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# Growth and Instability Analysis of Cashew Production in Kolar District, Karnataka

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**Abstract**

India is one of the largest producers and exporters of cashew, contributing significantly to the global supply. Among the Indian states, Karnataka plays a vital role in cashew cultivation. India is the second largest exporter of cashew kernels in the world and earns a sizeable amount of foreign exchange. In India, cultivation of cashew is confined to Kerala, Karnataka, Goa and Maharashtra along the Westcoast and Tamilnadan, Andhra Pradesh, Orissa and West Bengal along the eastcoast. Karnataka with a production of 77,850 tonnes of raw cashew nuts from an area of 1,39,260 hectares stands in fifth position both in terms of area and production in India during 2022-23. This study is based on secondary data and tools such as arithmetic mean, coefficient of variation, Compound Annual Growth Rate (CAGR), Hazel's decomposition and CDVI to examine the trends in cashew area, production and productivity in Karnataka and undivided Kolar district. The data collected to analyse the growth rate and decompose the variance of production area, production and yield of cashew kernels data is divided into two periods, Period (1991-92 to 2006-07) and Period-II (2007-08 to 2022-23) with the overall Period (1991-92 to 2022-23). In the Overall Period (1991-92 to 2022-23), the CAGR for the area under cashew cultivation averaged at 1.46 per cent, while the production growth rate improved significantly to 2.53 per cent. The increase in mean yield, interaction between change in mean area and mean yield and change in area-yield covariance contributed to cashew production growth but the production growth rate was highly unstable. However, the increase in mean area helped to stabilize production. The results suggest that the increase in cashew production in Kolar district was primarily due to an increase in the yield of the cashew. The increase in interaction between the change in area and the change in yield also played a major role, but the area contributed to small extent. The change in area-yield covariance was a negative factor.

*Keywords* : Compound annual growth rate, Coefficient of variation, Trend, Instability and analysis

Cashew (*Anacardium occidentale* L.) is an economically significant nut crop widely cultivated in tropical and subtropical regions. India is one of the largest producers of cashew, contributing significantly to global production and exports (Kumar *et al.,* 2020). Among the states, Karnataka plays a vital role in cashew cultivation, with Karnataka with a production of 77,850 tonnes of raw cashew nuts from an area of 1,39,260 hectares stands in fifth position both in terms of area and production in India during 2022-23. The productivity of cashew trees in the state was 560 kg / ha which is less than the national average of 650 kg/ ha.

The growth of cashew production is influenced by various factors, including area expansion, productivity improvements and technological advancements. The study investigate key economic parameters, including

the Compound Annual Growth Rate (CAGR), Cuddy-Della Valle Index (CDVI) and Hazell Decomposition method, to provide a comprehensive understanding of growth trends and sources of instability. It helps to understand the sources of growthwhether driven by increased cultivation area, yield improvements or a combination of bothis crucial for formulating policies that enhance productivity and profitability in the sector (Kumar *et al*., 2021). Several studies have analysed the trends in cashew production, highlighting fluctuations due to climatic conditions, market demand and government interventions (Rao and Venkatachala pathi, 2018).

This study aims to analyse the sources contributing to cashew production growth in Karnataka, focusing on changes in mean area, mean yield and the interaction between area and yield. With the hypotheses that there is increase in the production of cashewnut with stable production in Karnataka The findings will provide valuable insights into the sustainability of cashew cultivation and guide policymakers in developing strategies for enhancing cashew production.

## Methodology

### Compound Annual Growth Rate (CAGR) Analysis

To study the annual growth rate in quantity and value of export of coir products, the compound growth rate was computed using semi-log or exponential model. Growth rates of area, production and yield of cashew kernels were computed for a period of 32 years from 1991-92 to 2022-23. The data were collected for undivided Kolar district as Chikkaballapur was bifurcated from Kolar district during 2007. Chintamani-1 variety was officially released in 1993 and based on the secondary data at ARS, Chintamani, the significant sales of Chintamani I planting material started primarily from 1999-2000 onwards and the economic yield of this variety starts only from seven years after planting (2006-07). It is assumed that one of the reason for the area expansion is with the intervention of Chintamani I variety particularly in Kolar district and generally in Karnataka state. Hence, the data were divided into two periods, period I (1991-92 to 2006-07) and Period-II (2007-08 to 2022-23) including the overall period of 1991-92 to 2022-23.

