

Analysis of Instability and Growth Rate of Cotton in Three District of Marathwada

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Research Article

Abstract: The nature and structure of Data & Instability of the crops depends upon the Growth Rate. The present paper analyzes the instability and the growth in cotton area, production and Yield during the period 1977-2007 of three districts in Marathwada, for this purpose Co-efficient of variation, Coppock’s Instability and Compound Growth Rate was worked out to find out instability associated.

Keyword: Coefficient of Variation, Coppock’s Instability and Compound Growth Rate.

Introduction

Maharashtra is one of the most progressive State of India. The State has made massive contribution in the development of agriculture field particular after the green revolution. The contribution of agriculture and other allied sector to the net state domestic product has declined from 35 percent in year 1970-71 to 12 percent in 2004-05. Thus the growth rate of the gross state domestic product (GSDP) 4-8 percent which was comparatively less than India gross domestic product 5-8 percent pr annum.

Thus the state has four divisions viz. Western Maharashtra, konkan, Marathwada and Vidarbha, this division have specialization in their regions according to the crop growth which western Maharashtra consist mainly sugarcane, wheat, onions, Konkan regions mostly paddy and fruits, Vidarbha mostly cultivate cotton, Asher and soybeans and Marathwada specially cotton, oil seed & pulses.

Methodology and Data

The present paper is based on the secondary time series data on area, production and yield obtained by the official publication of Maharashtra government “Epitome part I and part II and statistical survey of district of Maharashtra. The entire period was divided into four part the three part was 10 years each and the four part is overall period of 30 years, the time series data of 30 years fro 1997to 2007 were consider under analysis. The routine statistical calculation is worked

out for area, production and yield of three district of Marathwada, Aurangabad, Jalna and Beed for the respective 30 years time period.

Coefficient of variation (CV) were worked out as

$$CV = \left(\frac{\sigma}{\mu} \right) \times 100$$

Coppock’s instability index: - (CII)

Trend free measure of variability which is a close approximation of the average year to year percentage variation adjusted by trend (Kaur and Singhal, 1988.)

$$V \log = \frac{\sum \left(\log \frac{X_{t+1}}{X_t} - m \right)^2}{n}$$

$$\text{Coppock’s instability index} = \text{Antilog} \left(\sqrt{V \log} - 1 \right) \times 100$$

Where, X_t =Area/Production/Yield

t =number of years.

M= Mean of the difference between Logs of

X_{t+1}, X_t .

Log V = logarithmic variance of the series.

Compound growth rate (CGR):-

The data of area, production and yield of cotton were worked out for different periods as well as entire period of analysis by fitting to exponential function as follows.

$$X_t = ab^t$$

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

$$b = (1+r)/100$$

Where,

X_t =Area/Production/Yield of Cotton crop in years.

t = time element which takes the value 1, 2, 3,.....,n

a = intercept

b = regression coefficient

C.G.R is worked as follows:

$$\text{C.G.R} = (\text{antilog } b - 1) \times 100$$

View on Cotton Production Scenario over the Years

Table 1: Area, Production and Yield of cotton in Aurangabad district

Year	Area (00’hect)	Production(00’m tons)	Yield (kg/ha)	Percentage of yield against the area
1975-80	6787	4212	534	7.87%
1980-85	2691	1852	584	21.70%
1985-90	2842	2477	729	25.81%

1990-95	3440	2617	657	19.20%
1995-20	6635	5096	606	9.13%
2000-05	9044	8966	783	8.66%
2005-08	5882	11761	676	11.49%
Overall	37303	37207	4669	12.52%

Table 2: Area, Production and Yield of cotton in Beed district

Year	Area (00'hect)	Production (00'm tons)	Yield (kg/ha)	Percentage of yield against the area
1975-80	1482	951	544	36.70%
1980-85	1477	964	534	36.15%
1985-90	1480	1077	629	42.5%
1990-95	2897	2286	647	22.33%
1995-20	4774	3798	669	14.01%
2000-05	5218	4723	746	14.29%
2005-08	1718	2501	492	14.32%
Overall	20764	18801	4261	20.52%

Table 3: Area, Production And Yield of cotton in Jalna district

Year	Area(00'hect)	Production(00'm tons)	Yield (kg/ha)	Percentage of yield against the area
1980-85	6156	4662	642	10.42%
1985-90	5951	3925	552	9.28%
1990-95	6185	4223	591	9.56%
1995-00	7699	7034	699	9.08%
2000-05	8491	9610	1025	12.07%
2005-08	5008	11638	788	15.73%
Overall	39490	41092	4297	10.88%

Source: 1) Epitome of agriculture part I&II. 2) Commissioners of agriculture.

After the independent country has achieved a massive development in the field of agriculture however the Maharashtra has made significant of quantities increase in the field of agriculture specially in cotton. Production to improve the quality of Agriculture the government of Indian launched five - years plan to improve the productively for the agriculture impacts. As the result of this initiation of systematic cotton improvement programmes launched by AICCIP on 1st April 1976. For cotton improvement involving genetic, production and protection technologies, which result

helped to a get better cotton yield. But due to erratic condition of rainfall and other parameter in the Marathwada region the cotton yield remains more or less the same through the study period. From the above data of Aurangabad, Beed and Jalna district the area, production increases throughout them but there is no significant increase in the yield. The maximum percentage of yield against area in Aurangabad, Beed and Jalna are 25.81%, 42.5% and 12.07% in the year 1985-90, 1985-90 and 2000-2005 respectively.

