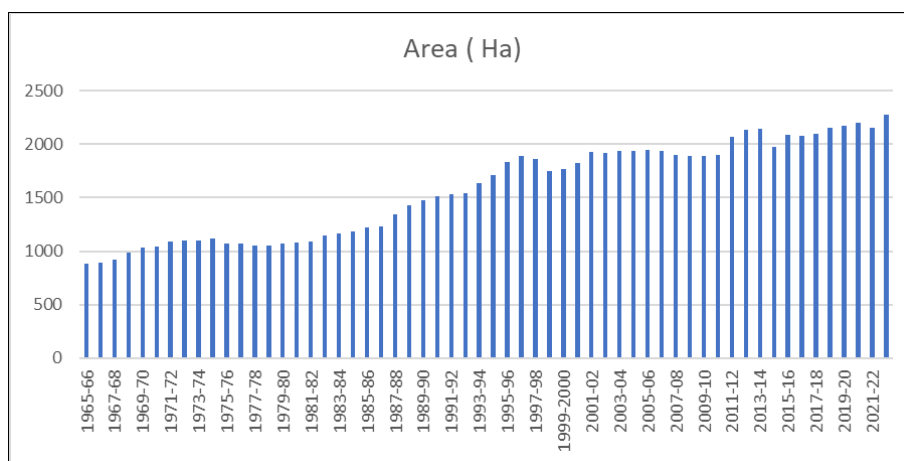


Fig 1: growth in area under Coconut cultivation in India (1965-2022)

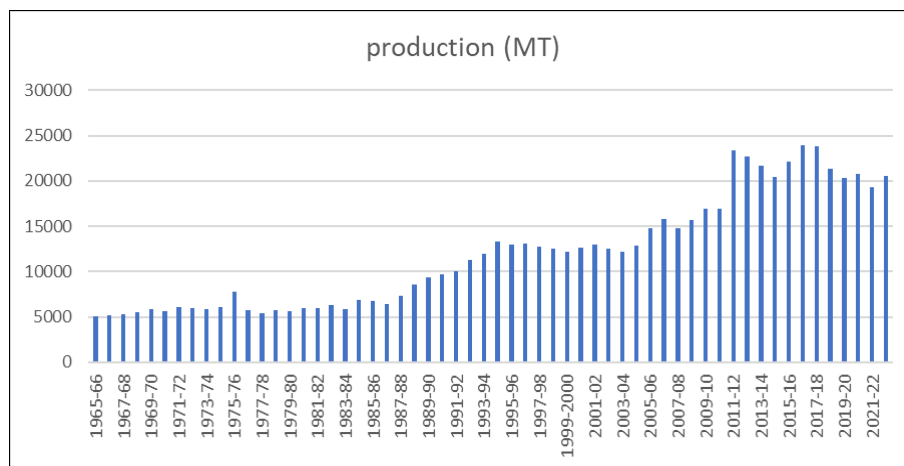


Fig 2: growth in production under Coconut cultivation in India (1965-2022)

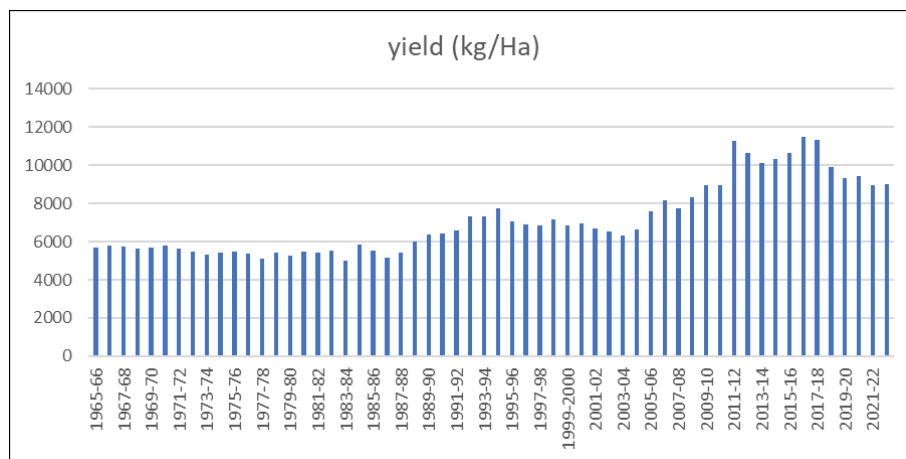


Fig 3: growth in yield under Coconut cultivation in India (1965-2022)

2. Performance of Areca-nut in India

According table 2, standard deviation of area (186.1705), production (365.595) and yield (257.0747) is moderately high indicating rapid growth. The simple growth rate of area

(10.08%) and production (18.11%) is quite high compared to the growth rate of coconut and cashew-nut but yield (1.61%) is growing slowly nut continuously.

