

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

Dr. Amod Sharma

Head, Department of Agricultural Economics
 Nagaland University, SASRD, Medziphema: Campus
 District Dimapur - 797 106, Nagaland

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 III: 1969-1970 to 1978-1979
- Decade IV: 1979-1980 to 1988-1989
- Decade V: 1989-1990 to 1998-1999

Decade VI: 1999-2000 to 2008-2009

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 R^2 value on the variables.

$$Y = ab^t$$

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:

$$\text{Log} Y = \text{Log} a + t \text{Log} b$$

Now, CGR per cent can be expressed as:

$$\text{CGR per cent} = (\text{Antilog } b - 1) \times 100$$

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

$$t = \frac{r}{SE(r)} \text{ with } (n - 2) \text{ degree of freedom, where } r \text{ is CGR}$$

per cent and n is the number of observations (years)

$$\text{and } SE(r) = \frac{100.b.SE(\log b)}{0.4343}$$

(ii) Co-efficient of variability

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

$$CV = (\text{standard deviation} / \text{mean}) \times 100$$

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 rate (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 1: Compound Growth Rate

Decades	Area	Production	Productivity
Decade I st	5.154**	7.133**	1.85*
Decade II nd	0.44086NS	2.33**	1.89*
Decade III rd	-0.0484NS	3.40**	3.52**
Decade IV th	-1.904**	0.37NS	2.32**
Decade V th	2.741**	2.28**	-0.45NS
Decade VI th	1.133*	12.47**	11.21**
Decade VII th	8.994**	22.59**	12.72**
Overall	0.475NS	2.97**	2.49**

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

Table 2: Co-efficient of Variation

Decade	Variable	Co-efficient of Variation		
		Mean	SD	CV
Decade I st	Area	7034.25	1086.325	15.443
	Production	3992.61	832.32	20.85
	Yield	95.80	7.74	8.08
Decade II nd	Area	7858.74	315.525	4.0149
	Production	5276.29	677.77	12.85
	Yield	114.00	12.58	11.03
Decade III rd	Area	7616.92	329.537	4.326
	Production	6346.71	961.94	18.95
	Yield	141.50	15.16	13.39
Decade IV th	Area	7526.38	517.973	6.882
	Production	7572.69	898.56	11.87
	Yield	171.40	20.40	11.90
Decade V th	Area	8189.59	798.196	9.7465
	Production	11523.91	1375.39	11.94
	Yield	239.50	19.75	8.25

Decade VI th	Area	8711.87	640.923	7.357
	Production	15923.37	6182.15	38.82
	Yield	307.10	105.04	34.21
Decade VII th	Area	11086.67	931.15	8.399
	Production	31183.33	6345.65	20.35
	Yield	475.00	62.36	13.13
Overall	Area	7978.373	1087.251	13.627
	Production	9520.51	6897.103	72.45
	Yield	192.33	106.096	55.16

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 (20.35 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 over the study period.

There existed severe ups and down in the growth process repealing 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

- [1] Aiyasamy, P. K. and Subramanian, V. 1979. Growth rates in area, production and yield of rice in Tamil Nadu. *Agricultural Situation in India*. 33. (12): 789-793.
- [2] Barah, 2001. Northeastern India - Strategies for Agricultural Development - An Overview. Proceedings. Prioritization of Strategies for Agricultural Development in Northeastern India. Published by NCAP. 1.
- [3] Borthakur, S. and Bhattacharyya, B. K. 1999. Trend analysis of area, production and yield of rice in Assam: 1951-52 to 1993-94. *Agricultural Situation in India*. 56. (4): 203-206.
- [4] Cavery, R. 1991. Groundnut Production in Tamilnadu - A Decomposition Analysis. *Agricultural Situation in India*. 46. (5): 321.
- [5] Chung, K. and Pal, S. 1996. Growth rates, trends, fluctuation and variability in area and production of pulse. *Journal of Indian Society of Agricultural Statistics*. 48. (1): 79-80.
- [6] Padnaban, N. R.; Singh, V. V.; and Singh, M. 1996. Cotton production in Tamilnadu. *Agricultural Situation in India*. 53. (3): 169-73.
- [7] Sadeesh, J.; Pouchepparadjou, A. and Thimmappa, K. 2006. Growth and instability analysis of major oilseeds in India. *Agricultural Situation in India*. 63. (3): 179-189.
- [8] Saikia, A. 2001. Performance of Agricultural Economy in the North East India - Constraints and Performance. Proceedings. Prioritization of Strategies for Agricultural Development in Northeastern India. Published by NCAP: 16.
- [9] Shaheen, F. A. and Shiyani, R. L. 2004. Growth and instability in area, production and yield of fruit crops in Jammu and Kashmir - a disaggregate analysis. *Agricultural Situation in India*. 60. (10): 657-663.
- [10] Sharma, Amod and Kalita, D. C. 2004. Trends of area, production and productivity of food grain crops in north eastern states. Nagaland University Research Journal. 2. Sept.: 31-37.
- [11] Sharma, Amod and Kalita, D. C. 2008. Trends of area, production and productivity of major fruit crops in Jammu & Kashmir. *Agricultural Situation in India*. LXV. 7. October: 477-488.
- [12] Singh, D. K.; Kumar, H. and Reddy, A. A. 2007. Growth performance of Chickpea: a zone-wise analysis. *Agricultural Situation in India*. 64. (7): 297-301.
- [13] Suresh, A.; Chand, P. and Kumar, S. 2005. Pattern and growth of diffusion of high yielding varieties of paddy in Indian Agriculture. *Agricultural Situation in India*. 62. (2): 127-134.
- [14] Swain, H. 2007. Growth and variability of oilseeds production in Rajasthan. *Agricultural Situation in India*. 62. (8): 367-375.
- [15] Swain, H. and Bhakar, R. R. 2006. Trends and variability of some cereals, pulses and commercial crops in Rajasthan. *Agricultural Situation in India*. 63. (6): 377-385.

AUTHOR'S PROFILE



Dr. Amod Sharma

Born in Jharkand on 13th September 1968, E.Q.: M. Sc. (Ag.) in 1991 & Ph. D. Agricultural Economics in 1993 from Raja Balwant Singh College, Bichpuri, 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 reputed journals, more than two dozens articles and attended more than 15 refresher / training courses.