P: ISSN No. 0976-8602 RNI No.UPENG/2012/42622 VOL.-6, ISSUE-2, April-2017

E: ISSN No. 2349-9443 Asian Resonance

Growth and Instability of Gram in Western Maharashtra Region

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Abstract

The present study based on the last 30 year time series data on area, production and productivity to identify the trend. The compound growth rate and coefficient of variation here analysed for period I, period II and overall 30 years for Western Maharashtra region. The study indicate that compound growth rate for area, production and productivity for almost all the district where positive, except Nashik, Dhule and Kolhapur district. The highest area of gram is observed in Ahamadnagar district followed by Pune and Nashik district. i.e 10.74, 3.54 and -2.92 per cent per annum respectively, during the last 30 years i.e. overall production found to be statistically significant at 1 per cent level of probability with the highest coefficient of variation is observed in Solapur district followed by Ahamadnagar and Dhule i.e. 78.61, 65.53 and 59.38 per cent respectively.The production and productivity instability in selected pulses crop were observed in almost the entire district in the Western Maharashtra. The coefficient of variation for almost all the district were less in period I as compared to period II. The similar pattern also observed in production. On the other hand the growth rate of productivity for the gram was positive for almost all the district and both the periods. Highest compound growth rate for productivity during the overall period was observed in Jalgaon followed by Dhule and Nashik i.e. 5.61, 5.55 and 5.34 respectively. The coefficient of variation range in between 21.43 and 34.25 per cent. Thus it is concluded that gram is ascent during the study period. Considering the importance of gram as a low input and less water requirement crop. It is recommended option for the farmer in operating in any environment where other crop not performing well. In the developing and developed economies. It is need to concentrate on the crop specially to cultivate under marginal and stress prone areas to attend the sustainability.

Keywords: Gram, Growth Rate and Instability.

Introduction

Pulses are grown in more than 171 countries. The world's major producers of pluses are India (23.1 per cent.), China (12.08 per cent), Myanmar (7.57 per cent) , Canada (6.7 per cent) and Brazil (4.03 per cent) which together account for half of the global output. The pluses industries in India generally refers to a number of crops like chickpea (gram), tur, masur, urad, moong, and peas. The pulses crop occupied 72.3 million ha. area and contributed 64.4 million tonnes with productivity of 890 kg per ha. In the triennium ending 2010-11. India having the largest share about 25 per cent production, about 33 per cent acreage and about 27 per cent consuming of total pluses of the world,

Gram (*Cicer arietinum* L.) is the high-value of pulse crop belongs to the family Leguminaceae. It is also called chickpea or Bengal gram in south Asia. In Maharashtra it is called as Harbara. Bengal gram is grown in winter season mainly in Northern and Central region of country. Due to increase in irrigated area, use of improved varieties and modern technology, its area is gradually shifting towards south-central region. It is most important leguminous crop. In a developing country like India, agricultural growth leads to a rising demand for products

Gram contain Protein–18-22 per cent, Calcium–280 mg/100 g, Carbohydrate- 61-62 per cent, Iron–12.3 mg/100 g, Fat–4.5 per cent, Phosphorus–301 mg/100 g and Calorific value–396.

Aim of the Study

The objectives of the study are,

1. To estimate the annual growth rate of area, production and productivity of gram.
2. To work out the instability during last 30 years.

Review of Literature

Mundinamani *et al*. (1998) work out the growth rates in area, productivity and production of total pulses in general and red grams in particular for Karnataka using time series data. They found that the growth rates of area, productivity and production of total pulses were remained stagnant. District wise analysis showed that the district Bijapur and Gulbarga registered significant positive growth rates in area, productivity and production of total pulses in respect of red gram. The compound growth rate of area, production and productivity of red gram in Bijapur district is 0.45, -3.93, -3.75 and for Gulbarga district 3.99, 2.37, and 5.69 respectively. The contribution of different factor to the growth rates of red gram and total pulses revealed mixed trend.

