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Growth rate of Urdbean in Raigarh district of Chhattisgarh state

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Abstract

The research work was carried out to analyze the growth rates of area, production and productivity of *urdbean* in Raigarh district of Chhattisgarh state. The study was conducted in Lailunga block of Raigarh district (C.G.) where *urdbean* is an important Pulse crop. Multistage stratified random sampling technique was adopted to select the district. Raigarh district was selected purposively as this district was having the highest area under *urdbean* crop in the state. A negative growth rate of 2.00 per cent with due statistical significance in area of *urdbean* has been found. It is of great concern to be noted that the production of *urdbean* crop declined by 2.00 per cent per annum over the period. Whereas in the case of productivity, the growth rate increased by 0.94 per cent annually. Similar trend was also found in state level data. In Chhattisgarh state the negative growth rate was reported in area and production both declined by 2.00 per cent per annum. Whereas, in the case of productivity, an annual growth rate by the tune of 0.36 per cent was reported over the period.

Keywords: Random, sampling, stratified, productivity, technique, multistage, growth rate

Introduction

India is the largest producer and consumer of pulses in the world contributing around 25-28 per cent of the total global production. The country grows a variety of pulse crops such as chickpea, pigeon pea, mungbean, *urdbean*, dry peas and lentils under a wide range of agro-climate conditions. The production of total pulses in India is presently about 15 million tones covering an area of about 22-23 million hectares as against the annual demand of 23-25 million tones and majority of which falling under rain fed, resource poor and harsh environments that are frequently prone to drought and other abiotic stress condition^[1].

Urdbean [Vignamungo (L.) Hepper] or black gram is one of the most important cultivated pulse crops of the 'Vigna' group. It is cultivated since prehistoric period in India and considered to be originated from Vignasilvestris. Archeological studies have shown that *urdbean* was cultivated in the country as far back as 2200 B.C. *Urdbean*, also known as black gram (*Vigna mungo*), based on seed color and other characteristics; *urdbean* has been grouped under two main type's viz. var. *mungo* with large black seed and early maturity and var. *viridis* with small greenish seed and late maturity^[2].

The area, production and productivity of *urdbean* have increased from 1.87 m ha in 1971-72 to 3.11 m ha during 2012-13 with production level of 1.90 MT. This increase in production has been due to additional area brought under the crop as well as productivity gains (from 0.5 to 1.3 t/ha). Summer cultivation in northern India and winter cultivation in rice fallows in southern and coastal areas of the country also added to additional acreage. In India, the states like Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Maharashtra, Rajasthan, Orissa, Bihar, Karnataka and West Bengal are major *urdbean* producing states. *Urdbean* is grown mostly during rainy season, however, development of short duration and diseases (powdery mildew and yellow mosaic virus) resistant varieties led its cultivation during spring/ summer season in almost all parts of country and during rabi season (in rice fallows) in peninsular India^[3].

In Chhattisgarh state the major pulse growing districts are Raigarh, Surguja, Durg, Bilaspur, and Rajnandgaon, among these Raigarh district takes first position in area of pulses with 44,740 hectare with total production of 1707 metric tonnes, with average productivity of 382 kg per hectare. Of the total pulses grown in Raigarh district, *urdbean* is very important pulse crop which occupies 18.18% area and 14.28% of total pulse production of Raigarh District. Looking to the growing importance of pulses the present study to analyze the growth rates of area, production, and productivity of *urdbean* in Raigarh district of Chhattisgarh state was taken up^[4].

Material and Methods

This deals with the nature and type of data required, sampling techniques used for collecting the data and the analytical tools applied in processing of the data for analysis of growth rate in terms of area, production and productivity.

The research work has been considered in the following heads:

1. Sampling technique
2. Selection of district
3. Nature and source of data
4. Analysis of data

Sampling technique

A multistage stratified random sampling technique was adopted to select the district engaged in *urdbean* production.

Selection of district

In the First stage sampling, Raigarh district was selected purposively as this district was having the highest area under *urdbean* crop in the state i.e. 18.18 per cent of the total *urdbean* area of the state.

Nature and source of data

The data required for the present investigation were secondary in nature. The secondary data were collected from various official publication of Raigarh and department of Agricultural, Chhattisgarh.

Analysis of data

A. Compound Growth Rate

Annual compound growth rates in area, production and productivity of *urdbean* was worked out for the state Chhattisgarh as well as for Raigarh district by fitting an exponential function of the following form

$$Y = a b^t$$

$$\log y = \log a + t \log b$$

Where,

Y = Area / Production / Productivity

a = constant

b = regression coefficient

t = time in year

$$\text{Compound growth rate (\%)} = (\text{Antilog } b-1) \times 100$$

B. Decomposition Analysis

Following decomposition model was used to know the components of production of *Urdbean*

$$\text{Area effect} = \frac{(A_n - A_o) Y_o}{Y_n - P_o} \times 100$$

$$\text{Yield effect} = \frac{(Y_n - Y_o) A_o}{P_n - P_o} \times 100$$

$$\text{Interaction effect} = \frac{(Y_n - Y_o)(A_n - A_o)}{P_n - P_o} \times 100$$

Where,

A = Area

P = Production

Y = productivity

n = current year

o = base year

Results and Discussion

The primary data collected for study has been analysed and the results of the study were presented below:

Growth rates

To find out the annual rate of change a log linear trend equation was estimated on the 10 year time series of area, production and productivity of *urdbean* crop in respect of Raigarh district and Chhattisgarh state.

