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Growth and instability of major pulses in Chhattisgarh

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Abstract

The study was conducted on Growth and Instability of major pulses in Chhattisgarh. For the study data was collected from directorate of pulses development, GoI, Bhopal official website and also from agriportal Chhattisgarh website. In Chhattisgarh, CAGR of area, production and productivity of gram were (3.38%), (-13.41%) and (-5.04%), CAGR of area, production and productivity of arhar were (0.04%), (2.12%) and (1.98%). In Rajnandgaon, CAGR of area, production and productivity of gram were (9.99%), (10.19%) and (1.51%), CAGR of area, production and productivity of arhar were (17.03%), (15.98%) and (2.92%) respectively.

In Chhattisgarh, instability of area, production and productivity of gram were (1.37%), (29.04%) and (27.35%), instability of area, production and productivity of arhar were (15.66%), (13.07%) and (13.75%). In Rajnandgaon, instability of area, production and productivity of gram were (2.19%), (2.30%) and (19.34%), instability of area, production and productivity of arhar were (3.08%), (5.57%) and (15.15%) respectively.

Keywords: CAGR, log, GoI

Introduction

Nature has blessed our nation with a wide variety of land, soil, and agro-climatic conditions that allow for the production of several types of pulse crops. In farming systems and in the diets of the world's poor, pulses play a significant and varied role. It is characterized by conditions with low soil fertility and moisture stress. They fit perfectly in three developmental objectives in poor nations: enhancing nutrition and improving health conditions, lowering poverty through increased food security, and ecosystem toughness. These are the seeds of legumes, which are a type of family of Fabaceae. In addition to its nutritional value and application as cattle feed, pulse production offers the producers a lot of agronomic benefits.

The rotating benefit of pulses tends to increase soil nitrogen levels, lowering the need for chemical weed and pesticides as well as supplementary nitrogenous fertilizers for crops, and thereby upsetting the seasonal crop disease and insect cycles. They thus contribute significantly to the development of sustainable agriculture. For the impoverished and vegetarians, pulses constitute the main source of protein. Red gram, Green gram, Black gram, Lentil, and Field Pea make up all of the pulses. These pulses' split grains, known as dal, are a fantastic source of high-quality protein, vital amino and fatty acids, fibre, minerals, and vitamins. Pulses are one of the most affordable sources of protein for human consumption and have a protein content of (18-25%). By enhancing the nitrogen status, long-term fertility, and sustainability of the cropping systems, these pulses enhance soil health. They release significant amounts of leftover nitrogen and organic matter for succeeding crops, meeting up to 80% of their nitrogen needs from symbiotic atmospheric nitrogen. Pulses use around one-fifth as much water as cereals do, which results in water savings.

Agriculture is the largest sector of the economy and plays a vital role in generating economic activity by providing food and raw materials, employment for a sizable population, capital for its own development, and surpluses for generating public economy. Agriculture depends on the environment and the production of farm products. The production of several yields, including grains, pulses, oilseeds, vegetables, grain crops, and so forth, is largely a result of agribusiness. The combination of oats, pulses, and vegetables is more important in daily life, and it also improves our wellbeing.

Overall, pulses play a crucial role in the agriculture and economy of Chhattisgarh, and the state government is taking steps to support their production and promote sustainable farming practices.

In India 2020-21 total pulses production is 25575.69 million tones. In Chhattisgarh 2021-22 total area under rabi pulses 790.86 million hectares and total production 447.36 million tones and total area under kharif pulses 277.33 million hectares and total production was 129.06 million tones.

Material and Methods: 1 Compound annual growth rate

To compute the growth rate of area, production and productivity of pulses in Rajnandgaon district, the following mathematical model was used: -

$$Y = aB^t$$

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

Where,

Y= Area/ production /productivity a= Constant

B= Regression coefficient t= time in year

Compound annual growth rate (%) = (Antilog B-1)100

Cuddy-Della Valle Instability Index

The instability in area, production and yield of selected pulses crop was measured in relative term using Cuddy-Della Valle Index (IX).

$$IX = CV\sqrt{(1 - R^2)}$$

Where,

IX = Instability index

CV= Coefficient of variation (in % age)

R² = Coefficient of determination from a time-trend regression adjusted by the number of degrees of freedom.

