

## RESEARCH NOTE

### Growth in area, production and productivity of Cashew in India

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In India, cultivation of cashew is confined to Kerala, Karnataka, Goa and Maharashtra along the West-coast and Tamil Nadu, Andhra Pradesh, Odisha and West Bengal along the East-coast. The growth in the area, production and productivity of cashew in India was estimated using the compound annual growth rate function. The necessary secondary data were collected for a period of 15 years from 2000-01 to 2014-15. Growth rates on all India level showed a significant positive growth in area under cashew. The production of cashew also registered significant positive growth. But in case of productivity, cashew registered non-significant and negative. The compound annual growth rate in area under cashew nuts during 2014-15 was maximum in Odisha 3.94 per cent followed by Tamil Nadu 3.81 per cent and Andhra Pradesh 2.86 per cent. In the case of production, it was maximum in Maharashtra 6.70 per cent followed by Karnataka 5.22 per cent, West-Bengal 4.79 per cent. But in case of productivity, most of them were negative and non-significant only West-Bengal was 2.39 per cent followed by Maharashtra 1.85 per cent positive and significant at one per cent.

**Key words:** Area, Cashew, Production

Cashew (*Anacardium occidentale* L.), native to Eastern Brazil was introduced to India just as other commercial crops like rubber, coffee, tea etc. by the Portuguese in 1960. The first introduction of cashew to India was made in Goa from where it spread to other parts of the country. In the beginning, it was mainly considered as a crop for afforestation and soil binding to check the erosions. The nuts, apple and other by-products of the plants are of commercial importance. Though, its commercial exploitation began from 1920, marginal lands and denuded forests were the areas set apart for this plantation development. Due to the absence of high yielding varieties and multiplication technique, indiscript seed and seedlings were used for planting purpose.

Cashew ranks third in world production of edible nuts that are traded globally. Cashew is produced in around 32 countries of the world. India led in production of cashews in 2015-16 with a production of 1,72,719 metric tonnes (kernel basis), which represented 23 per cent of global production, followed by Côte d'Ivoire 1,71,111 metric tonnes, Vietnam 1,13,095 metric tonnes, East Africa (40,000), Brazil (33,000), Cambodia (19,048), Indonesia (12,000) and others (1,28,712). Worldwide, trade in cashew exceeds US\$3 billion and, 1,10,000 tonnes are traded on

international markets. Global production of cashews in 2015-16 reached 7,38,861 metric tonnes, an increase of 3 per cent from the previous season and 16 per cent up compared with 2004-05. East and West-Africa export almost all their production in shell (raw cashew nuts) to India, Vietnam and Brazil which are to be shelled and processed. India with share of (30 per cent) and Vietnam with share of (54 per cent) were the major exporters during 2015-16. As a major importer of cashew, the USA has a strong influence over the world price (Anon., 2016).

A large number of small and marginal farmers, especially those living on the coastal belts of India, depend on cashew for their livelihood. Cultivation of cashew in India confines mainly to the peninsular areas. It is grown in Kerala, Karnataka, Goa and Maharashtra along the West coast and Tamil Nadu, Andhra Pradesh, Odisha and West Bengal along the East-coast. To a limited extent, it is being cultivated in Chhattisgarh, North-Eastern states (Assam, Manipur, Tripura, Meghalaya and Nagaland) and Andaman and Nicobar Islands. Now, cashew occupies an area of 10.30 lakh hectares in the country with a production of 9.98 lakh metric tonnes in 2014-15.

The Cashew Export Promotion Council of India (CEPC) was established by the Government of India in the year 1955, with the active cooperation of the cashew industry with the object of promoting exports of cashew kernels and cashew nut shell liquid from India. By its very set up, the council provides the necessary institutional framework for performing the different functions that serve to intensify and promote export of cashew kernels and cashew nut shell liquid. The council provides the necessary liaison for bringing together foreign importers with member exporters of cashew kernels. The enquiries received from the foreign importers are circulated amongst council members. The council also extends its good offices in settling complaints amicably in the matter of exports/imports either of quality and/or variation in fulfillment of contractual obligation.

The area under cashew cultivation in India increased from 6.34 lakh hectares in 1995-96 to 10.35 lakh hectares in 2015-16. Among states, Maharashtra tops with respect to area, production and productivity of cashew nut. Over the years, the area under cashew cultivation has registered an increase in all the major cashew growing states, except in Kerala. This is attributed to diversification of land under cashew cultivation to other remunerative crops.

