



## Research Article

### GROWTH AND INSTABILITY OF GRAM IN VIDHARBHA REGION

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#### ABSTRACT

Gram is the most important pulses crop in the world. However India The world's major producers of pulses crop. India is the world leader in chickpea (Bengal gram) production, and produces approximately ten times as much as second largest producer Australia. Other key producer are Pakistan, Turkey, Myanmar, Ethiopia and Iran. 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 Vidharbha region. The study indicate that compound growth rate for area, production and productivity for almost all the district where positive, except Bhandara district. The highest area of gram is observed in Yawatmal district followed by Amravati and Buldhana district. i.e 16.75, 13.51 and 13.19.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 Yawatmal district followed by Amravati and Buldhana i.e. 82.17, 55.03 and 54.73 per cent respectively. The production and productivity instability in selected pulses crop were observed in almost the entire district in the Vidharbha. 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 period except Bhandara in period I. Highest compound growth rate for productivity during the overall period was observed in Amravati followed by Akola, Buldhana i.e.7.94, 6.05, 5.53, respectively. The coefficient of variation range between 22.68 to 47.42 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.

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#### 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 tones 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.

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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.

#### MATERIALS AND METHODS

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 of Vidharbha region were estimated to study the growth. It was estimated with the following exponential model.

$$Y = a b^t$$

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

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

$$\text{Coefficient of Variation}(\%) = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

## RESULTS AND DISSUCION

### Growth Performance in Gram

The district-wise compound growth rates of area, production and productivity of gram in Vidharbha region for two periods and overall were worked out. Presented in Table No 1. The study reveals that, out of eight districts of Vidharbha the area under gram cultivation highest in Buldhana (23.78) followed Wardha (20.37) and Amravati (19.70 ) 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 Akola district it was estimated 30.04 per cent per annum followed by Amravati and Yawatmal district i.e. 23.04 and 21.24 per cent per annum respectively. It was found to be statistically significant. Whereas, for the overall period the compound growth rate of area and production were positive in all most all the district except Bhandara.

Table 1. District Wise Compound Growth Rate for Gram

| Sr.no. | Dist             |   | Period i  | period ii | Overall  |
|--------|------------------|---|-----------|-----------|----------|
| 1      | Buldhana         | A | 23.781**  | 20.46**   | 13.199** |
|        |                  | P | 41.485**  | 32.81**   | 19.450** |
|        |                  | Y | 14.327**  | 10.27*    | 5.537**  |
| 2      | Akola            | A | 16.380**  | 30.04**   | 10.724** |
|        |                  | P | 33.569**  | 42.82**   | 17.405** |
|        |                  | Y | 14.7666** | 09.72     | 6.053**  |
| 3      | Amravati         | A | 19.704**  | 23.04**   | 13.510** |
|        |                  | P | 38.497**  | 33.97**   | 22.619** |
|        |                  | Y | 15.7094** | 06.53*    | 7.946**  |
| 4      | Yawatmal         | A | 18.354**  | 21.24**   | 16.753** |
|        |                  | P | 22.720**  | 35.65**   | 25.258** |
|        |                  | Y | 3.23      | 12.05**   | 7.324    |
| 5      | Wardha           | A | 20.373**  | 05.29     | 10.759** |
|        |                  | P | 24.457**  | 15.44**   | 15.331** |
|        |                  | Y | 3.38      | 07.39**   | 4.009    |
| 6      | Nagpur           | A | 11.118**  | 18.91**   | 11.504** |
|        |                  | P | 19.559**  | 21.16**   | 17.437** |
|        |                  | Y | 7.475*    | 7.82**    | 5.207*   |
| 8      | Chandrapur       | A | 7.801**   | 19.22**   | 8.951**  |
|        |                  | P | 14.407**  | 29.66**   | 13.241** |
|        |                  | Y | 6.1308*   | 08.12*    | 3.949*   |
| 9      | Bhandara         | A | -4.525    | 25.827    | -4.6627  |
|        |                  | P | -0.4024   | 31.336    | -0.9160  |
|        |                  | Y | 4.3324    | 4.296     | 3.9470   |
| 10     | Vidharbha region | A | 4.754*    | 4.664     | 1.303**  |
|        |                  | P | 12.89**   | 11.08**   | 1.924**  |
|        |                  | Y | 6.641*    | 7.015**   | 0.928**  |

Note: A- Area, P- Production, Y- Yield, 5 per cent, 1 per cent Level of Significancy.