Result and Discussion: 1. Growth trend

The table 1 showed the compound annual growth rate

(CAGR) of area, production and productivity of gram and arhar for Chhattisgarh and Rajnandgaon district. In arhar CAGR of area, production and productivity were (0.04%), (2.12%) and (1.98%) respectively, that shows area is decreasing but production and productivity remain the positive. In gram CAGR of area, production and productivity are (3.3%), (-13.41%) and (-5.04%) respectively, this show if area is positive but production and productivity declined. This trend indicated in fig 1.

In Rajnandgaon the growth in area, production and productivity of gram was (9.99%), (10.19%) and (1.51%) respectively. This indicated that productivity and production was found to be nonsignificant growth, however the growth in area of gram was significant. In arhar area, production and productivity was (17.03%), (15.98%) and (2.92%) respectively, which showed that growth in productivity of arhar was nonsignificant, while growth in production and area was significant. This similar trend shows in fig. 2.

Comparing the CAGR of Chhattisgarh and Rajnandgaon for both crop arhar and gram the area, production and productivity of Rajnandgaon was much more than Chhattisgarh. It showed that Rajnandgaon was the major arhar and gram producing district in Chhattisgarh state.

Table 1: Compound annual growth rate of major pulses in Chhattisgarh and Rajnandgaon (in %)

S. no.	Pulses	Area	Production	Productivity
A. Chhattisgarh				
1	Arhar	0.04	2.12	1.98
2	Gram	3.38*	-13.41	-5.04
B. Rajnandgaon				
1	Arhar	17.03*	15.98**	2.92
2	Gram	9.99*	10.19	1.51

*Significant at 1% level of probability

**Significant at 5% level of probability

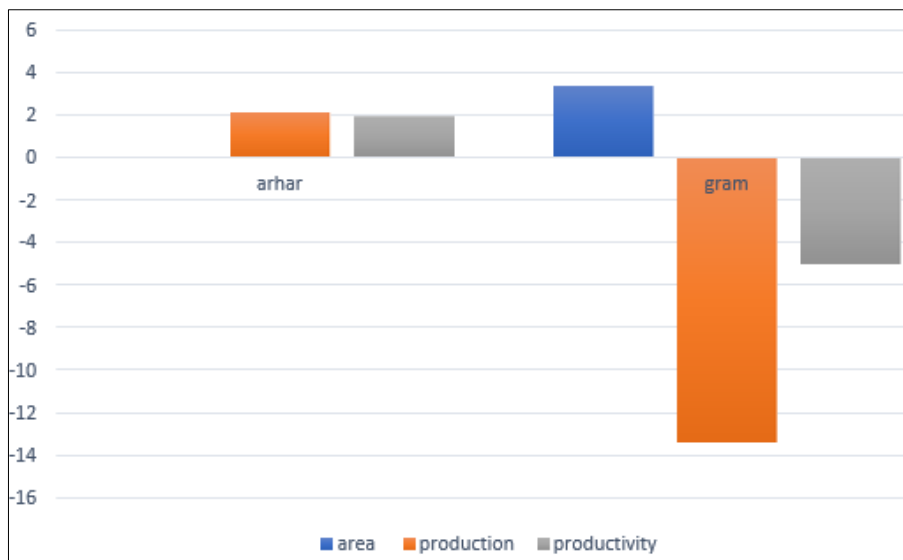


Fig 1: In Chhattisgarh, CAGR of area, production and productivity of arhar and gram

