Growth in area, production and productivity of major crops in Karnataka

V.A. RAMACHANDRA, RAJASHEKHAR T. BASANAYAK, RENUKA SALUNKE AND MUNJI RAVUSAHEB

ABSTRACT: The analysis of growth is usually used in economic studies to find out the trend of a particular variable over a period of time and used for making policy decisions. The necessary secondary data were collected for a period of 26 years from 1982-83 to 2007-08. The growth in the area, production and productivity under different crops were estimated using the compound growth function. Growth rates showed a significant positive growth in area under pulses, vegetables and spices and fruits and nuts while cereals showed significant negative growth. The area under jowar, bajra, ragi and minor millets were experiencing a substantial annual decrement. The area under rice has recorded a mild annual increment. The growth in area under oilseeds and commercial crops was negative and insignificant. Similarly, the production of cereals, pulses, vegetables and fruits showed a significant positive growth rate. The production of oilseeds and commercial crops registered insignificant positive growth. The productivity of different crops registered significant growth in the case of cereals, pulses and fruits. Productivity of oilseeds recorded moderately significant positive growth. The productivity of commercial crops registered insignificant positive growth and for vegetables, the growth in productivity was insignificant and negative.

KEYWORDS: Growth, Production, Productivity, Major crops

INTRODUCTION

In India, agriculture and other allied activities contribute significantly to the Gross Domestic Product (GDP), accounting for nearly 16 per cent of the total GDP. It provides employment to around 64 per cent of the total work force while contributing 18 per cent of the total export. India, with only 2.3 per cent of world's total land area supports 18 per cent of human and 15 per cent of livestock population in the world. The country has made an impressive progress on the food front, which has resulted in increased production of food grains.

The state of Karnataka is blessed with varied agro-climatic conditions which permit the farmers of the state to cultivate not only a variety of crops in a season but also a number of crops like cereals, pulses, oilseeds, commercial crops and horticultural crops across different seasons of the year.

In Karnataka, the food crops share an area of 68.2 per cent of the total cultivated area while remaining 31.8 per cent of the cropped area was shared by non-food crops. The total food grain production in the state has increased from 62.8 tons during 1987-88 to 120.48 lakh tones during 2008-09. The state has large arable area under different crops having potential to increase further. It has paddy area of 14.16 lakh hectares, ragi 8.32 lakh hectares, jowar 13.82 lakh hectares, bajra 4.32 lakh hectares, maize 11.13 lakh hectares, wheat 2.76 lakh hectares, minor millets 0.36 lakh hectares, making a total cereal area of 54.87 lakh hectares. Chickpea has an area of 6.05 lakh hectares, pigeonpea 6.81 lakh hectares, with a total pulse area of 23.85 lakh hectares. The area under groundnut is 9.08 lakh hectares; cotton and sugarcane are grown in area of 4.03 lakh hectares and 3.06 hectares, respectively. (Karnataka State at a Glance, 2008-09). It is desirable to study the growth in area, production and productivity of major crops in Karnataka. The present study
aims at examining the growth in area, production and productivity of major crops in the state.

**MATERIALS AND METHODS**

The study on growth in area, production and productivity of major crops was purposively taken up in Karnataka state of India. The secondary data on area under different crops, production and yield for the period 1982-83 to 2007-08 were used to analyze the trends. Data used for the study were collected from various published sources from the Directorate of Economics and Statistics (DES), Bangalore, Karnataka. Data on season wise crop was obtained from the Annual Season and Crop Report of the DES. Time series data pertaining to area, production, productivity of vegetables and fruits crop were collected for the same period from Centre for Monitoring Indian Economy (CMIE) report.

The growth in the area, production and productivity under different crops was estimated using the compound growth function of the formula:

\[
Y = ab^t
\]

where,

- \(Y\) = Dependent variable in period t (Area/Productivity/Production)
- \(a\) = Intercept
- \(b\) = Regression co-efficient = \((1+g)\)
- \(t\) = Years which takes values, 1, 2, …, n
- \(u\) = Disturbance term for the year \(t\)

The equation was transformed into log linear form for estimation purpose. The compound growth rate \((g)\) in percentage was then computed using the relationship \(g = (10^b -1)\times100\).