The total number of Chintamani-1 cashew seedlings sold in Karnataka from 1996 to 2022 was 136,822. The highest sales were recorded in Kolar (117,165 seedlings), contributing over 85 per cent of the total distribution. Notably, from 1999 to 2002, the majority of grafts were sold. Based on this observation, the data is segmented at 2007, considering that cashew requires seven years to attain economic yield for calculating Hassel's decomposition. Tumkuru (8,431 seedlings) and Bengaluru (7,048 seedlings) followed with moderate sales, while Ramanagar (305 seedlings) and other regions (3,873 seedlings) had relatively lower sales. (Table 1).

**Table 1**

**Number of Chintamani-1 variety cashew seedlings sold from ARS, Chintamani in Karnataka State during 1996-2022**

| Year/ District | Ramanagara | Kolar | Bengaluru | Tumakuru | Others | Total |
|---|---|---|---|---|---|---|
| 1996 | 10 | 65 | 0 | 0 | 0 | 75 |
| 1997 | 0 | 500 | 0 | 0 | 0 | 500 |
| 1998 | 0 | 1241 | 0 | 0 | 0 | 1241 |
| 1999 | 0 | 4044 | 316 | 303 | 760 | 4663 |
| 2000 | 0 | 10031 | 125 | 300 | 1100 | 10456 |
| 2001 | 0 | 8584 | 967 | 0 | 0 | 9551 |

Continued....

**TABLE 1 Continued....**

| Year/ District | Ramanagara | Kolar | Bengaluru | Tumakuru | Others | Total |
|---|---|---|---|---|---|---|
| 2002 | 0 | 497 | 285 | 720 | 0 | 1502 |
| 2003 | 0 | 641 | 7 | 401 | 0 | 1049 |
| 2004 | 200 | 2368 | 75 | 0 | 30 | 2643 |
| 2005 | 0 | 9982 | 160 | 0 | 335 | 10142 |
| 2006 | 0 | 953 | 97 | 0 | 0 | 1050 |
| 2007 | 0 | 2681 | 70 | 0 | 15 | 2751 |
| 2008 | 0 | 3840 | 67 | 0 | 0 | 3907 |
| 2009 | 20 | 3207 | 130 | 50 | 10 | 3407 |
| 2010 | 0 | 1716 | 631 | 0 | 9 | 2347 |
| 2011 | 10 | 11526 | 319 | 168 | 10 | 12023 |
| 2012 | 0 | 12816 | 88 | 100 | 0 | 13004 |
| 2013 | 0 | 6877 | 870 | 0 | 30 | 7747 |
| 2014 | 50 | 7637 | 394 | 740 | 0 | 8821 |
| 2015 | 0 | 1211 | 15 | 30 | 0 | 1256 |
| 2016 | 0 | 2479 | 838 | 1615 | 124 | 4932 |
| 2017 | 0 | 3351 | 705 | 1620 | 0 | 5676 |
| 2018 | 15 | 8387 | 150 | 830 | 1000 | 9382 |
| 2019 | 0 | 1737 | 530 | 0 | 0 | 2267 |
| 2020 | 0 | 3539 | 22 | 175 | 0 | 3736 |
| 2021 | 0 | 4145 | 0 | 1034 | 0 | 5179 |
| 2022 | 0 | 3110 | 187 | 345 | 450 | 3642 |
| Total number of seedlings | 305 | 117165 | 7048 | 8431 | 3873 | 136822 |

*Source* : Agriculture Research Station, Chintamani (1996-2022)

To estimate the growth rate in the area, production and productivity of cashew, the compound growth rate technique was employed using the following exponential function of the form of model.