Table 2: Performance of area, production and yield of Areca-nut in India during 1965-2022

Descriptive Statistics	Area (ha)	Production ('000' ton)	Yield (kg/h.)
Mean	315.2414	423.4483	1183.638
Standard Error	24.44538	48.00498	33.75556
Standard Deviation	186.1705	365.595	257.0747
Variance	34659.45	133659.7	66087.39
Minimum	137	119	830
Maximum	938	1666	1849
SGR%	10.08%	18.11%	1.61%

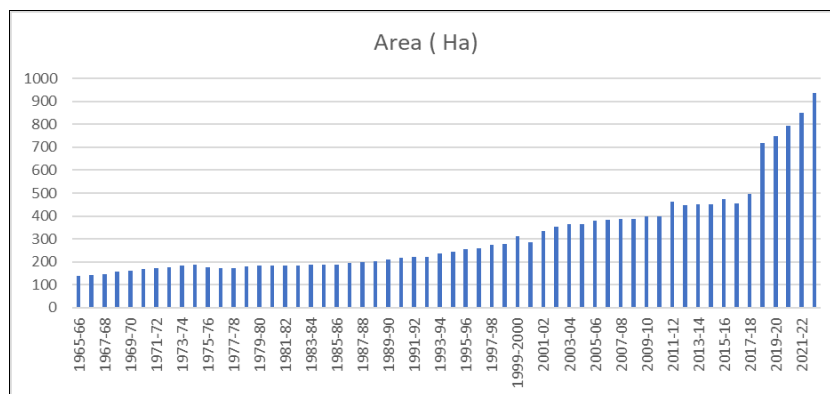


Fig 4: growth in area under Areca-nut cultivation in India (1965-2022)

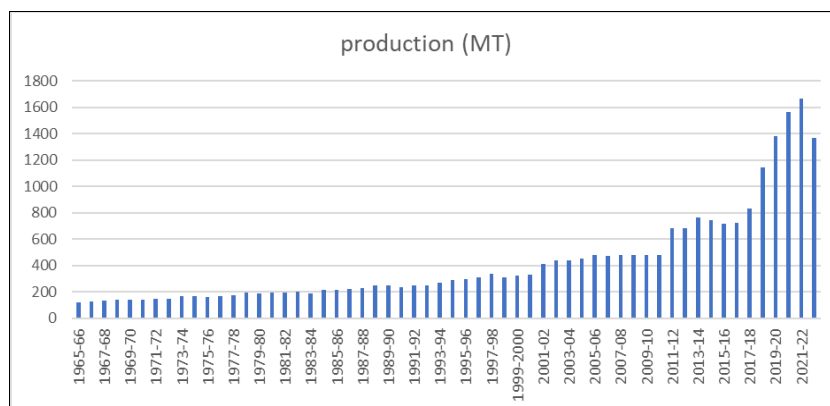


Fig 5: growth in production under Areca-nut cultivation in India (1965-2022)

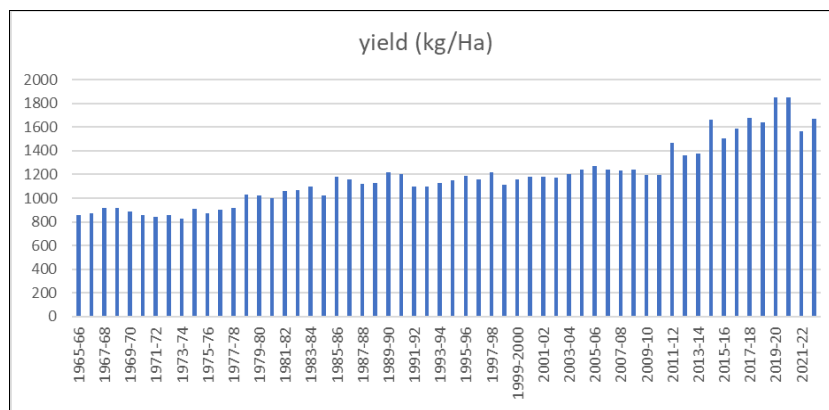


Fig 6: growth in yield under Areca-nut cultivation in India (1965-2022)

3. Performance of Areca-nut in India

According to table 3, standard deviation of area (273.8546), production (237.317) and yield (165.9012) is moderate

indicating growth with modern practices. High growth rate was visible in production (11.24%), moderate growth in area (6.82%) and slow growth in yield (1.29%).