**RESULTS AND DATA ANALYSIS**

The average area under cereals in the state during the study period was 50.97 lakh ha (Table 1). The fluctuation in the area under cereals in the state appeared to be low as the coefficient of variation was 9.46 per cent. The growth in area under cereals in the state has recorded a mild annual decrement (-0.734 % pa). The area under cereals in the state appeared to be low as the study period was 50.97 lakh ha (Table 1). The fluctuation in area under cereals in the state has recorded a mild annual decrement (-0.734 % pa). The area under cereals in the state has recorded a negative annual decrement of -0.734 % pa.

The growth rate analysis of area under bajra indicated that the crop has lost its area during the period from 1982-83 to 2007-08 in the state. The growth in production in bajra showed slight increasing trend of 0.019 per cent per annum. The state registered a significant increase in maize area (8.01 % per annum) during the study period. The rapid expansion of area under this crop was mainly due to its important features like short duration, adaption to a wide range of soils and climatic conditions and high yield per hectare as compared to other cereal crops. maize yield has been increasing at the rate of 0.23 per cent per annum. In Karnataka, maize production was increasing at 8.29 per cent per annum during the study period. Similar trend was reported by Singh and Singh (1991) and Sinha and Thakur (1993) who observed an increasing trend in yield level in their study.

During the study period, Karnataka showed significant decrease in area under ragi crop which might be due to low output price in the market for this crop. Production of ragi showed increasing trend in the state during the study period. The fluctuation in growth of production of ragi in the state was low (22.27 %). Productivity growth of ragi also showed similar trend as that of production. Rajpurohit (1983) had observed that there was a consistent growth in yield of ragi in Karnataka during the period from 1976-77 to 1980-81.

The area under minor millets in the state showed deceleration trend which might be due to low prices for these crops. The state showed significant increase in yield of minor
millet (1.60% per annum) with mild fluctuation of sixteen per cent. Production of minor millets showed almost deceleration trend (-6.70% per annum).

The details of growth in area, production and productivity of pulses in Karnataka are presented in Table 2. Pigeonpea, black gram, green gram and chickpea are the different pulses grown in the state. The total area under pulses in the state was 26.65 lakh hectares. There was mild fluctuation in the area under pulses in the state (26.37%). The growth rate in area under pulses has recorded significant increment of 3.01 per cent per annum. The reason for the increase in the area under all the pulses might be due to better relative prices. The state was producing 4.76 lakh tones of pulses. The growth in pulses output in the state was around 0.314 per cent per annum with medium fluctuation. The average productivity of pulses was about 2269.46 kg/ha in the state. The productivity showed a growth rate of only 0.20% per cent per annum. This increase might also be due to the efforts of the research projects at the national and state level in improving productivity of pulses over years; availability of good quality seeds that minimize the incidence of soil borne diseases and availability of improved package of practices.

Pigeonpea is one of the major pulse crops grown in the state. It occupied almost forty per cent of the total pulses area in the state. The total area under pigeonpea in the state was 4.64 lakh hectares. The growth rate in area under pigeonpea was about 2.09% per cent per annum with medium fluctuation of twenty per cent. Pigeonpea production in the state is growing at around 2.11% per cent per annum and its fluctuation is about forty per cent. The pigeonpea productivity in the state witnessed an annual increment of 1.16 per cent per annum. The reason for the increase in area might be due to the availability of better varieties, better relative prices and relatively low water requirement.

The total area under black gram in the state was about 1.14 lakh hectares. The area under black gram has witnessed an annual growth of 4.23% per cent per annum. However, black gram showed declining growth rate (-0.18%) with respect to its productivity (Table 2). The total production of black gram in the state was 0.37 lakh tones which showed a medium fluctuation of fifty per cent. The growth in production of black gram was 3.06% per cent per annum.

The results of growth rate analysis of area under green gram during the entire period indicated a significant growth of 4.52% per cent per annum with fluctuation of 40 per cent. The total area under green gram in the state was 2.86 lakh hectares. The growth analysis of green gram production revealed almost a similar trend as that of the area growth performance. During the entire period, the growth rate for production of green gram was 0.88 per cent per annum. The green gram yield growth analysis showed a negative growth of about one per cent at the state during entire period.