$Y = a\, b^t e^{Ut}$ ..... (1)

Where,

Y = Dependent variable (Area / Production / Productivity)

a = Intercept (constant)

b = Regression coefficient

'a' and 'b' are the parameters to be estimated

t = time period

$U_t$ = Disturbance term for the year 't'

The equation (1) was transformed into log linear form as below and was estimated by using Ordinary Least Squares (OLS) technique,

$\ln Y = \ln a + t \ln b + Ut$ ..... (2)

Compound growth rate (g) in percentage was then computed from the following relationship

$g = (\beta - 1)\, 100$ ..... (3)

Where,

g = Compound growth rate in per cent per annum

β = Antilog of b

The significance of regression co-efficient was tested using, 't' test as defined below

$$t = \frac{bi}{se(bi)}$$

Where,

$b_i$ = Regression co-efficient

se ($b_i$) = Standard error of the regression co-efficient

The standard error of the regression co-efficient was used to test its significance with 't' statistic.

**Cuddy Della Valle Index (CDVI)**

CDVI is obtained from the coefficient of variation (CV) Where,

$$CV = \frac{\text{standard deviation}}{\text{mean}} \times 100 \text{ ---------- (3.6)}$$

CDVI is estimated as follows,

$$CDVI = CV \times \sqrt{1 - \bar{R}^2} \text{ ---------- (3.7)}$$

where,

CV is the coefficient of variation in percentage

$\bar{R}^2$ is the coefficient of determination from the regression adjusted for its degrees of freedom.

Cuddy Della valueIndex indicates the real direction of the instability and is a better measure to find out the instability in major agricultural commodities. If the index values are below 15 per cent, then it is categorized as low instability, if the value lies between 15 to 30 per cent, then it is categorized as medium instability and more than 30 per cent, is categorized as high instability.

**Hazell's Decomposition Method**

The decomposition model developed by Peter, Hazell in 1982 was primarily developed to used the instability in Indian cereal production. This model is one among the most common methods of decomposition used till now. In this model, average production and variance of production are decomposed into several components. This model is mainly used for the time series data.

Model :

Let Q be the production, A be the area and Y be the yield. Then,

$$Q = A * Y$$

The average production can be expressed as,

$E(Q) = \overline{AY} + Cov$ (A, Y) …… (4)

Where, A and Y indicates the mean area and mean yield.

Thus, it can be noted that covariance between area and yield and also changes in the mean area and mean yield are affecting average production. The objective of the decomposition analysis is to partition the changes in average production between the first and second period.

The average production in first period is given by,

$E(Q_I) = \overline{A}_I \overline{Y}_I + Cov\ (A_I, Y_I)$.....(5)

and in the second period it is

$E(Q_{II}) = \overline{A}_{II} \overline{Y}_{II} + Cov\ (A_{II}, Y_{II})$.....(6)

Each variable in the second period is expressed as its counterpart in the first plus the change in the variable between the two. For example,

$\overline{A}_{II} = \overline{A}_I + \Delta \overline{A}$ **…… (7)**

Where, $\Delta \overline{A} = \overline{A}_{II} - \overline{A}_I$

Thus equation 6 can be rewritten as,

E(QII) = ($\overline{A}$I+Δ $\overline{A}$) ($\overline{Y}$I + Δ $\overline{Y}$) + Cov (AI, YI ) + Ä Cov (A,Y) ..... (8)

The change in average production, Δ (*QQ*), is obtained by subtracting equation (5) from equation (8).

ΔE(Q) = E(*Q*II) - E(*Q*I)

ΔE(Q) = $\overline{A}$IΔ$\overline{Y}$ + $\overline{Y}$I Δ$\overline{A}$ + Δ$\overline{A}$IΔ$\overline{Y}$ + Δ Cov (A, Y) ……..... (9)

First period variables can be expressed as second period values less the change between two periods. For example,

**TABLE 2**

**Components of change in average production**

| Sourcesof Change | Symbol | Components of change |
|---|---|---|
| Change in mean yield | Δ Y | $\overline{A}_I\Delta Y$ |
| Change in mean area | $\Delta\overline{A}$ | $Y_I\Delta$Ä |
| Interaction between change in mean area and mean yield | $\Delta\overline{A}$, ΔY | $\Delta\overline{A}$, ΔY |
| Change in area - yield Covariance | ΔCov(A, Y) | Δ*Cov*(*A*,*Y*) |

*Source* : Hazell, 1982

$\overline{A}I = \overline{A}II - \Delta\overline{A}$ ..... (10)

This change in average production has four different components which are the These sources include the changes in mean area ($\Delta\overline{A}$), changes in mean yield ($\Delta\overline{Y}$), the interaction between changes in mean area and mean yield ($\Delta\overline{A}I\Delta\overline{Y}$) and the changes in the variability of area and yield (ΔCov(A, Y)) (Hazell, 1982). These components of change in average production are presented in Table 2.

