

## Analysis of Growth and Instability of Soybean Production in Western Vidarbha of Maharashtra

JAGANNATH<sup>1</sup>, JAGRATI, D<sup>2</sup>., WALI, V. B<sup>2</sup>. AND VINODAKUMAR, S. N<sup>3</sup>

<sup>1</sup> Department of Agricultural Economics and Statistics, Post Graduate Institute, Dr. P. D. K. V., Akola, (Maharashtra State) - 444 104

<sup>2</sup> Department of Agricultural Economics <sup>3</sup> Department of Agronomy, University of Agricultural Sciences, Raichur- 584 104

email : vin3234@rediffmail.com

### ABSTRACT

Present investigation was undertaken to study the growth rate and instability of area, production and productivity of soybean crop. The study was based on secondary data for the period of 23 years (1984-85 to 2006-07) for the districts viz., Buldana, Yavatmal, Akola, Amravati and Amravati division as a whole of western vidarbha of Maharashtra. The growth rates for area and production for soybean was recorded very high during period I. It may be due to introduction of soybean in the year of the period I. The highest increasing trend in area and production for soybean was registered in Buldhana district. During the overall period i.e. 23 year as a whole, Amravati division recorded lowest degree of instability in area, 23.46 per cent Coefficient of variation (CV) and per cent and Amravati recorded lowest degree of Coppock's instability index (CII) 19.09 per cent indicates least consistency in terms of area during overall twenty three years.

**Key words** Growth rate, Instability, Coefficient of variation, Coppock's instability index.

Soybean is an important global crop, providing oil and protein. Above 80 % of the global soybean output is crushed worldwide to obtain oil and meal. In the total crop very small proportion is consumed directly by humans. Raw soybean, including the immature green form, are toxic to humans, swine, chickens, in fact all mono-gastric animals. Soybean is gaining popularity on account of its unique characteristics and adaptability to varied agro-climatic conditions. It has unmatched composition of 40 per cent protein and 20 per cent oil and nutritional superiority on account of containing essential amino acids, unsaturated fatty acids, carbohydrates, vitamins and minerals. In this research work we study the comparison of soybean crop area under cultivation, yield and production capacity in Buldana, Yavatmal, Akola, Amravati and Amravati division as a whole of western vidarbha of Maharashtra. The question regarding growth of supply has two aspects, both are equally important. The more widely known and understood aspect refers to the growth of agricultural products. This is a major problem covering finding resources for agriculture to produce larger output and

improving the institutional frame leading to a shift of the supply function. The second and equally important aspect deals with the shape of the supply curve or response of the supply of agricultural products to changing level of prices.

### MATERIAL AND METHODS

The study was confined to four districts of Amravati revenue division of Maharashtra state, namely Buldhana, Akola, Amravati and Yavatmal. The four districts constituted more or less in the middle of India peninsular and forms parts of the Deccan plateau, name as Western Vidarbha region. The districts of Maharashtra have been selected purposively for the present study as it has been found to be the forefront in adoption of new agricultural technology. The study used time series data on the area, production and productivity of soyabean crops, for a period of 23 years, (1984-85 to 2006-07).

The instability in agriculture was assessed by estimating coefficient of variation (CV) in area, production and yield. To measure the instability in area, production and productivity, an index of instability was used as a measure of variability.

As the objective of the study is to assess the increase in instability associated with area, production and yield, the instability was computed separately, for two time period, i.e. 1984-85 to 2006-07. In order to assess the association of instability in agriculture with the rate of growth; compound growth rates were worked out for two time periods. The compound growth rate of area, production and yield for major crops were estimated for two sub periods. The first period was 1984-85 to 1995-96 and second 1995-96 to 2006-07.

The district-wise compound growth rates will be estimated to study the growth. It will be estimated with the following exponential model.

$$Y = ab^t$$

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

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

**Table 1. District wise compound growth rate for soybean**

Particular		Buldhana	Yavatmal	Akola	Amravati	Amravati Division
Period I (1984-94)	Area	157.18**	58.3**	104.1**	30.01**	41.109**
	Prod.	115.97**	85.82**	74.6**	44.04**	56.21**
	Yield	4.65	17.75**	14.06*	12.79*	19.08**
Period-II (1995-2007)	Area	22.84**	18.59**	24.8**	5.57**	15.68**
	Prod.	20.30*	12.49	22.15**	4.43	12.93**
	Yield	-0.92	-5.11	3.77	-1.07	-0.37
Overall (1984-2007)	Area	45.1**	34.6**	49.5**	16.07**	25.41**
	Prod.	41.78	40.18**	44.98**	19.83**	29.61**
	Yield	1.03**	4.14*	6.33**	3.99*	5.65**