The area under chickpea showed a significant and positive growth rate of 5.12% per cent per annum with fluctuation of 48.62% per cent. The area under chickpea in the state was 3.14 lakh hectare. The significant and positive growth in production of chickpea was observed in Karnataka and the growth rate was 7.39 per cent per annum. The production of chickpea in

Table 1 : Growth in area, production and productivity of cereals in Karnataka

<table>
<thead>
<tr>
<th>No.</th>
<th>Crop</th>
<th>Average area (lakh ha)</th>
<th>CV%</th>
<th>CGR% pa</th>
<th>Average productivity (kg/ha)</th>
<th>CV%</th>
<th>CGR% pa</th>
<th>Average production (lakh tons)</th>
<th>CV%</th>
<th>CGR% pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rice</td>
<td>12.80 (25.11)</td>
<td>10.21</td>
<td>0.832**</td>
<td>2398.69</td>
<td>12.99</td>
<td>1.46**</td>
<td>29.48 (39.83)</td>
<td>21.82</td>
<td>2.339**</td>
</tr>
<tr>
<td>2.</td>
<td>Jowar</td>
<td>18.02 (35.35)</td>
<td>25.85</td>
<td>-2.974**</td>
<td>821.46</td>
<td>19.07</td>
<td>0.90</td>
<td>15.50 (20.94)</td>
<td>17.73</td>
<td>-1.054*</td>
</tr>
<tr>
<td>3.</td>
<td>Bajra</td>
<td>4.13 (8.10)</td>
<td>21.11</td>
<td>-1.438*</td>
<td>581.03</td>
<td>23.74</td>
<td>1.46*</td>
<td>2.29 (3.09)</td>
<td>31.62</td>
<td>0.019</td>
</tr>
<tr>
<td>4.</td>
<td>Maize</td>
<td>4.61 (9.04)</td>
<td>59.64</td>
<td>8.019**</td>
<td>2883.11</td>
<td>12.37</td>
<td>0.23</td>
<td>12.79 (17.28)</td>
<td>63.32</td>
<td>8.293**</td>
</tr>
<tr>
<td>5.</td>
<td>Ragi</td>
<td>10.03 (19.67)</td>
<td>12.92</td>
<td>-1.395**</td>
<td>2341.73</td>
<td>21.88</td>
<td>1.55**</td>
<td>13.35</td>
<td>22.27</td>
<td>0.154*</td>
</tr>
<tr>
<td>6.</td>
<td>Minor millets</td>
<td>1.38 (2.70)</td>
<td>65.84</td>
<td>-8.167**</td>
<td>493.53</td>
<td>16.79</td>
<td>1.60**</td>
<td>0.60 (0.81)</td>
<td>57.42</td>
<td>-6.709**</td>
</tr>
<tr>
<td>7.</td>
<td>Total cereals</td>
<td>50.97 (100.00)</td>
<td>9.64</td>
<td>-0.734**</td>
<td>8585.38</td>
<td>13.20</td>
<td>1.04**</td>
<td>74.01 (100.00)</td>
<td>21.32</td>
<td>2.002**</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent percentage to the total. * and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 2 : Growth in area, production and productivity of pulses in Karnataka

<table>
<thead>
<tr>
<th>No.</th>
<th>Crop</th>
<th>Average area (lakh ha)</th>
<th>CV%</th>
<th>CGR% pa</th>
<th>Average productivity (kg/ha)</th>
<th>CV%</th>
<th>CGR% pa</th>
<th>Average production (lakh tons)</th>
<th>CV%</th>
<th>CGR% pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pigeonpe</td>
<td>4.64 (39.38)</td>
<td>20.31</td>
<td>2.09**</td>
<td>451.76</td>
<td>25.24</td>
<td>1.16</td>
<td>2.07 (43.48)</td>
<td>40.99</td>
<td>2.991**</td>
</tr>
<tr>
<td>2.</td>
<td>Black gram</td>
<td>1.14 (9.67)</td>
<td>31.36</td>
<td>4.23**</td>
<td>751.61</td>
<td>25.62</td>
<td>-0.18</td>
<td>0.37 (7.77)</td>
<td>55.55</td>
<td>3.060*</td>
</tr>
<tr>
<td>3.</td>
<td>Green gram</td>
<td>2.86 (24.27)</td>
<td>41.61</td>
<td>4.52**</td>
<td>566.88</td>
<td>19.18</td>
<td>-0.99</td>
<td>0.76 (15.96)</td>
<td>48.85</td>
<td>0.881</td>
</tr>
<tr>
<td>4.</td>
<td>Chickpea</td>
<td>3.14 (26.65)</td>
<td>48.62</td>
<td>5.12**</td>
<td>476.46</td>
<td>23.31</td>
<td>1.88**</td>
<td>1.56 (32.77)</td>
<td>57.07</td>
<td>7.399**</td>
</tr>
<tr>
<td>5.</td>
<td>Total pulses</td>
<td>11.78 (100.00)</td>
<td>26.37</td>
<td>3.01**</td>
<td>2269.46</td>
<td>23.69</td>
<td>0.20**</td>
<td>4.76 (100.00)</td>
<td>51.03</td>
<td>0.314**</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent percentage to the total. * and ** indicate significance of values at P=0.05 and 0.01, respectively