The components of change in average production can be portrayed biometrically, under the simplifying assumption that COV (A, Y) = 0. This analysis used the first period as base, but based on the second period, an alternative procedure can be developed. Both methods are mathematically accurate, but method II combines pure and interaction effects.

## RESULTS AND DISCUSSION

The analysis of cashew cultivation in Karnataka reveals distinct growth trends across the three periods of study: Period I (1991-92 to 2006-07), Period II (2007-08 to 2022-23) and the Overall Period (1991-92 to 2022-23). During the Period I, area under cashew cultivation expanded significantly with a Compound Annual Growth Rate (CAGR) of 2.04 and production followed a similar trend with a CAGR of 1.73. However, productivity saw a slight decline with a CAGR of -0.30 per cent, indicating that despite the increase in the area and production, yield efficiency did not improve proportionately (Table 03).

In Period II (2007-08 to 2022-23), the growth rate in the area under cultivation slowed down to 1.09 per cent, reflecting the maturity of the expansion phase seen in Period I. Despite this, the production growth rate remained relatively stable at 1.60 per cent, modest increase in productivity at 0.50 per cent, although the increase was not statistically significant. This period shows a shift towards improving yields, albeit gradually, which helped maintain production levels despite the reduced pace of area expansion.

When considering the Overall Period (1991-92 to 2022-23), the CAGR for the area under cashew cultivation averaged at 1.46 per cent, while the production growth rate improved significantly to 2.53 per cent. This improvement in production can be attributed to a substantial positive change in productivity, which grew by 1.06 per cent. These results suggest that over the entire period, efforts to enhance productivity of cashew nut, contributing to a more substantial increase in overall cashew production in Karnataka are to be strengthened. The results accept the hypothesis of positive significant growth in productivity of cashewnut in Karnataka.

The Cuddy-Della Valle Index (CDVI) indicates low instability in the area, production and productivity of cashew in Karnataka, as all values remain below the threshold of 15. In Period I (1991 - 92 to 2006 - 07), CDVI values were 1.48 (area), 1.45 (production), and 0.35 (productivity), increasing slightly in Period II (2007 - 08 to