Table 3: Performance of area, production and yield of Cashew-nut in India during 1965-2022

Descriptive Statistics	Area (ha)	Production ('000' ton)	Yield (kg/h.)
Mean	662.0517	416.2414	610.0862
Standard Error	35.95887	31.16124	21.78389
Standard Deviation	273.8546	237.317	165.9012
Variance	74996.33	56319.34	27523.2
Minimum	1195	104	390
Maximum	38399	817	865
SGR%	6.82%	11.24%	1.29%

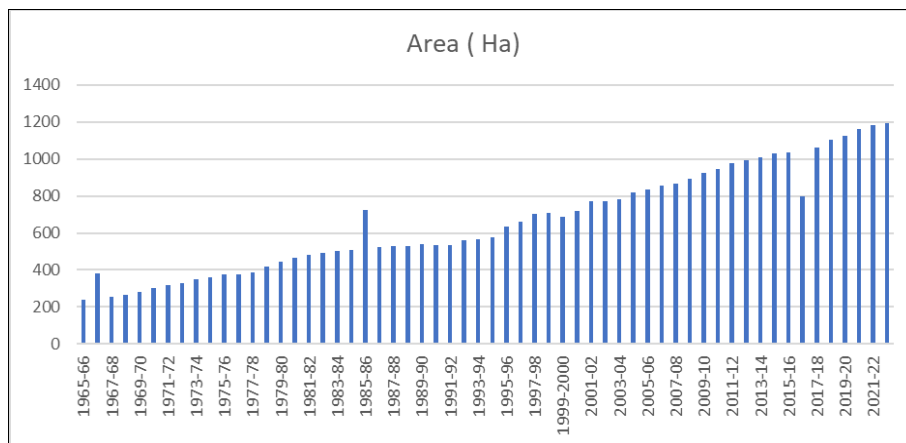


Fig 7: growth in area under Cashew-nut cultivation in India (1965-2022)

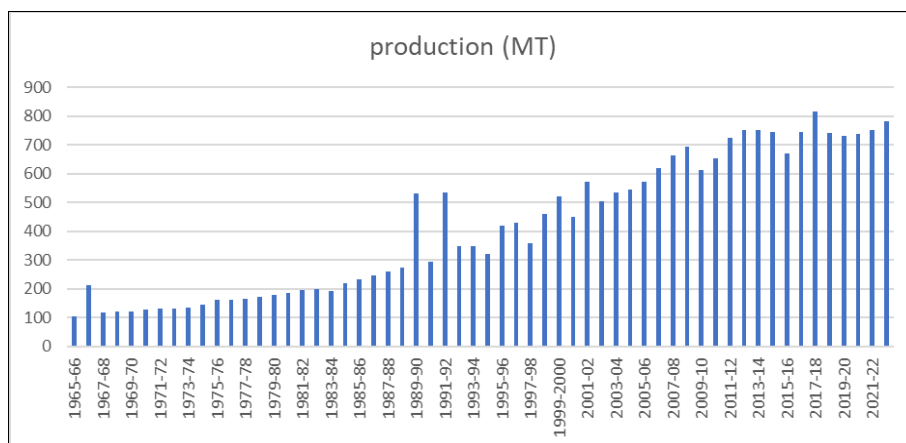


Fig 8: growth in production under Cashew-nut cultivation in India (1965-2022)

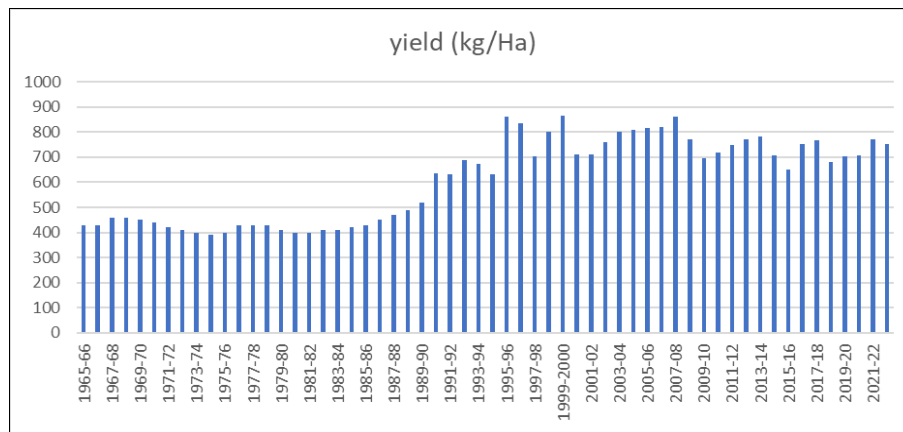


Fig 9: growth in yield under Cashew-nut cultivation in India (1965-2022)

Conclusion

Plantation industry is an emerging sector. This study clearly indicated continuous growth in all three parameters area, production and yield of coconut, areca-nut and cashew-nut. The simple growth rate for areca-nut observed the highest growth compared to coconut and cashew-nut. Government policies and scheme plays crucial role in boosting the production of plantation crops. Workshops on modern practices, technological advancements in temperature control, better irrigation practices and many more. Providing financial assessment to farmers for purchasing of land area, equipment, better processing of coconut, areca-nut and cashew-nut which increases export and provide farmers with better economic profit and boosting the Indian economy.

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