HIND AGRICULTURAL RESEARCH AND TRAINING INSTITUTE
the state was 1.56 lakh tons. The growth rate in productivity of chickpea in the state was 1.88 per cent per annum with mild fluctuation of twenty three per cent. The productivity of chickpea was 476.46 kg/ha.

Table 3 shows the growth in area, production and yield of major oilseeds in Karnataka. The total area under oilseeds in the state was 21.28 lakh hectares. The state registered an increase in area under oilseeds (0.93 % per annum) with a mild fluctuation of 20.53 per cent. This was in line with the findings of Singh and Dhaliwal (1993) at all India level. At the state level, oilseed production was increasing slightly at 0.06 per cent per annum with mild fluctuation of twenty five per cent. The productivity of oilseeds in the state was about 2189.84 kg/ha. The state registered an annual increment of 0.04 per cent growth in the productivity of oilseeds.

The growth in groundnut area during the period was 0.06 per cent per annum. It can be observed that yield growth of groundnut was negative and non-significant (-0.48 % per annum). The significant decline in area during the study period was mainly responsible for the negative growth performance of groundnut in the state. This was largely due to lack of location specific high yielding, varieties and occurrence of disease and pests.

The growth analysis of area under sesamum revealed a negative growth of -2.362 per cent per annum. The sesamum yield growth analysis showed a growth of 2.83 per cent per annum at the state level. During the entire study period, the production growth rate of sesamum was just 0.41 per cent per annum.

At the state level, the area growth of safflower was declining at the rate of -4.874 per cent per annum. Production of safflower decreased significantly at -3.328 per cent per annum. This was due to combined effect of decline both in yield and area. The growth performance of safflower yield in the state revealed that its growth rate increased at the rate of 1.62 per cent per annum.

The area under sunflower showed a significant and positive growth rate of 4.04 per cent per annum. This could be attributed to the high price prevailed for sunflower as well the suitability of the crop to the dry tracts which acted as an incentive for the farmers to extend sunflower cultivation. The significant and positive growth in production of sunflower was observed in the state with the growth rate of 4.23 per cent per annum. This might be due to the positive growth in area under sunflower and thus it was area led growth. However, the growth in productivity of sunflower in the state was negative (-1.49 % pa).

The growth performance of area, production and productivity of major commercial crops grown in the state are presented in Table 4. The total area under commercial crops in the state was 11.13 lakh hectares. The growth in area under commercial crops in the state has recorded a slight decrease of -0.03 per cent per annum. Tingre et al. (2009) reported the similar result while examining the growth rates of area, production and yield of major crops in Amravati district of Vidarbha. The state was producing 243.47 lakh tones of commercial crops with compound growth rate of 0.059 per cent per annum.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crop</th>
<th>Average area (lakh ha)</th>
<th>CV%</th>
<th>Average productivity (kg/ha)</th>
<th>CV%</th>
<th>Average production (lakh tons)</th>
<th>CV%</th>
<th>Average productivity % pa</th>
<th>Average production % pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Groundnut</td>
<td>10.25 (48.16)</td>
<td>18.4</td>
<td>780.53</td>
<td>19.56</td>
<td>1.81 (61.78)</td>
<td>33.95</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td>2.</td>
<td>Sesamum</td>
<td>1.16 (5.45)</td>
<td>26.36</td>
<td>404.38</td>
<td>30.88</td>
<td>0.46 (3.36)</td>
<td>33.55</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td>3.</td>
<td>Safflower</td>
<td>1.59 (7.47)</td>
<td>42.25</td>
<td>577.46</td>
<td>22.96</td>
<td>0.87 (6.88)</td>
<td>36.68</td>
<td>0.42</td>
<td>0.42</td>
</tr>
<tr>
<td>4.</td>
<td>Sunflower</td>
<td>8.28 (38.90)</td>
<td>42.24</td>
<td>407.46</td>
<td>25.12</td>
<td>3.50 (27.68)</td>
<td>46.64</td>
<td>0.43</td>
<td>0.43</td>
</tr>
<tr>
<td>5.</td>
<td>Total oilseeds</td>
<td>21.28 (100.00)</td>
<td>20.53</td>
<td>2169.84</td>
<td>12.15</td>
<td>12.64 (100.00)</td>
<td>25.85</td>
<td>0.06</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent percentage to the total. * and ** indicate significance of values at P=0.05 and 0.01, respectively

