Growth and Variability in Area, Production and Yield of Cotton Crop

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Abstract – This study is going to attempt to examine the trends and variability in the growth of cotton as nonfood crop in the Country. For the analysis purpose, the relevant secondary data from 1949-50 to 2011-2012 have been examined. The compound growth rates have been estimated with the help of exponential function and variability by using the technique of co-efficient of variation for the convenient of comparison over the period, so it is subdivided into eight periods. The study concludes that a moderate to high significant growth has been observed in case of area, production and yield of cotton as a whole covering the study period. Concerning the variability, the study concludes that there persist wide fluctuations in the growth of area, production and yield of cotton over the study period.

Keywords – Growth, Variability, Area, Production, Cotton.

I. INTRODUCTION

Cotton has been traditionally known as the backbone of non food crops of agricultural economy of India. Today, India is second largest producers of cotton in the world after china being leading in production as well as productivity too, it accounted for an estimated production of 24.32 million tones during the year 2011-12 (Annon., 2012). India contributes about 16.5 per cent of the total world production of cotton.

Objectives of study
(i) To study the growth rate in area, production and yield of cotton crop at national level and
(ii) To find out the variability in area, production and yield of cotton crop at national level.

II. RESEARCH METHODOLOGY

The study is based on the relevant secondary data collected from different published sources of the Central Government of India, Cotton Corporation of India Limited. The data on area, production and yield of cotton crop at national level have been collected from sources like Economic Survey, Agricultural Statistics at a Glance, Published by Directorate of Economics and Statistics, Department of Agriculture & Co-operation, Government of India. A time period of 63 years from 1949-1950 to 2011-2012 have been chosen for study. For analytical purpose this entire time period is divided into seven decades as well as overall period.

Decade I: 1949-1950 to 1958-1959
Decade II: 1959-1960 to 1968-1969
Decade VII: 2009-2010 to 2011-2012
Overall period: 1949-1950 to 2011-2012

(i) Compound Growth Rate

To calculate the compound growth rates (CGR) of area, production and yield of cotton, the following exponential trend equation has been used due to higher R² value on the variables.

\[ Y = ab^t \] (i)

Where \( Y \) = the variable for which growth rate is calculated, 
\( t \) = time variable taking the values 1, 2, 3, .........., n, 
\( a \) = intercept, 
\( b \) = the regression co-efficient of ‘Y’ on t.

The above exponential equation can be expressed in terms of log form as follows:

\[ \log Y = \log a + t \log b \]

Now, CGR per cent can be expressed as:

\[ \text{CGR per cent} = \left( \frac{\text{Antilog } b - 1}{1} \right) \times 100 \]

To test the significance of compound growth rate t test has been used as follows:

\[ t = \frac{r}{SE(r)} \] with (n - 2) degree of freedom, where \( r \) is CGR per cent and n is the number of observations (years)

and \( SE(r) = \frac{100b \cdot SE(\log b)}{0.4343} \)

(ii) Co-efficient of variability

To measure the variability of area, production and yield the following formula has been used.

\[ CV = \left( \frac{\text{standard deviation}}{\text{mean}} \right) \times 100 \]

Where: \( CV = \) Co-efficient of variation in per cent.

III. RESULTS AND DISCUSSION

Table 1 reveals that the area at national level was recorded to be maximum (8.994 per cent) during decade VII, which is positively significant at 5 per cent level and lowest growth rate (-1.904 per cent) was recorded during IV decade, which shows a negative impact over the time period. Whereas decade I and V both were positively significant at 5 per cent level, while decade VI is positively significant at 10 per cent level of probability. Decade II and III were found non significant with positive and negative impact respectively. While the overall decade shows positive impact on area over the time.

Among all the periods, decade VII showed highest positive and significant growth rare (22.59 per cent) in...
case of production. The second highest positive impact was recorded on decade VI (12.47 per cent), followed by 7.133 per cent on decade I, decade III (3.40 per cent), decade II (2.33 per cent) and decade V (2.28 per cent) respectively. Only decade IV was found to be non significant impact on production over the period.

Further table reveals that the decade VII showed highest and positive growth rate (12.72 per cent) compared to all other decade and overall periods, followed by decade VI (11.21 per cent). Decade III was recorded as 3.52 per cent, overall decade with 2.49 per cent and decade IV with 2.32 percent were found to be positively significant at 5 per cent level, respectively. While, decade II with 1.89 per cent and decade I with 1.85 per cent both were found significant at 10 per cent level of probability, whereas, decade V showed negative non significant growth rate in productivity.

It has been revealed from Table 2 that area under cotton crop was recorded highest variation during decade I (15.44 per cent) followed by overall decade (13.63 per cent), decade V (9.75 per cent), decade VII (8.39 per cent), decade VI (7.36 per cent), decade IV (6.88 per cent), decade III (4.33 per cent) and it was recorded least during decade II (4.02 per cent), respectively. The variation in area of cotton was ranging from 15.44 per cent to 4.02 per cent respectively.