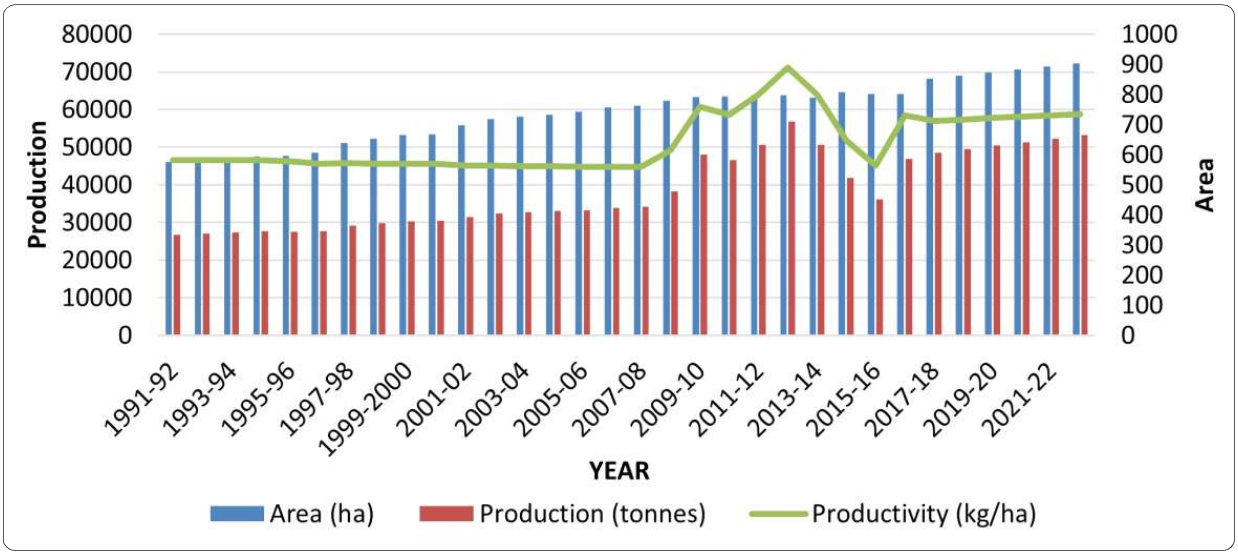


Fig. 1 : Trend in Area, production and productivity of Cashew in Karnataka

**TABLE 3**

**Growth rate in area, production and productivity of cashew in Karnataka**

| | Particulars | Period I (1991-92 to 2006-07) | Period II (2007-08 to 2022-23) | Overall Period (1991-92 to 2022-23) |
|---|---|---|---|---|
| CAGR (%) | Area (ha) | 2.04 ** | 1.09 ** | 1.46 ** |
| | Production (t) | 1.73 ** | 1.60 * | 2.53 ** |
| | Productivity (kg/ha) | -0.30 ** | 0.50 NS | 1.06 ** |
| Mean | Area (ha) | 52729.75 | 65914.52 | 59322.13 |
| | Production (t) | 30046.62 | 47195.67 | 38621.14 |
| | Productivity (kg/ha) | 570.57 | 715.29 | 642.93 |
| SD | Area (ha) | 5137.49 | 3678.97 | 8011.35 |
| | Production (t) | 2497.73 | 6391.36 | 9933.71 |
| | Productivity (kg/ha) | 8.51 | 85.70 | 94.83 |
| CV (%) | Area (ha) | 9.74 | 5.58 | 13.50 |
| | Production (t) | 8.31 | 13.54 | 25.72 |
| | Productivity (kg/ha) | 1.49 | 11.98 | 14.75 |
| CDVI | Area (ha) | 1.48 | 1.95 | 2.75 |
| | Production (t) | 1.45 | 11.94 | 10.06 |
| | Productivity (kg/ha) | 0.35 | 12.16 | 10.68 |

*Note* : ** and *significant at one per cent and five per cent level of level of probability respectively, NS-non-significant

2022 - 23) to 1.95, 11.94 and 12.16, respectively. Over the entire period (1991 - 92 to 2022 - 23), values remained low at 2.75, 10.06 and 10.68, confirming overall stability in cashew cultivation trends.

The variability measures such as the Coefficient of Variation (CV) and the Cuddy-Della Valle Index (CDVI) provide further insights. The CV for area, production and productivity were lower in Period I,

indicating relatively stable growth during this phase. In contrast, the variability increased in Period II, particularly for production and productivity, as reflected by higher CV and CDVI values. This could imply that while Period II saw attempts to boost productivity, these efforts were accompanied by greater fluctuations, possibly due to varying degrees of success across different regions or years. Overall, the data suggest a transition from expansion-driven growth in Period I to productivity-driven growth in Period II, with Period II serving as a crucial but challenging phase of this evolution. The results accept the hypothesis of the production of cashew nuts in Karnataka exhibits low instability.

**Growth and Instability Analysis of Cashew Production in Kolar District of Karnataka**

The area production and productivity data of Kolar district in Karnataka state were divided into two periods, Period I (1991 - 92 to 2006 - 07) and Period II (2007-08 to 2022-23),

The analysis of cashew cultivation in Kolar district reveals distinct growth trends across the three periods of study: Period I (1991 - 92 to 2006 - 07), Period II (2007 - 08 to 2022 - 23) and the Overall Period (1991 - 92 to 2022 - 23). During the Period I, area under cashew cultivation expanded significantly with a Compound Annual Growth Rate (CAGR) of 9.64 per cent and production also increased but little slower pace with a CAGR of 9.55 per cent. due to a slight decline in production with a CAGR of -0.079 per cent. This indicate that production growth was mainly due to area when the yield efficiency did not improve proportionately (Table 4).