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crop</th>
<th>Average area (lakh ha)</th>
<th>CV%</th>
<th>Average productivity (kg/ha)</th>
<th>CV%</th>
<th>Average production (lakh tons)</th>
<th>CV%</th>
<th>Average productivity % pa</th>
<th>Average production % pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cotton</td>
<td>5.85 (52.56)</td>
<td>26.56</td>
<td>202.65</td>
<td>31.71</td>
<td>7.06 (2.89)</td>
<td>27.09</td>
<td>-0.666</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Tobacco</td>
<td>0.68 (6.10)</td>
<td>29.12</td>
<td>736.73</td>
<td>16.60</td>
<td>0.47 (0.19)</td>
<td>24.82</td>
<td>2.565**</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Chickies</td>
<td>1.56 (14.01)</td>
<td>18.82</td>
<td>634.03</td>
<td>50.67</td>
<td>0.94 (0.38)</td>
<td>49.27</td>
<td>5.999**</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Sugarcane</td>
<td>3.04 (27.31)</td>
<td>31.18</td>
<td>88.73</td>
<td>10.82</td>
<td>235.04 (96.53)</td>
<td>35.94</td>
<td>2.612**</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Total commercial crop (selected)</td>
<td>11.13 (100.00)</td>
<td>12.18</td>
<td>2169.84</td>
<td>12.15</td>
<td>12.64 (100.00)</td>
<td>25.85</td>
<td>0.06</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses represent percentage to the total. * and ** indicate significance of values at P=0.05 and 0.01, respectively
State level area growth analysis of cotton showed a decline by -2.27 per cent per annum. The total area under cotton in the state was 5.85 lakh hectares. At state level, cotton production decreased at a rate of -0.66 per cent which was insignificant. Cotton productivity experienced insignificant positive growth rate of 0.30 per cent per annum with fluctuation of about thirty per cent. The average productivity of cotton in the state was 202.65 kg/ha.

The tobacco area was declining (-3.306 % pa) with annual fluctuation of about thirty per cent. The average area under tobacco in the state was 0.68 lakh ha. The production of tobacco was increasing at 2.56 per cent per annum during the study period. The average production of tobacco was 0.47 lakh tons. The yield growth of tobacco in the state was declining at the rate of -0.71 per cent per annum. The productivity showed a mild fluctuation of about thirty per cent.

A significant increasing growth in production and productivity of chilli was observed while the growth rate for area under chilli was declining. The growth in area under chilli in the state was -0.274 per cent per annum with mild fluctuation of eighteen per cent. Chilliies were grown in an area of about 1.56 lakh ha. The average production of chilli in the state was 0.94 lakh tons. The growth rate of production of chilli was 5.99 per cent per annum. The findings of the study are in line with the results obtained by Veena (1996), Dharwad, Bellary, Gulbarga and Raichur districts are the chilli growing districts of the state while Bijapur district picked up chilli cultivation in recent years.Better prices, improved varieties and production technology and export opportunities, credit facilities in recent years might have encouraged the growth in chilli production. The growth rate in productivity of chilli increased at 6.41 per cent per annum.