Instability of Area, Production and Yield

Table1: Decade- wise instability (CV in%) of Area, Production and Yield of cotton of Aurangabad District

Duration	Area	Production	Yield
Period I (1977-87)	50.30%	54.01%	21.80%
Period II(1987-97)	16.90%	37.75%	41.89%
Period III(1997-07)	27.30%	61.71%	35.66%
Overall	59.93%	122.34%	45.68%

Table 2: Decade- wise instability (CV in%) of Area, Production and Yield of cotton Beed District

Duration	Area	Production	Yield
Period I (1977-87)	23.27%	31.32%	30.93%
Period II(1987-97)	48.63%	61.68%	22.18%
Period III(1997-07)	18.03%	39.82%	23.70%
Overall	67.80%	105.80%	33.23%

Table 3: Decade- wise instability (CV in%) of Area, Production and Yield of cotton Jalna District

Duration	Area	Production	Yield
Period I (1980-90)	5.18%	29.53%	25.34%
Period II(1990-00)	7.11%	28.18%	24.73%
Period III(2000-07)	22.73%	71.38%	45.32%
Overall	26.32%	88.35%	50.13%

The coefficient of variation for different periods of area, production and yield were worked out as show in tables. The area and production of Aurangabad is highly in sufficient over the 30 year period where as the less variability in area was observed during the period II and the same pattern of same were observed in the period I. The Jalna has highly insignificant in terms of production and yield but the area has less significant only 26.32% variation were observed. Thus the district

has better significant during the period I and period II in area, production and yield which is observed as 5.81% 29.35% and 25.34% respectively. Thus the Beed district has similar pattern of insignificance as Aurangabad in terms of area and production were as yield is less significant the district has better performance in significant during the period I and period III in terms of area, production and yield.

Table 4: Decade- wise instability (CII in %) of Area, Production and Yield of cotton of Aurangabad District

Sr.no.	Cotton	Period I	Period II	Period III	overall
1	Area	19.03%	13.02%	8.51%	27.05%
2	Production	48.01%	57.96%	61.29%	57.73%
3	Yield	28.22%	41.68%	46.92%	62.67%

Table 5: Decade- wise instability (CII in %) of Area, Production and Yield of cotton of Beed District

Sr.no.	Cotton(Production)	Period I	Period II	Period III	overall
1	Area	33.16%	26.36%	23.90%	26.15%
2	Production	62.51%	71.04%	47.90%	56.61%
3	Yield	62.59%	44.72%	33.29%	44.18%

Table 6: Decade- wise instability (CII in %) of Area, Production and Yield of cotton of Jalna District

Sr.no.	Cotton(yield)	Period I	Period II	Period III	overall
1	Area	44.18%	30.12%	30.12%	4.40%
2	Production	79.73%	43.74%	43.74%	61.32%
3	Yield	67.80%	36.03%	30.98%	49.89%

Overall instability is higher in production them area and yield at all there three districts. Where as the instability in lower in the case of area specially Jalna district followed by Aurangabad and Beed. But production and yield is highly insignificant throughout

periods under the study among all three districts. These indicates that as compare to area, production and yield under the cotton crop is highly insignificant among the 30 years of period which result in low productivity to the cotton growing farmer.

Compound growth rate (C.G.R.)

Aurangabad Compound Growth Rate

Sr.no.	Cotton	Period I	Period II	Period III	overall
1	Area	-13.41**	7.74**	11.91**	3.77**
2	Production	-15.00**	4.27**	32.83**	6.07**
3	Yield	-2.72*	-5.44**	20.22**	1.96

Note:- ** Significant at 1% level, *Significant at 5% level

Beed Compound Growth Rate

Sr.no.	Cotton	Period I	Period II	Period III	overall
1	Area	-0.16	18.29**	10.36**	6.46**
2	Production	-0.87	15.91**	17.85**	8.46**
3	Yield	-1.28	0.86	9.72**	1.87

Note:- ** Significant at 1% level, *Significant at 5% level

Jalna Compound Growth Rate

Sr.no.	Cotton	Period I	Period II	Period III	overall
1	Area	-0.27	5.18**	9.86**	2.56*
2	Production	-0.59	15.04**	25.47**	6.75**
3	Yield	-0.45	8.37**	15.33**	4.08**

Note:- ** Significant at 1% level, *Significant at 5% level

From the above table it shows the C.G.R of area, production and yield of Aurangabad is negatively significant during the period I were as the Beed and Jalna district are non-significant. The positive significant and increasing trends were observed from the period II onward and the same trend in period III, but the result of thus on overall trend of cotton, the area and production of Aurangabad & Beed show significant growth rate, but non-significant growth in terms of

yield. Thus only the Jalna district has positive and significant growth rate in terms of area, production as well as yield.

Conclusion

From data analysis of 30 year of area production and yield of Aurangabad Beed and Jalna districts show that is three is significantly increased in cotton growing area but there is much fluctuation in terms of production, but it shows significant growth

during period II and period III .But over all growth of yield doesn't shows much variation over 30year period. Thus this concludes that the district gets comparatively less yield as compare to the other state district.

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