In contrast, Period II witnessed a notable shift in dynamics. The area under cashew cultivation decreased substantially, with a CAGR of -7.33 per cent and production growth stagnated at 0.38 per cent, which was statistically non-significant. Interestingly, productivity saw a significant

**Table 4**

**Growth Rate in Area, Production and Productivity of Cashew in Kolar District of Karnataka (1991-1992 To 2022-2023)**

| Particulars | | Period I (1991-92 to 2006-07) | Period II (2007-08 to 2022-23) | Overall Period (1991-92 to 2022-23) |
|---|---|---|---|---|
| CAGR (%) | Area (ha) | 9.64 ** | -7.33 ** | 3.27 ** |
| | Production (t) | 9.55 ** | 0.38 NS | 9.37 ** |
| | Productivity (kg/ha) | -0.079 ** | 8.33 ** | 5.90 ** |
| Mean | Area (ha) | 1435.25 | 2701.75 | 2068.50 |
| | Production (t) | 525.18 | 2786.37 | 1655.78 |
| | Productivity (kg/ha) | 366.39 | 1102.18 | 734.29 |
| SD | Area (ha) | 711.07 | 1166.18 | 1147.45 |
| | Production (t) | 258.96 | 1357.18 | 1497.73 |
| | Productivity (kg/ha) | 0.49 | 412.12 | 471.058 |
| CV(%) | Area (ha) | 49.54 | 43.16 | 55.47 |
| | Production (t) | 49.30 | 48.78 | 90.45 |
| | Productivity (kg/ha) | 0.49 | 37.39 | 64.15 |
| CDVI | Area (ha) | 21.49 | 22.87 | 48.02 |
| | Production (t) | 21.62 | 50.38 | 33.95 |
| | Productivity (kg/ha) | 0.32 | 22.87 | 30.73 |

*Note* : ** significant level of probability and NS non-significant

improvement, registering a CAGR of 8.33 per cent. This suggests that although the cultivation area decreased, advancements in agricultural practices or the adoption of better varieties like Chintamani-1 contributed to a substantial increase in yield per hectare.

The Overall Period, which encompasses the entire timeframe from 1991 - 92 to 2022 - 23, presents a more balanced picture. The area under cultivation showed a moderate increase with a CAGR of 3.27 per cent, production grew robustly with a CAGR of 9.37 per cent and productivity improved significantly with a CAGR of 5.90 per cent. The mean values for area, production and productivity indicate that there has been a consistent effort to enhance the overall efficiency of cashew cultivation in the district. (Table 4 and Fig. 2)

The Cuddy-Della Valle Index (CDVI) reveals increasing instability in cashew cultivation in Kolar district of Karnataka over time. In Period I (1991 - 92 to 2006 - 07), instability was low for productivity (0.32) and medium for area (21.49) and production (21.62). In Period II (2007 - 08 to 2022 - 23), instability remained medium for area (22.87) and productivity (22.87), but rose to high for production (50.38). Over the overall period (1991 - 92 to 2022 - 23), CDVI values indicate high instability in area (48.02) and production (33.95) and medium to high instability in productivity (30.73). This suggests that while productivity was relatively stable in the early years, recent decades have seen rising fluctuations, especially in production and area under cashew cultivation in Kolar.

Compared to Karnataka, which shows low instability in area, production and productivity, Kolar district exhibits high instability in area and production and medium to high instability in productivity over the overall period.

The variability in the data, as reflected by the Standard Deviations (SD) and Coefficients of Variation (CV), highlights fluctuations in both periods, particularly in production and productivity. The Cuddy-Della Valle Index (CDVI) further underscores the stability and changes over time, with higher values in Period II as compared to Period I, suggesting greater variability in the recent years. Despite these fluctuations, the significant improvement in productivity during Period II indicates a positive trend towards more efficient