Note: \* Significant at 5 % level    \*\* Significant at 1 % level

Where,

CGR = Compound growth rate

t = time period in year

y = area/ production / productivity

a & b = Regression parameters

The 't' test will be applied to test of significance of

## RESULT AND DISCUSSION

**Growth performance for Soybean:** The growth performance of soybean pertaining to two periods and overall was presented in Table 1 which, revealed that due to introduction of soybean in the region during the period I, the growth rates for area and production were recorded very high. The highest increasing trend in area and production was registered in Buldhana district. However, growth rates in the productivity were recorded highest in Yavatmal (17.75 per cent per annum) followed by Akola (14.06 per cent per annum) and Amravati (12.79 per cent) during period I. The results revealed that during period II, the picture drastically has been changed, the compound growth rates of productivity registered negative growth

rates in all district in Amravati division except Akola district, but they were not found statistically significant. However, the growth rates were positively significant for both area and production during second period of the study.

The growth rates were also worked out for pooled period of 20 years for soybean where all most all found to be positive and significant in all districts of Amravati division as well as division as a whole both in area, production and productivity of soybean. During this period compound growth rates for area, production and yield were found highest in Akola district *i.e.* 49.50, 44.98 and 6.33 per cent per annum, respectively and statistically significant at one per cent level. Whereas the Amravati division as a whole recorded 25.41, 29.61 and 5.65 per cent per annum compound growth rates for area, production and productivity, respectively and also found significant at one per cent level.

**Instability for soybean:** The CV and CII techniques were employed to examine the extent of instability in area, production and yield of soybean in district of Amravati division and division as a whole for two periods. Soybean crop was introduced during the start of first period. Hence, for the period I, statistical data collection was initiated, it may cause a very high instability during the period.

**Table 2. Districtwise instability indices in soybean**

Name of District	Particular	Period I (1984-94)		Period II (1995-2007)		Overall (1984-2007)	
		CV	CII	CV	CII	CV	CII
Buldhana	Area	130.94	73.59	65.32	18.46	102.75	83.87
	Prod.	119.94	65.75	62.15	18.46	100.66	76.99
	Yield	23.57	12.38	30.92	14.05	29.08	13.49
Yavatmal	Area	118.72	29.47	66.84	16.4	115.8	56.85
	Prod.	141.85	42.41	56.98	15.12	40.31	52.06
	Yield	44.07	15.87	31.39	14.03	47.39	206.93
Akola	Area	139.01	57.59	68.57	12.09	16.18	114.81
	Prod.	124.61	39.68	58.86	19.52	114.11	90.82
	Yield	39.23	15.81	38.85	12.21	47.48	49.39
Amravati	Area	61.16	19.09	21.14	12.35	63.83	47.37
	Prod.	73.09	26.51	45.49	14.89	83.47	51.64
	Yield	37.82	15.65	33.67	12.35	39.32	44.06
Amravati Division	Area	23.46	22.26	48.34	16.04	93.83	37.05
	Prod.	24.92	30.36	47.63	14.63	96.11	47.49
	Yield	33.57	17.76	23.37	13.23	36.56	16.32

Note: CV = Coefficient of Variation    CII = Coppocks Instability Index

As seen from Table.2, Shows that CV for area and production was found to be similar for all districts, except Amravati district during first period *i.e.* the coefficient of instability for area and production for all the district was found to be within the limited range. However, for Amravati division as a whole, CV for area, production and yield shows 23.46, 24.92 and 33.57 per cent, respectively. During second period, relatively speaking about one degree of instability, it was lower as compared to first period for area and production in all most all the district of western Vidarbha zone. The lowest instability was observed in Amravati district for area and production *i.e.* 45.49 and 33.67 per cent.

During the overall period, the Amravati district recorded lowest CII in area (47.37 per cent) was production (51.64 per cent). The division as a whole has also registered highest coefficient of instability as compared to other two periods for all variables *viz.*, area, production and productivity.

Soybean appeared to be one of the important emerging crops in the Western Vidarbha zone and it become additional crop in the cropping pattern of the region. Growth rate of area and production of soybean increased in Western Vidarbha. Percent contribution of area and yield effect is more responsible for soybean production.

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