Chand and Raju (2008) revealed that in a large state like Andhra Pradesh. The study has estimated instability in three major crops before (1981-93) and after (1993-04) the initiation of economic reforms at the state and district levels in Andhra Pradesh. Instability index for area has shown an increase after 1992-93 for rice and cotton and decline in the case of ground nut. It increased from 11.5 to 13.4 in rice and from 17.5 to 18.8 in cotton. The instability status as perceived through the state level data may be vastly different from that experienced at the disaggregate level. The study has concluded that the state level analysis does not reflect complete picture of shocks in agriculture production, and, further, shocks in production underestimates shocks in farm income. They has suggested the need for addressing risks in farm income by devising area-specific crop insurance and other suitable mechanisms. The net effect of fluctuations in production and prices on farm income has depicted that instabilities in area, production, yield and prices do not negate each other. The instability has been found higher in farm income than area, production and prices in all the cases, and it has not changed over time. This underscores the need for addressing risks in farm income by devising area-specific crop insurance or other suitable mechanization.

Hasan *et al*. (2008) studied the change and instability in area, production, and yield of two major cereal crops wheat and maize in Bangladesh based on secondary data during 1980-81 to -2003-04 using different statistical techniques. Area and production of wheat has increased satisfactorily. But yield was not increased to meet the demand of the country. In the case of maize, significant increment happened in yield during the study period. Area and production of maize also increased to fulfill the increasing demand of population. Presently, production of maize has increased more rapidly than its area. The growth in area, production, and yield of wheat slightly improved in period-II, whereas the growth rate in area, production, and yield of maize improved rapidly. Though both of wheat and maize are unstable crops, maize showed very instability in its area and production because of its increasing tendency in the recent years.

Shaheen and Shiyani (2004) worked out the instability in area, production and productivity of fruit crop in Jammu and Kashmir for the period from 1990-91 to 2001-02 by using Cuddy-Della instability index. The result of instability index indicated moderate to high instability in production and productivity for all fruits, except apple, which showed low instability for all three parameter (area, production and productivity) throughout all the period.

Shende *et al.* (2009) reveled that, Cotton crop is grown in the entire State except Konkan and eastern Maharashtra. In this study, the growth and instability were estimated. Also assess the relative contribution of area and yield to change in the, output of cotton in Maharashtra. For the study the secondary time series data for 45 years were collected. The results indicate that the compound growth rate of area under crop was more over one per cent for the entire district of all three regions and also the region as a whole during the overall period.

Shende, et.al. (2010) an attempt has been made to study the growth and instability of major crops in Western Vidarbha . The study was based on the secondary data on area, production and productivity of jowar, cotton and soybean collected from the various government publications. At over all period, the area effect was most stronger factor for increasing production of jowar in all the district and division as whole, except Akola district i.e.305.22 per cent. at overall period, the result clearly indicated that the yield effect was most responsible for production of cotton in all the district of Amravati division as a whole and the area effect was most responsible factor for increasing soybean production in Amravati division i.e.46.98 per cent with positive yield and interaction effect i.e1.91 and 51.41 per cent respectively.

Shende et al. (2010). The study indicated that, the yield effect was most responsible for production of cotton in all the districts of Amravati division as a whole and the area effect was most responsible factor for increasing soybean production in Amravati division *i.e.* 46.98 per cent with positive yield and interaction effect *i.e.* 1.91 and 51.41 per cent, respectively.

Methodology

In this study, for the analysis of growth and instability. The period was equally divided into two sub period of 15 years and overall as shown below.