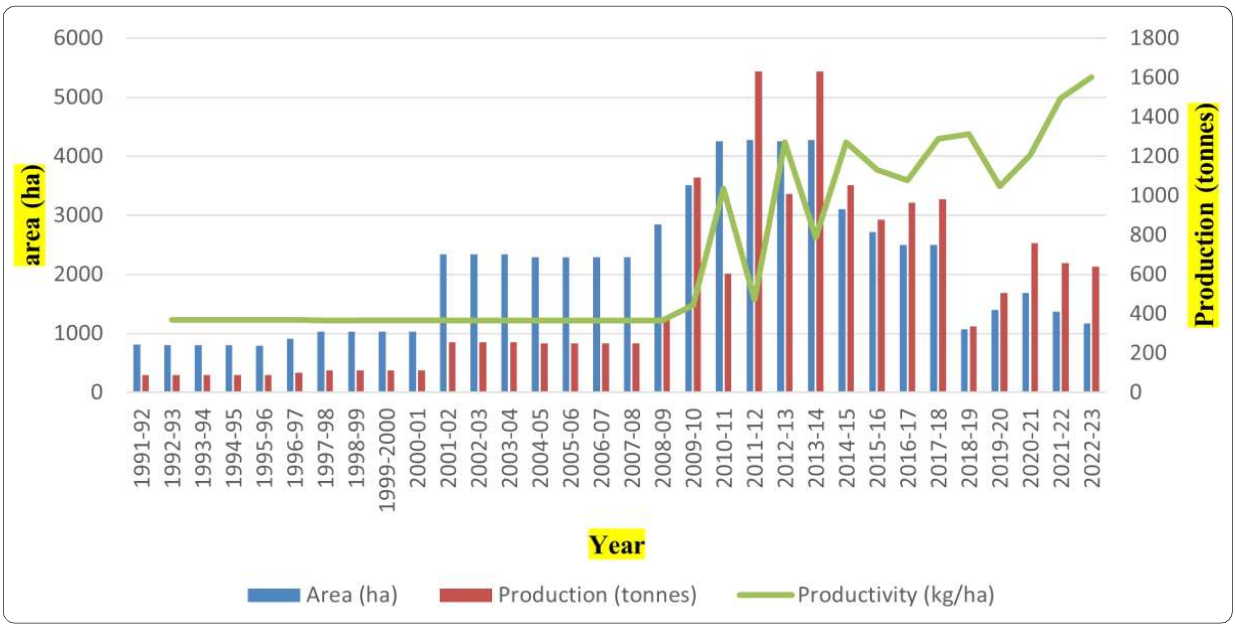


Fig. 2 : Trend in Area, production and productivity of cashew in Chikkaballapur and Kolar

cashew production, which are likely influenced by better management practices and the adoption of high-yielding varieties. Prakash *et al.* (2023) reported similar results in their Growth of Maize Ecosystem in India and Karnataka vis-a-vis Associated Risk in Production: An Economic Insight

**Decomposition Analysis**

The decomposition of the total output growth during the period from 1991 - 92 to 2022 - 23 was analysed by employing Hazell's decomposition technique. The main objective was to understand whether the factors influencing the growth in output has changed over the period or not. In this model, average production and the variance of production were decomposed into several components.

The Hazell's decomposition produces four components of change in average production of cashew crop that represents the sources of instability of crop. The negative sign of components indicates stability, while a positive sign implies the instability for the crop production. The study period was bifurcated into period - I (1991 - 92 to 2006 - 07), period - II (2007 - 08 to 2022 - 23) to know the factors contributed to increased cashew production.

The decomposition analysis of cashew production in Karnataka state (Table 5) revealed that the change in mean yield was the major contributor for the increase in gross production, with 44.50 per cent of the total change followed by the Change in mean Area 43.86 per cent, Interaction between change in mean yields and change in mean area contributed to 11.13 per cent. Change in area- yield covariance was also a positive contributor, but to the smaller extent (0.51%). Harish *et al.* (2022) reported contrasting results in their Application of Hazell Decomposition Model in Potato Production: A Case Study of Karnataka

Thus, to conclude, production of cashew in Karnataka state was unstable during the period 1991 - 92 to 2022 - 23. The increase in mean yield, interaction between change in mean area and mean yield and change in area-yield covariance contributed to cashew production growth but was highly unstable. However, the increase in mean area helped to stabilize production. (Table 5 and Fig. 3)

The decomposition analysis of cashew production in Kolar district (Table 6) revealed that the change in mean yield was the major contributor for the increase in gross production, with 58.29 per cent of the total change followed by the Interaction between change in mean yield and change in mean area contributed to 51.44 per cent. Change in mean area which also a positive contributor, but to the smaller extent (17.38%). The contribution of change in area-yield covariance was negative with 27.12. Pavithra *et al*. (2021) reported similar results in their study on application of Hazell's decomposition model in ragi production.

