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Research Article

GROWTH ANALYSIS OF AREA, PRODUCTION AND PRODUCTIVITY OF CABBAGE IN DHAMTARI DISTRICT OF CHHATTISGARH

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ABSTRACT

The research on Cabbage was an attempt to analysis of growth, production and productivity of cabbage crop in Chhattisgarh, taking the previous ten years data and is estimated. Maximum decrease in area under cabbage crop was (-) 11.02 % recorded in the year 2008-09 and maximum increase in area under cabbage crop was 20.23 % in the year 2009-10, whereas maximum increase in production and productivity of cabbage crop in Dhamtari district of Chhattisgarh was 32.67 % in the year 2006-07 and 35.45 % in the 2011-12 respectively. For area, production and productivity of cabbage the instability was highest for the production. Growth rates were significant at 1% level of significance.

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INTRODUCTION

Cabbage is one of the principal horticultural crops in Chhattisgarh states. This crop is resilient and can adjust to diverse growing environment differing in soil, rainfall and weather. There has been consistent in area under cabbage to due extension of its cultivation in the entire states. The demand for cabbage has been increasing year after year from ancient times. Cabbage growing farmers in Chhattisgarh by and large have adopted only non monetary inputs and parley the adoption of high yielding variety. Total cabbage production in Chhattisgarh was 809.94 ('000 tons.), and the area under the crop was 698.74 (000 ha) during the year 2004-05 to 2013-14. Index Number and compound growth rates were worked out for studying the trends in area, production and productivity of cabbage in Chhattisgarh. The functional form $Y = a + bt$ was used to estimate compound growth rates. Percentage simple growth rate at different points of time was calculated by using following formula.

$$rp = \frac{At - A0}{A0} \times 100$$

Where rp = percentage simple growth rate between different points of time

At = Area/Production/productivity at time t

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A_0 = Area/Production/productivity at the base year

Annual compound growth rates of area, production and productivity were calculated by following log linear function (Dandekar, 1980)

$$Y_t = A(1+r)^t \quad (1)$$

Where Y_t = Area / Production / productivity at time t ; t = time in years; r = Compound growth rate

Taking log on both sides of equation (1) we get $\log Y_t = \log A + t \log(1+r)$

Putting $\log Y_t = Y$, $\log A = a$ and $\log(1+r) = b$ we get

$$Y = a + bt,$$

$1+r = \exp b$ therefore, $r = (\exp b - 1) \times 100$ Standard error of compound growth rates

(CGR) were calculated by using the following formula (Rao et al, 1981)

$$SE(CGR) = 100 \ln 10 b \times S.E.(Inb)$$

Student 't' distribution was used to test the significance of growth rates. The test statistic used is

$$t = \frac{CGR}{SE(CGR)}$$

Where t follows student 't' distribution with (n-k) degrees of freedom (n = number of observation and k = number of parameters). Coefficient of

Variation (CV) was used to study the instability in cabbage production.

$$CV = (\text{Standard deviation} / \text{Mean}) \times 100$$

The contribution due to area, productivity and their interactions between area and productivity was calculated by using following equation-

$$\text{Change in production (DP)} = \text{Productivity effect (A0 Y)} + \text{Area effect (Y0 A)} + \text{Interaction effect (Y)}$$

$$\text{Where, } P = P_n - P_o, \quad Y = Y_n - Y_o, \quad A = A_n - A_o$$

Where A_o, P_o & Y_o are area, production and productivity in base year and A_n, P_n & Y_n , are area, production and productivity in current year A and Y represent change in area and

productivity, respectively.

RESULTS AND DISCUSSION

The trend in area, production and productivity of cabbage in Chhattisgarh were investigated by using the data published by Statistical Abstract of Chhattisgarh, Raipur. The results of the investigation are presented and discussed below.

Trends in area, Production and Productivity

To determine the results in area, production and productivity of cabbage in Chhattisgarh, the Index

Number was constructed by using 2004-05 as the base year. The indices of area, production and productivity are presented in Table 1. It is evident from the table that increasing trend was observed in area but not regular. The maximum change in area was found in the year 2004-05. But there was decline in the area as compared to the base year. In case of production maximum increasing trend was observed in 2005 -06 but declined in the year 2006-07, 2007-08 and 2008-09. In case of productivity maximum increasing trend was observed in 2005-06 but declined in the year 2007-08, 2009-10 and 2012-13 the trend in the productivity was found irregular.

Relative Change in area, Production and Productivity

Table 2 revealed that relative increase or decrease in area under cabbage was not uniform as compared to the base year. Maximum change in the area was found to be 20.23 % in the year 2009-10.

Table 1 Index number of area, production and productivity of cabbage in Chhattisgarh

Year	Area	Production	Productivity
2004-05	263.12	9054	6.44
2005-06	280.18	9256	9.31
2006-07	290.45	3900	5.30
2007-08	301.23	3685	4.10
2008-09	315.21	5787	5.85
2009-10	330.65	6202	3.40
2010-11	321.15	7360	6.20
2011-12	310.89	7625	7.22
2012-13	315.45	7837	4.50
2013-14	314.78	5880	8.22

Table 2 Relative per cent change over previous year in area, production and productivity of cabbage in Chhattisgarh

Year	Area	Production	Productivity
2004-05	4.15	9.65	6.04
2005-06	10.29	11.84	8.87
2006-07	-5.25	-15.45	-9.41
2007-08	6.67	32.67	20.00
2008-09	-11.02	19.38	27.39
2009-10	20.23	6.17	-10.01
2010-11	14.29	12.02	-4.75
2011-12	8.00	25.45	35.45
2012-13	12.85	11.33	-12.10
2013-14	3.79	7.04	3.21

Table 3 Variation and fluctuation of area, production and productivity of cabbage in Chhattisgarh

	Area	Production	Productivity
Mean	38.30	75.60	5.05
Standard Deviation	9.74	24.27	1.85
Coefficient of Variation	42.96	85.90	36.59
Growth Rate	7.27**	11.76**	6.34**
Instability Index	2.27	15.69	5.18

** Significant at 1% level of significance

Maximum decrease in the area was (-) 11.62 in the year 2008-09. In production also trend was not uniform. Maximum increase in production was 32.67 % in the year 2007-08 and maximum decrease in the production was (-) 15.45 % in the year 2006-07. In productivity increasing trend was not regular. Maximum increase in productivity was 35.45 % in the year 2011-12 and maximum decrease in productivity was (-) 12.10 % in the year 2012-13.

Instability in cabbage production

To examine the stability over time in Chhattisgarh in area, production and productivity of cabbage mean, standard deviation and coefficient of variation are worked out and shown in Table 3. Production was found highly unstable 85.90 %, with area 42.96 % and productivity 36.59 %. Positive growth rate 7.27 was found in area, production 11.76 and productivity 6.34. The growth rates for area, production and productivity of cabbage were found statistically significant at 1% level of significance.

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