The state registered a highly significant increase in area under sugarcane (4.14 % pa). Irrigated area growth, better prices and less labour requirement contributed a lot to the growth of total area under sugarcane. It was grown in an area of 3.04 lakh ha in the state. At the state level sugarcane production was increasing at 2.61 per cent per annum. The average production of sugarcane in the state was 235.04 lakh tons with mild fluctuation of 35 per cent. Samui et al. (2005) reported similar result while analyzing the area, yield and production of sugarcane in different agro-climatic regions of Maharashtra. The growth performance of sugarcane productivity in the state registered an increasing growth of 0.45 per cent per annum.

In general, a significant growth in area and production of selected vegetables was observed during the study period (Table 5). The increase in demand for vegetables consumption, better prices, higher income with improved varieties and production technology in recent years might have encouraged
The growth in vegetable production in the state. Onion, okra, brinjal, cardamom, ginger and coriander are the different vegetable and spices crops grown in the state. The growth in area under vegetables and spices has recorded an annual increment of 2.80 per cent per annum. The growth in production of vegetables and spices increased significantly at the rate of 3.51 per cent per annum. The average production of vegetables and spices in the state was 10.92 lakh tons. The overall productivity performance of vegetable crop was poor.

The compound growth in area under onion was 6.17 per cent per annum with fluctuation of 48.58 per cent. The area under onion in the state was 0.86 lakh ha. The production of onion also registered an increment of 7.02 per cent per annum. The average production of onion in the state was 5.88 lakh tons. However, the growth in productivity of onion in the state was found to be declining (-0.64 % pa). The average productivity of onion in the state was 5876.5 kg/ha.

The area under okra showed a declining growth rate of -0.12 per cent per annum with fluctuation of about 25 per cent. The average area under okra was 0.10 lakh ha. Despite the decrease in area, the production of okra has shown an increasing trend in the state. This was mainly due to increase in productivity of okra. Okra showed the production growth rate of 0.20 per cent per annum with variability of 25 per cent. The average production of okra in the state was 0.83 lakh tons. Similar trend was noticed in the growth in productivity of okra in the state. The growth rate for productivity of okra was 0.40 per cent per annum with low coefficient of variation value of 10.03 per cent. The average productivity of okra in the state was 8038.77 kg/ha.

The brinjal was grown in an area of 0.19 lakh ha. Brinjal registered a declining growth rate of -1.05 per cent per annum with mild fluctuation of about 21 per cent. The average production of brinjal was 4.09 lakh tons. The growth in production of brinjal was -1.28 per cent per annum with coefficient of variation of 36.48 per cent. Brinjal productivity recorded a negative growth of -0.23 per cent per annum. The average productivity was 20987.23 kg/ha with 23.5 per cent variability.

The area under cardamom in the state decreased as noticed by the negative growth rate of -1.71 per cent per annum. The area under cardamom in the state was 15 lakh ha with slight variability of 14.92 per cent. The production of cardamom was 0.01 lakh tons. It showed a significant declining growth rate of -2.27 per cent per annum with variability of 18 per cent. Similar trend was shown by productivity of cardamom with growth rate -0.52 per cent per annum. The productivity of cardamom in the state was 56.46 kg/ha. The productivity was almost stagnant in the state as shown by lower value of coefficient of variation (6.46%) and mild annual negative growth rate (-0.53 % pa).

In the case of ginger, a significant growth in area, yield and production was observed during the study period. The total area under ginger was 0.06 lakh ha with growth rate of 8.89 per cent per annum. The variability in growth in area under ginger was high (87.93 %). Ginger production registered the growth rate of 8.89 per cent per annum. The average production was 0.08 lakh tons with variability of 87.67 per cent. The productivity of ginger was almost stable as indicated by its low value of coefficient of variation (1.10%). The average productivity of ginger in the state was 1319 kg/ha showing growth rate of 0.012 per cent per annum.

The area under coriander in the state had negative growth of -4.06 per cent per annum with mild variability (35.15%). Coriander was grown in an area of 0.15 lakh ha in the state. The production of coriander recorded a negative growth (-3.39 % pa) with moderate variability of 36 per cent. The average production of coriander in the state was 0.02 lakh tons. However, productivity of coriander showed significant positive growth of 0.60 per cent per annum. The average productivity of coriander in the state was 154.88 kg/ha.