Period I : 1985-86 to 2000-01
Period II : 2001-02 to 2014-15
Overall : 1985-86 to 2014-15

The compound growth rate of area, production and yield for gram for each gram growing district were estimated to study the growth. It was estimated with the following exponential model. Rahman et.al. (2008)

$$Y=a\ b'$$

$$CGR = [Antilog\ (log\ b)-1\ ] \times 100$$

The 't' test was applied to test of significance of 'b'

To measure the instability in area, production and productivity, and index of instability was used as measure of variability. Shukla et.al. (1993)

The coefficient of variation (C.V) will be calculated by the formula-

Coefficient of Variation (%) =

$$\frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

Result & Discussion

Growth Performance in Gram

The district-wise compound growth rates of area, production and productivity of gram in Western Maharashtra region for two periods and overall were worked out. Presented in Table No.1. The study reveals that, out of nine districts of Western Maharashtra the area under gram cultivation highest in Ahamadnagar (09.12) followed Pune (07.53) and Sangli (05.48) district, statistically positively significant 1 per cent level for during period-I. However, the as compared to period I growth rate were higher side during the period-II. For Dhule district it was estimated 28.56 per cent per annum followed by Ahamadnagar district i.e. 08.92 per cent per annum respectively. It was found to be statistically significant.

Table No. 1

District Wise Compound Growth Rate for Gram.

S. No.	Dist		Period I	Period II	Overall
1	Nashik	A	-0.380	04.43	-2.927*
		P	11.352	10.99 *	2.233
		Y	11.796*	06.28 **	5.340**
2	Dhule	A	0.892	28.56 **	-0.668
		P	5.475	37.77 **	5.226
		Y	4.553	15.63 *	5.558**
3	Jalgaon	A	8.626	05.05	1.1570
		P	13.662**	10.16	6.822**
		Y	4.651	04.87 *	5.615**
4	Ahmad nagar	A	9.1239*	08.92 *	10.747**
		P	15.737**	15.10	13.614**
		Y	6.05	05.67	2.603*
5	Pune	A	7.5304**	-0.10	3.547**
		P	12.700**	8.26 *	8.007**
		Y	4.806	6.90 **	4.397**
6	Solapur	A	4.9422	01.52	2.290
		P	6.071	6.59	7.251
		Y	1.049	6.93	4.360
7	Satara	A	-5.588	05.87	6.090
		P	14.620**	09.96	8.914**
		Y	7.293*	06.68	3.635**
8	Sangali	A	5.482**	-01.66	4.028
		P	23.285**	04.10	7.137**
		Y	16.876**	04.78	4.526**
9	Kolhapur	A	-1.603	-06.54	-1.554
		P	2.331	0.62	2.189**
		Y	4.004	08.25	3.964**
10	Western Maharashtra	A	4.75**	4.66	0.97**
		P	12.89**	11.08**	1.35**
		Y	6.64**	7.01**	0.73**

Note: A- Area, P- Production, Y- Yield, * Significant at 5% level and ** Significant at 1% level.

Whereas, for the overall period the compound growth rate of area and production were positive in all most all the district except area of Nashik, Dhule and Kolhapur.

The growth rates were also worked out for overall period of 30 years where almost all were found to be significant at 1 per cent level in all districts of Western Maharashtra region both in area, production and productivity of Gram. During this period compound rates for area and production were also found positive but less than 1 % in almost all the districts in the Western Maharashtra region and also statistically significant as compared to other periods. The higher growth rates were recorded in Ahmadnagar district for Area, production and i.e. 10.74 and 13.61 per annum and productivity in Jalgaon i.e. 05.61 respectively.

Instability in Gram

One should not obvious of instability by taking the growth rates only. Because the growth rates will explain only the rate of growth of over the period. Whereas, instability will judge, whether the growth performance is stable or unstable for the period for the pertinent variable.

As seen from the Table No. 2 The coefficient of variation indicates the instability. The lowest coefficient of variation for area under Gram cultivation was observed in Kolhapur district (19.60 per cent) for overall period and Highest in Sangli (141.1 per cent). On the other hand highest coefficient of variation for production was observed in Solapur (78.61 per cent) district during the thirty year. The coefficient of variation of the production during the overall period was range in between 22.18 to 78.61 per cent. The area and productivity was indicating instability in Gram crop in all most all the district in Western Maharashtra region.

The average area under cultivation of Gram for last thirty year was highest in Ahmadnagar followed by Pune, and Jalgaon district viz; 5972, 4426 and 4378 hectors respectively.