Table 2. District Wise Instability Indices in Gram

| S.N. | District |      | Period I |        |        | Period II |        |        | Overall |        |        |
|------|----------|------|----------|--------|--------|-----------|--------|--------|---------|--------|--------|
| 1    | BULDHANA | A    |          |        |        |           |        |        |         |        |        |
|      |          | P    |          |        |        |           |        |        |         |        |        |
|      |          | Y    |          |        |        |           |        |        |         |        |        |
| 2    | AKOLA    | CV   | 45.59    | 63.65  | 34.95  | 43.30     | 66.43  | 32.33  | 54.73   | 80.90  | 34.55  |
|      |          | MEAN | 272.53   | 174.53 | 591.4  | 512.87    | 408.07 | 724.40 | 392.7   | 291.3  | 657.93 |
|      |          | CV   | 38.56    | 59.54  | 35.93  | 48.31     | 78.03  | 48.97  | 52.37   | 89.72  | 47.42  |
| 3    | AMRAVATI | CV   | 346.00   | 197.80 | 537.67 | 564.47    | 462.93 | 743.93 | 455.23  | 330.37 | 646.80 |
|      |          | MEAN | 346.33   | 228.07 | 613.93 | 695.73    | 656.27 | 892.20 | 521.03  | 442.17 | 753.07 |
|      |          | CV   | 34.53    | 45.74  | 26.15  | 63.15     | 73.72  | 31.42  | 82.17   | 108.00 | 38.31  |
| 4    | YAVATMAL | CV   | 128.13   | 65.80  | 493.13 | 364.47    | 311.53 | 789.13 | 246.30  | 188.67 | 647.77 |
|      |          | MEAN | 35.66    | 42.72  | 20.13  | 22.04     | 38.15  | 20.36  | 39.02   | 55.44  | 23.09  |
|      |          | CV   | 155.13   | 81.73  | 510.07 | 276.80    | 177.20 | 639.67 | 215.97  | 129.47 | 574.87 |
| 5    | WARDHA   | CV   | 22.09    | 36.11  | 20.51  | 33.50     | 47.22  | 20.87  | 46.72   | 68.17  | 25.08  |
|      |          | MEAN | 290.73   | 150.27 | 503.27 | 575.87    | 404.60 | 663.33 | 433.30  | 277.43 | 583.30 |
|      |          | CV   | 19.42    | 31.92  | 20.51  | 34.68     | 49.55  | 26.41  | 41.19   | 61.11  | 25.88  |
| 6    | NAGPUR   | CV   | 147.73   | 61.40  | 408.67 | 249.60    | 130.47 | 497.13 | 198.67  | 95.93  | 452.90 |
|      |          | MEAN | 16.39    | 26.07  | 17.36  | 51.34     | 55.19  | 20.07  | 39.42   | 41.16  | 22.68  |
|      |          | CV   | 118.53   | 49.27  | 415.87 | 71.60     | 39.53  | 532.87 | 95.07   | 44.40  | 44.40  |
| 7    | C.PUR    | CV   | 30.658   | 47.25  | 23.59  | 37.88     | 53.70  | 22.47  | 47.78   | 72.25  | 27.22  |
|      |          | MEAN | 1805.1   | 1008.8 | 509.26 | 3311.4    | 2590.6 | 685.3  | 2558.2  | 1799.7 | 597.3  |
|      |          | CV   |          |        |        |           |        |        |         |        |        |

Note: CV- Coefficient of variation. M- Mean.

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 Vidharbha region both in area, production and productivity of Gram. During overall period compound rates for area and production were also found positive. The higher growth rates were recorded in Yawatmal district for Area, production and i.e. 16.75 and 25.25 per annum respectively and for productivity of Amravati district the Compound growth rate was 7.94 per cent per annum.

### Instability in Gram

One should not be 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 Wardha district (39.02 per cent) for overall period. On the other hand highest coefficient of variation for area was observed in Yawatmal (82.17 per cent) district during the thirty year (1985-86 to 2014-15). The coefficient of variation of the production during the overall period was range in between 41.16 to 108.0 per cent. The area and productivity was indicating instability in Gram crop in all most all the district in Vidharbha region. The average area under cultivation of Gram for last thirty year was highest in Amravati followed by Yawatmal, and Akola district viz; 89220, 79013 and 74393 hectares respectively.

### 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 Bhandara district. The compound growth rate of area under gram cultivation was highest in Yawatmal district (16.75 per cent per annum) followed by Amravati (13.51 per cent per annum) and Buldhana (13.19 per cent per annum) statistically significant. The compound growth rate of gram production highest in Yawatmal district (25.25 per cent per annum) followed by Amravati (22.61 per cent per annum) and Buldhana (19.25 per cent per annum) statistically significant.

The area and productivity was indicating stable growth in gram crop in all most all the district in Vidharbha region i.e. the coefficient of variation estimated in the range 39.02 to 82.17 per cent for area and 41.16 to 108.0 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 Vidharbha zone by providing high yielding varieties and improve technology. Hence, It is concluded that, gram appears to be the important rabi crop in the cropping pattern of Vidharbha region. Therefore, it is very big need to concentrate of this crop for policy maker and researcher.

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