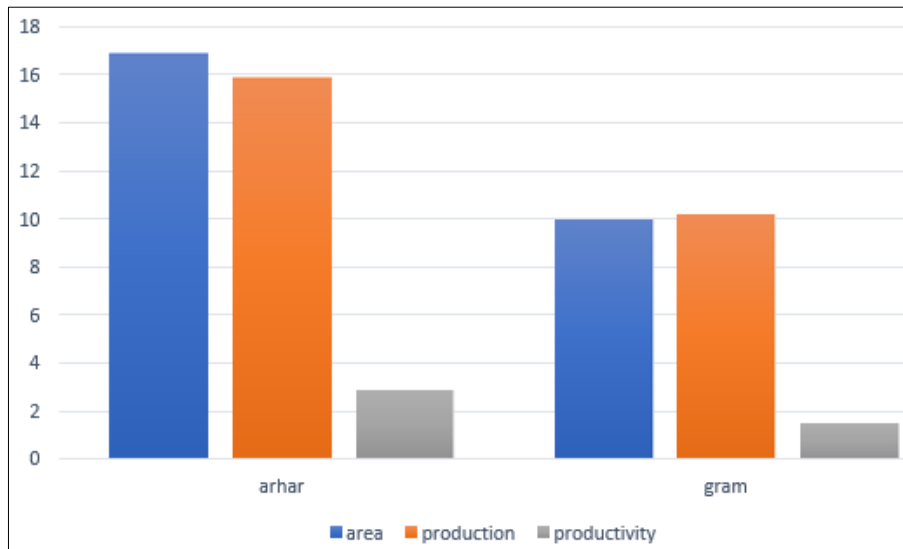


Fig 2: In Rajnandgaon, CAGR of area, production and productivity of arhar and gram

Instability

The table 2 showed that instability of gram and arhar in Chhattisgarh and Rajnandgaon of arhar and gram. In Chhattisgarh arhar instability of area was (15.66%), production was (13.07%) and productivity was (13.75%). In this area was more and production and productivity is slightly less than area. In gram instability of area was (1.37%), production was (29.04%) and productivity was (27.35%). In gram's area less instability compare with production and productivity. That similar things shows in fig. 3.

In Rajnandgaon area, production and productivity of gram was (2.19%), (2.30%) and (19.34%) respectively. This indicated productivity was increase as compared with production. In arhar area, production and productivity was (3.08%), (5.57%) and (15.15%) respectively, which shows

that area and production was decrease and productivity was increase. This similar trend shows in fig. 4. For instability we had three range groups i.e., <15 low instability, 15 to 30 medium instability and >30 high instability (A.S. Dudhat 2017) [6].

Table 2: Instability of major pulses in Chhattisgarh and Rajnandgaon (in %)

s.no.	Pulses	Area	Production	Productivity
A. Chhattisgarh				
1	Arhar	15.66	13.07	13.75
2	Gram	1.37	29.04	27.35
B. Rajnandgaon				
1	Arhar	3.08	5.57	15.15
2	Gram	2.19	2.30	19.34