The growth in area, production and productivity of selected fruits and nuts crops are depicted in Table 6. The growth in area under selected fruits and nuts has recorded an increment of 3.75 per cent per annum. The production of fruits and nuts crops included in the current study increased 3.586 % per annum during the study period. This might be due to their adaptability in varied-agro climatic condition of the state. Moreover, the increase in demand for fruits, better prices, relatively higher income with improved management practices and production technology in recent years encouraged the growth in fruits production. The average production of fruits and nuts in the state was 25.92 lakh tons with coefficient of variation of 33.2 per cent.

The area under banana in the state showed significant increase of 3.27 per cent per annum. There was a significant increase in production at the rate of 7.64 per cent per annum. The growth in productivity of banana was also positive (3.92 % pa). The area under banana was 0.31 lakh ha and it showed the moderate variability of about 37 per cent. The variability for production of banana in the state was high (72.78%). The average production of banana was 6.55 lakh tons. Banana showed an average productivity of 18986 kg/ha. Thus, the growth in production of banana in Karnataka was due to growth in both area and productivity of banana in the state.

Papaya recorded a significant increase in area, production and productivity in the state. The annual increment in area was found to be 9.14 per cent per annum with fluctuation of about 62 per cent. Production of papaya increased at 29.71 per cent per annum and it showed a high fluctuation of 83 per cent. The yield growth of papaya was 19.12 per cent per annum with the variability of 77 per cent. Thus, the growth in production of papaya in the state has come mainly from growth in productivity.

Chicco registered a significant positive growth in area and production while it showed insignificant negative growth
in productivity. Area under chicco increased at the rate of 5.68 per cent per annum with high fluctuation of about 200 per cent. Similarly, the production has increased at the rate of 2.80 per cent per annum showing moderate fluctuation of thirty per cent. However, the productivity of chicco registered a declining trend of -1.30 per cent per annum with mild fluctuation of 27 per cent. Thus, the growth in production of chicco was mainly due to growth in area under chicco.

The state registered a highly significant increase in area under coconut (3.41 % pa) during the study period. The total area under coconut in the state was 2.85 lakh ha. The total production of coconut in the state was 13.32 lakh tonnes (51.38%) with a mild fluctuation of 17.98 per cent. The production of coconut showed an annual positive growth of about 1.95 per cent per annum. The coconut productivity in the state witnessed an annual decrement of -1.42 per cent per annum with mild variability of 13.74 per cent. The growth in the production of coconut in the state has come mainly from growth in the coconut area.

Areca nut recorded a significant increment in area, production and productivity in the state. The area under areca nut was growing at the rate of 5.19 per cent per annum and its growth in production was 4.17 per cent per annum. Similarly, areca nut recorded the productivity growth of 1.36 per cent per annum. The total area under areca nut in the state was 0.95 lakh ha with moderate fluctuation of 43 per cent. The average production of areca nut in the state was 1.32 lakh tons with coefficient of variation of 39 per cent.

The production and productivity of cashew nut showed significant increase of 4.71 per cent per annum and 4.47 per cent per annum, respectively. The growth in area was also positive (1.27 % pa) but it was non-significant. This showed that increase in production of cashew nut in the state was mainly due to increase in productivity rather than due to increase in area.

Conclusion:
Growth rates estimated for changes in area under different crops showed a significant positive growth in area of pulses. The area under total vegetables and spices registered positive significant growth. The growth in area under oilseeds and commercial crops was negative and insignificant. Similarly the production of cereals, pulses, vegetables and fruits showed a significant positive growth rate. The production of oilseeds and commercial crops registered insignificant positive growth. The productivity of different crop registered significant growth in the case of cereals, pulses and fruits. Productivity of oilseeds recorded moderately significant positive growth. The productivity of commercial crop registered insignificant positive growth and for vegetables, the growth in productivity was insignificant and negative.

The study revealed that the area under jowar, bajra, ragi and minor millets have experienced a substantial annual decrement. The area under rice has recorded a mild annual increment. The overall area under cereals revealed to be decreasing annually. Therefore, it is necessary that measures should be taken to reverse the decreasing area under most of the cereals in order to ensure food requirement in the state. The area under pulses and vegetables and spices and fruits and nuts in the state is increasing year after year. However, the productivity of pulses, oilseeds and other commercial crops is almost stagnant. Thus, there is a need to take up productivity enhancing measures in these crops like varietal improvement, improved cultural practices, distribution of planting materials, disease control measures, and selection of appropriate crop according to agro-climatic conditions and irrigation facilities.