<table>
<thead>
<tr>
<th>Decade</th>
<th>Area</th>
<th>Production</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decade I&lt;sup&gt;th&lt;/sup&gt;</td>
<td>5.154**</td>
<td>7.133**</td>
<td>1.85*</td>
</tr>
<tr>
<td>Decade II&lt;sup&gt;th&lt;/sup&gt;</td>
<td>0.44086NS</td>
<td>2.33**</td>
<td>1.89*</td>
</tr>
<tr>
<td>Decade III&lt;sup&gt;th&lt;/sup&gt;</td>
<td>-0.0484NS</td>
<td>3.40**</td>
<td>3.52**</td>
</tr>
<tr>
<td>Decade IV&lt;sup&gt;th&lt;/sup&gt;</td>
<td>-1.904**</td>
<td>0.37NS</td>
<td>2.32**</td>
</tr>
<tr>
<td>Decade V&lt;sup&gt;th&lt;/sup&gt;</td>
<td>2.741**</td>
<td>2.28**</td>
<td>-0.45NS</td>
</tr>
<tr>
<td>Decade VI&lt;sup&gt;th&lt;/sup&gt;</td>
<td>1.133*</td>
<td>12.47**</td>
<td>11.21**</td>
</tr>
<tr>
<td>Decade VII&lt;sup&gt;th&lt;/sup&gt;</td>
<td>8.994**</td>
<td>22.59**</td>
<td>12.72**</td>
</tr>
<tr>
<td>Overall</td>
<td>0.475NS</td>
<td>2.97**</td>
<td>2.49**</td>
</tr>
</tbody>
</table>

** & * Significant at 5 & 10 per cent level

In case of the highest variation in production was recorded during overall decade (72.45 per cent) and lowest variation during decade IV (11.87 per cent). During decade VI (38.82 per cent), decade I (20.85 per cent), decade VII (23.5 per cent), decade III (18.95 per cent), decade II (12.85 per cent) and decade V (11.94 per cent), the variation in production of cotton was ranging from 72.45 per cent to 11.87 per cent respectively.

The highest variation in yield was recorded during overall decade (55.16 per cent) and lowest variation during decade I (8.08 per cent). During decade VI (34.21 per cent), decade III (13.39 per cent), decade VII (13.13 per cent), decade IV (11.90 per cent), decade II (11.03 per cent) and decade V (8.25 per cent), the variation in production of cotton was ranging from 55.16 per cent to 8.08 per cent respectively.

### IV. CONCLUSION

The study revealed a moderate to high significant growth in area, production and yield of cotton in case of for the period from 1949-50 to 2011-12. With regard to the variability in the growth of area, production and yield of cotton and, it is concluded that there persist wide fluctuations in the growth of area, production and yield of the study period.

There existed severe ups and down in the growth process revealing the smoothness of growth in the area, production and yield of cotton crop. In view of the above findings following suggestions are recommended for suitable policy formation.

Yield growth rate is skimpy because of poor availability of HYV seeds, wide spread infestation by insects and pests, destruction of crops by wild animals in the field, inadequate and irregular water supply due to low rainfall during the period etc. So, to increase the yield growth rate steps should be taken to overcome the mentioned difficulties face by the cultivators.

A rising trend in the growth featured by high degree of variability is a sign of vulnerability in the growth process. Wide spread ups and downs in the area, production and yield of a non food crop shatters the rational expectations of the cultivators and lead to many disruptive consequences. Thus, there is need for proper policies and programmes to concentrate on increasing the production and yield of cotton introducing HYVs and by increasing area under cultivation to include non-traditional areas and
encourage the farmers to use appropriate amount of input like fertilizers, improved seeds, pesticides and water.

REFERENCES


AUTHOR'S PROFILE

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Born in Jharkhand on 13th September 1968, E.Q.: M. Sc. (Ag.) in 1991 & Ph. D. Agricultural Economics in 1993 from Raja Balwant Singh College, Bhopur, Agra (Uttar Pradesh). At present working as Associate Professor and Head, Department of Agricultural Economics, Nagaland University, SASRD, Medziphema. Campus District: Dimapur, Nagaland. Life members of more than a dozens of professional bodies, Counselor and member of editorial boards of Journals, Referee of different Journals. Published 10 books on agriculture and allied fields, 8 manuals of UG, PG/Ph.D. course curriculum, organized 4 seminar / conferences as organizing secretary and 5 summer / winter school for faculty sponsored by the ICAR, New Delhi. Published more than 50 research papers in the international and national repute journals, more than two dozens articles and attended more than 15 refreshers / training courses.

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