The study on growth in area, production and productivity of cashew was purposively conducted on all India level. The secondary data on area, production and productivity of cashew were used to analyze the Compound Annual Growth Rate (CAGR). The time series data on area, production and productivity of cashew was available from 2000-01 to 2014-15 onwards. Hence, the analysis was covered for the period from 2000-01 to 2014-15. Data used for the study was collected from indiastats.com, the Cashew Export Promotion council of

India, the Directorate of Cashewnut and Cocoa Development. Time series data pertaining to area, production, productivity of cashew was collected for the same period from the Ministry of Agriculture and Farmer Welfare. Gov of India report. The growth in the area, production and productivity under cashew was estimated using the compound annual growth rate function.

The liner, log-liner, exponential and power functions are some of the important functional forms employed to study the growth rate.

Different functional forms were tried for working out of growth rates in area, production and productivity, some of the important forms tried were the linear growth model ( $Y=a+bt$ ), exponential function ( $Y=ab^t$ ) and quadric function ( $Y=a+bt+ct^2$ ) However, it was found that the exponential form of the function  $Y_t = ab^t$  is found to be better and most frequently used one. In the present study, the compound annual growth rate for the study of area, production and productivity of cashew in major cashew growing states namely Odisha, Tamil Nadu, Andhra Pradesh, Karnataka, West Bengal, Maharashtra, Goa and Kerala, country as whole were estimated by using exponential growth function (Angles, 2001) of the form

$$Y_t = ab^t + U_t \dots\dots\dots(1)$$

Where,

$Y_t$  Dependent variable for (area, production and productivity in year “t”)

a= Intercept

b= Regression co-efficient

t= Year which value from 1,2,...n

$U_t$  = Disturbance term in year “t”

The equation (1) is transformed into log-linear term and written as

$$\log y_t = \log a + t \log b + \log U_t \dots\dots\dots(2)$$

Equation (2) was estimated by using the Ordinary Least Square (OLS) technique.

The per cent compound growth rate (g) was derived using the following relationship (3)

$$g = (\text{Anti-log} b - 1) \times 100 \dots\dots\dots(3)$$

Where,

g= Compound growth rate per annum in percentage.

B= Anti-log of log b

The present study was carried out to analyse the growth in area, production and productivity of cashew in India during (2000-01 to 2014-15). The results of the analysis pertaining to growth of area, production and productivity of cashew in India for the period from 2000-01 to 2014-15, are presented in Table 1.

The area under cashew varied between 720 and 1,030 thousand hectares. The area under cashew in India had substantial change during the 15 years period. This was evident by the CAGR remaining at 2.58 per cent. Even the production of cashew during the period was showing little fluctuations for the period 2000-01 to 2004-05, there was a consistent increase in production from 760 thousand tonnes to 906 thousand tonnes in the year of 2010-11. The total cashew production recorded the highest of 998 thousand tonnes in 2014-15 and the CAGR of the production showed a positive figure with a growth rate of 3.46 per annum.

The productivity of cashew did not improve from the year 2000-01 onwards till the year 2014-15. Compared to the base year of 2000-01 to 2007-08, the yield had gone up by 13 kg per hectare which was not a big jump in productivity level of cashew compared to Vietnam and Brazil. Therefore, there was an urgent need to step up investment in research and development of cashew in India. Even though, the Indian Council of Agricultural Research (ICAR) had already established the Directorate of Cashewnut and Cocoa Development (DCCD). During the year 2007-8 to 2009-10 productivity of cashew had decreased at around 860 kg/hectare to 695 kg/hectare.

The study carried out to analyze the growth in area, production and productivity of major cashew producing states for the period of 2000-01 to 2014-15. In the Table 2 the figures shown that Odisha had the highest CAGR at rate of 3.94 per cent followed by Tamil Nadu, Andhra Pradesh, Karnataka, Maharashtra, West Bengal and Goa with the growth of 3.81 2.86 per cent, per cent 2.75 per cent, 2.55 per cent,

Table 1. Growth in area, production and productivity of cashew in India during 2000-01 to 2014-15

Years	Area (hectare)	Production (metric tonnes)	Productivity (kg/ha)
2000-01	720	627	710
2001-02	750	666	710
2002-03	770	675	760
2003-04	780	684	800
2004-05	820	700	810
2005-06	837	760	815
2006-07	854	765	820
2007-08	868	770	860
2008-09	893	835	773
2009-10	923	882	695
2010-11	945	906	720
2011-12	979	924	749
2012-13	992	944	760
2013-14	1,011	980	759
2014-15	1,030	998	723
Mean	878.13	806.86	764.27
CV (%)	11.34	15.24	6.34
R <sup>2</sup>	0.99	0.98	0.02 <sub>NS</sub>
CAGR (%)	2.58**	3.46**	-0.17

Note: \*\* Significant at 1% level. NS= Non-significant  
Source: Ministry of Agriculture and Farmers Welfare, Govt. of India

Growth in area, production and productivity of .....