The results suggest that the increase in cashew production in Kolar district was primarily due to an increase in the yield of the cashew. The increase in interaction between the change in area and the change in yield also played a major role, but the area contributed to small extent. The change in area-yield covariance was a negative factor.

**TABLE 5**

**Sources contributing to growth in cashew production in Karnataka state**

| Description | Sources of change | Value (in '000') | Per cent |
|---|---|---|---|
| Change in mean Area | $\Delta\overline{A}$ | 7522.89 | 43.86 |
| Change in mean yield | $\Delta Y$ | 7631.09 | 44.50 |
| Interaction between change in mean yieldsand Change in Mean area | $\Delta\overline{A}, \Delta Y$ | 1908.11 | 11.13 |
| Change in area- yield covariance | $\Delta Cov(A,Y)$ | 86.95 | 0.51 |
| Total Change in mean production | | 17149.04 | 100 |

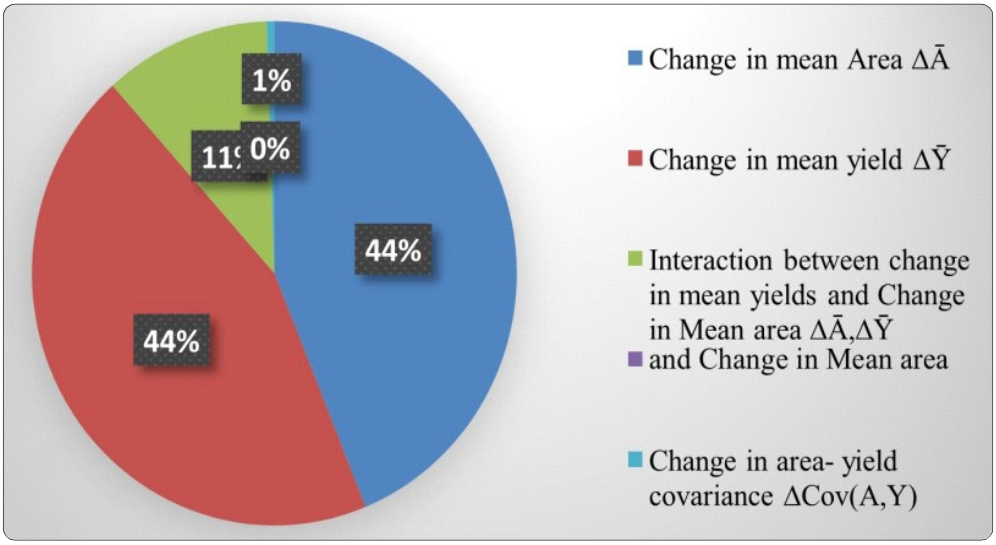


Fig. 3 : Sources contributing to growth in cashew production in Karnataka state

**TABLE 6**

**Sources contributing to growth in cashew production in Kolar district of Karnataka**

| Description | Sources of change | Value (in '000') | Per cent |
|---|---|---|---|
| Change in mean Area | $\Delta\bar{A}$ | 464.04 | 17.38 |
| Change in mean yield | ΔY | 1556.03 | 58.29 |
| Interaction between change in mean yields andChange in Mean area | $\Delta\bar{A}$, ΔY | 1373.08 | 51.44 |
| Change in area- yield covariance | ΔCov(A,Y) | -724.03 | -27.13 |
| Total Change in mean production | | 266.91 | 100 |

## Policy Recommendations

Based on the growth and instability analysis of cashew cultivation in Karnataka and Kolar district, a focused policy should prioritize productivity enhancement over mere area expansion, given the significant role of yield improvements in boosting overall production. Investments must be directed towards developing and disseminating high-yielding, climate-resilient varieties, like Chintamani-1, alongside promoting precision farming techniques and efficient extension services. Given the rising variability in recent years, the policy should also strengthen risk management mechanisms, such as crop insurance and real-time weather advisory systems. Simultaneously, targeted support for small and marginal farmers through incentives for orchard rejuvenation, input subsidies and market access will ensure sustainable and inclusive cashew sector growth.

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