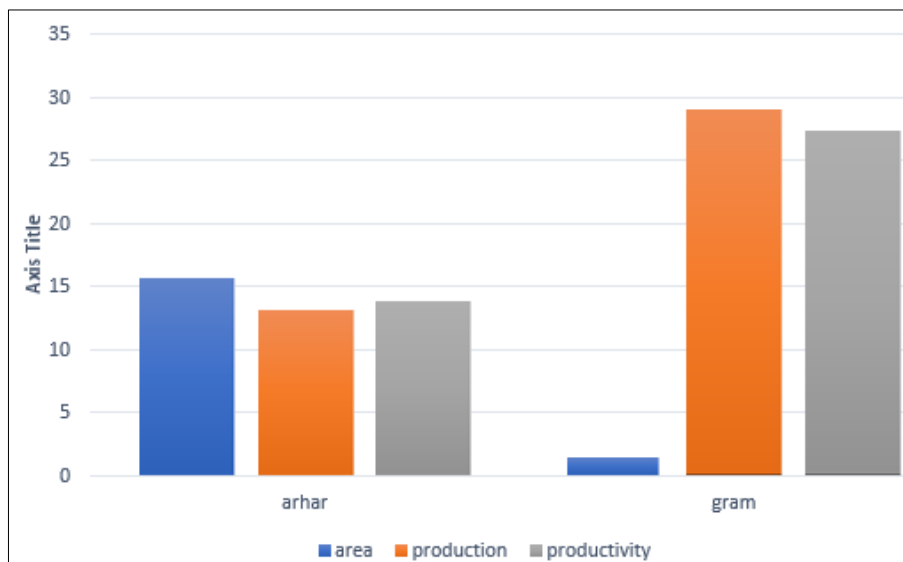


Fig 3: In Chhattisgarh, Instability of area, production and productivity of arhar and gram

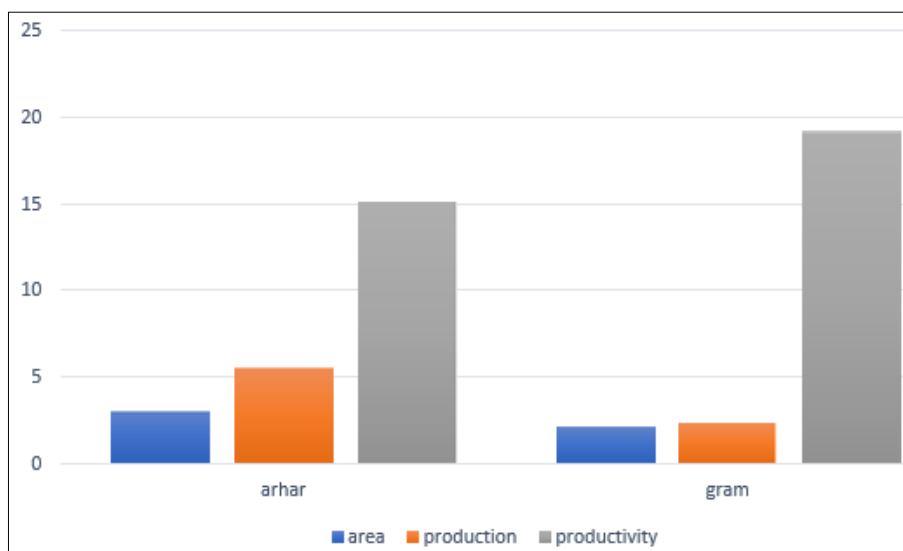


Fig 4: In Rajnandgaon, Instability of area, production and productivity of arhar and gram

Conclusion

In Chhattisgarh, CAGR of area, production and productivity of arhar were (0.04%), (2.12%) and (1.98%) respectively, that shows area is decreasing but production and productivity remain the positive. In gram CAGR of area, production and productivity were (3.38%), (-13.41%) and (-5.04%) respectively, It showed that area was positive but production and productivity declined.

In Rajnandgaon gram area, production and productivity was (9.99%), (10.19%) and (1.51%) respectively. This indicated that productivity was decrease as compared with production. In arhar area, production and productivity was (17.03%), (15.98%) and (2.92%) respectively, which showed that productivity was decrease with increase in production and area.

Comparing the CAGR of Chhattisgarh and Rajnandgaon for both crop arhar and gram the area, production and productivity of Rajnandgaon was much more that of Chhattisgarh this showed that Rajnandgaon was the major arhar and gram producing district in Chhattisgarh state.

In Chhattisgarh, arhar instability of area was (15.66%), production was (13.07%) and productivity was (13.75%). In this area was more and production and productivity is slightly less than area. In gram instability of area was (1.37%), production was (29.04%) and productivity was (27.35%).

In Rajnandgaon gram area, production and productivity was (2.19%), (2.30%) and (19.34%) respectively. This indicated productivity was increase as compared with production. In arhar area, production and productivity was (3.08%), (5.57%) and (15.15%) respectively.

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