Table 2. Growth in area under cultivation of major cashew producing states in India during 2000-01 to 2014-15 (Area in hectares)

Particulars	Kerala	Karnataka	Goa	Maharashtra	Tamil Nadu	Andhra Pradesh	Odisha	West Bengal
Mean	86,954	1,06,846	55,842	1,64,973	1,19,082	1,65,693	1,36,281.3	10,104
CV <sub>2</sub> (%)	12.52	12.40	2.36	11.56	16.69	13.10	17.65	10.62
R <sup>2</sup>	0.39	0.96	0.67	0.87	0.88	0.84	0.92	0.89
CAGR (%)	-1.73*	2.75**	0.43**	2.55**	3.81**	2.86**	3.94**	2.33**

Note: \*\* Significant at 1% level. \* Significant at 5% level.

Source: Directorate of Cashewnut and Cocoa Development (DCCD)

Table 3. Growth in production of cashew in major producing states in India during 2000-01 to 2014-15 (metric tonnes)

Particulars	Kerala	Karnataka	Goa	Maharashtra	Tamil Nadu	Andhra Pradesh	Odisha	West Bengal
Mean	76,938.67	55,316.67	28,620.00	1,83,416.70	59,852.67	98,568.93	81,603.33	9,953.86
CV (%)	11.58	25.11	9.96	27.69	12.06	11.49	15.80	20.77
R <sup>2</sup>	0.04	0.90	0.02	0.81	0.65	0.60	0.71	0.89
CAGR (%)	-0.50 <sup>NS</sup>	5.22**	0.32 <sup>NS</sup>	6.70**	2.28**	2.07**	3.19**	4.79**

Note: \*\* Significant at 1% level. NS= Non-significant.

Source: Directorate of Cashewnut and Cocoa Development (DCCD)

Table 4. Growth in productivity of major cashew producing states in India during 2000-01 to 2014-15(kg/ ha)

Particulars	Kerala	Karnataka	Goa	Maharashtra	Tamil Nadu	Andhra Pradesh	Odisha	West Bengal
Mean	907.33	574.46	583.73	1,220.40	568.93	693.40	705.20	958.20
CV (%)	7.07	16.96	24.20	27.69	15.90	19.54	18.31	12.48
R <sup>2</sup>	0.24	0.62	0.09	0.32	0.54	0.38	0.33	0.69
CAGR (%)	0.78 <sup>NS</sup>	0.94 <sup>NS</sup>	4.34 <sup>NS</sup>	1.85*	-2.51**	-2.65*	-2.38*	2.39**

Note: \*\*Significant at 1% level. \*Significant at 5% level. NS= Non-significant.

Source: Directorate of Cashewnut and Cocoa Development (DCCD)

2.33 per cent and 0.43 per cent respectively. In this study only Kerala showed negative CAGR at rate of -1.17 per cent, this might be attributed mainly to the replacement of cashew with remunerative crops like rubber in Kerala, But in case of production, most of the states showed a positive CAGR and showed increase in the production for the study period which were presented in the Table 3 and showed that Maharashtra was the top and had 6.70 per cent followed by Karnataka 5.22 per cent, West Bengal 4.79 per cent, Odisha 3.19 per cent, Tamil Nadu 2.28 per cent and Andhra Pradesh 2.07 per cent of CAGR.

The results for the productivity of major cashew producing states were presented in the Table 4 for the period of 2000-01 to 2014-15. The figures showed that the growth rate of productivity for the states like West Bengal and Maharashtra which

increased and had a positive CAGR. The growth rate of productivity in West Bengal and Maharashtra were 2.39 per cent and 1.85 per cent respectively, and this meant that productivity increased during this period. Thus, the figures of remaining states had shown decreased like Andhra Pradesh, Tamil Nadu and Odisha which had negative CAGR at rate of -2.65, -2.51 and -2.38 per cent respectively, the plantation of cashew in marginal lands, poor genetic makeup of the existing cashew plantations, non-adoption of package of practices for cashew, non-adoption of regular spacing and influence of climatic factors were the main reason for low productivity.

The growth rate on all India level in the case of area and production found to be significant but productivity was found to be non-significant. The results indicated that, there is a significant growth in the bearing area and production of cashew in India.

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