However, Rehman et.al.(2008) exposed that cubic model are suitable for different varieties and the annual growth rate in percentage were significantly different from time to time in country for the pigeon pea, chickpea and field pea varieties.

Table No. 2: District Wise Instability Indices in Gram.

S.N.	District		Period I			Period II			Overall		
1	Nashik		A	P	Y	A	P	Y	A	P	Y
		CV	25.29	39.27	28.27	18.98	29.33	14.72	28.10	34.68	23.69
		MEAN	497.0	255.0	511.53	362.6	235.9	639.2	429.8	245.4	575.3
2	Dule	CV	21.96	35.75	13.27	50.79	71.36	37.61	37.42	59.38	34.25
		MEAN	252.4	149.67	594.9	201.0	179.9	796.1	226.7	164.8	695.5
3	Jalgaon	CV	28.73	37.0	15.86	31.16	39.69	17.31	29.49	41.70	25.24
		MEAN	448.0	315.07	682.8	427.53	431.5	992.3	437.8	373.3	837.5
4	A.Nagar	CV	30.79	40.97	19.24	31.74	50.13	23.16	47.49	65.53	21.81
		MEAN	395.2	226.6	560.9	799.3	525.1	623.8	597.2	375.8	592.4
5	Pune	CV	17.42	30.17	19.34	18.06	27.83	16.66	21.09	36.26	21.43
		MEAN	392.2	228.4	573.1	493.0	355.7	730.8	442.6	292.0	651.9
6	Solapur	CV	27.78	53.67	36.9	24.59	80.72	28.01	26.40	78.61	33.11
		MEAN	333.07	169.6	485.2	377.13	273.6	594.4	355.1	221.6	539.8
7	Satara	CV	34.78	35.53	23.18	19.40	29.70	21.20	33.14	40.03	23.26
		MEAN	165.67	102.0	551.0	255.3	166.4	648.8	210.5	134.2	599.9
8	Sangli	CV	14.86	38.70	29.76	151.0	28.91	19.75	141.1	35.43	25.09
		MEAN	242.2	159.27	641.9	459.53	210.0	728.8	350.8	184.6	685.3
9	Kolhapur	CV	21.29	17.56	15.39	17.96	22.89	21.01	19.60	22.18	21.76
		MEAN	107.73	74.87	705.2	102.6	88.33	876.1	105.1	105.1	790.6
10	**Western Maha.**	CV	16.84	31.01	17.93	30.33	31.38	16.20	27.53	36.74	20.12
		MEAN	2833.5	1680.4	590.3	3478.1	2466.6	736.7	3155.8	2073.5	663.5

Note: CV- Coefficient of variation (per cent per annum). M- Mean. (Area: 00ha, Production: 00 tonne, Productivity: kg/ha).

Conclusion

The results of this study lead to the conclusion that, The compound growth rate of area and production were positive in all most all the district except area of Nashik, Dhule and Kolhapur district. The compound growth rate of area under gram cultivation was highest in Ahamadnagar district (10.74 per cent per annum) followed by Pune (03.54 per cent per annum) and Nashik (-2.92 per cent per annum) statistically significant. The compound growth rate of gram production highest in Ahamadnagar district (13.61 per cent per annum) followed by Satara (05.81 per cent per annum) and Pune (08.00 per cent per annum) statistically significant. The area and productivity was indicating stable growth in gram crop in all most all the district in Western Maharashtra region i.e. the coefficient of variation estimated in the range 19.60 to 41.10 per cent for area and 22.18 to 65.53 per cent for production. Thus, it indicates that the gram is cultivated traditionally in the region during rabi season. Hence, it is a scope to increase the production of gram, especially in western Western Maharashtra zone by providing high yielding varieties and improve technology.

Hence, It is concluded that, gram appears to the important rabi crop in the cropping pattern of Western Maharashtra region. Therefore, it is very big need to concentrate of this crop for policy maker and researcher.

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