Absolute and Relative change

An attempt was made to determine the magnitude of changes in area, production and productivity of the selected pulse crop taking recourse of a simple measurement, measuring only the absolute and relative changes at two points of time series.

Absolute and Relative change in area, production and productivity of *urdbean* of Raigarh district and Chhattisgarh state (2005-06 to 2015-16)

Particulars	Raigarh		Chhattisgarh	
	Absolute change	Relative Change (%)	Absolute change	Relative Change (%)
Area	-2715 (ha.)	-13.88	-1544 (ha.)	-13.17
Production	-368.33 (qt.)	-8.38	-322 (qt.)	-9.84
Productivity	14.33 (kg/ha.)	6.37	11 (kg)	3.82

It may be noted from table that in Raigarh district, the total area under *urdbean* declined by 2,715 hectares over the period of one decade indicating a decrease of 13.88 per cent. The production also declined by 368.33 quintals indicating a decrease of 8.38 percentages. However, the overall productivity of *urdbean* increased by 14.37 kg per hectare or 6.37 per cent during the same period.

The similar trend can also be seen in the state, the overall area under this crop reported a decline of 1,544 hectares indicating a relative decline of 13.17 per cent. The production also decline to the tune of 322 quintals over the time (9.84%) and productivity increased by 11 kg per hectare or 3.82 percentages over the same period i.e. 2005-06 to 2015-16.

The growth rates of area, production and productivity of *urdbean*

It can be seen from the table that a negative rate of growth of area of *urdbean* has been found to be in the order of 2.00 per cent with due statistical significance. It is of great concern to noted further from the table that the production of *urdbean* crop declined by 2.00 per cent per annum over the period. In the case of productivity, the rate of growth was found to be in the tune of 0.94 per cent annually.

Similar trend was also found in state level data. In Chhattisgarh state the negative growth rate was reported in area and production both declined by 2.00 and 2.00 per cent per annum. Whereas, in the case of productivity Thus, one can infer that negative rate of growth of production of *urdbean* was more on account of negative rate of growth in area with very less or any particular change in productivity over the year under observation.

Growth rates of area, production and productivity of *Urdbean* of Raigarh district and Chhattisgarh state (2005-06 to 2015-16)

S. No.	Parti- cular	Raigarh			Chhattisgarh		
		Area	Produc- tion	Produ-ctivity	Area	Produc- tion	Produ-ctivity
1.	SGR (%)	-2.11	-1.18	0.91	-2.01	-1.54	0.47
	a	20366.06	4503.2	220.24	12174.67	3467.86	283.60
	b	-386.06**	-50.20***	2.12***	-220.35**	-49.35***	1.38
2.	CGR (%)	-2.00	-2.00	0.94	-2.00	-2.00	0.36
	a	4.31	3.65	2.34	4.08	3.54	2.45
	b	-0.0091**	-0.0051**	0.0040**	-0.0090**	-0.0066***	0.0016

Note: - ***-significant in 1% level of probability, **-significant in 5% level of probability

Decomposition Analysis

In order to visualise clearly the contribution of acreage and productivity (yield) towards *urdbean* production in the district as well as in the Chhattisgarh state as a whole, the data were subjected to the analysis of component element.

Decomposition analysis of *urdbean* production

Particulars		Effect	%
An	50527		
Ao	58672	Area	166
An-Ao	-8145		
Pn	12078	Yield	- 76
Po	13183		
Pn-Po	-1105		
Yn (Pn/An)	0.239	Interaction	10
Yo (Po/Ao)	0.224		
Yn-Yo	0.0143	Total	100.00

Table revealed that in the expansion of production of *urdbean*, both in Raigarh as well as in the state, it was area which played a prominent role (166%). The combined effect of other factors had a minor role (10%). This reflects that farmers adopted extensive cultivation in *urdbean* production. Thus, the increase in production was primarily attributed to the area expansion and not by the productivity important.

Conclusions

To enhance the production and productivity of *urdbean* proper allocation and level of increase in fertilizer, irrigation and human labour inter culture to be followed. Creation of demand and searching of export oriented substances should be extended to the best level of state and commercial agencies for further increase the prospect of *urdbean* crop. Farmers in regard of sound farming practices based on scientific recommendation should be acquainted with the researcher and extension agencies for narrowing the gap between potential and actual yield.

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