

Study the Growth and Instability in *Lathyrus Sativus* Production of Chhattisgarh

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Abstract: *Lathyrus sativus* (grass pea) is a high-yielding, drought-resistant legume consumed as a food in northern India. Its development into an important food legume, and is thought of as an 'insurance crop' as it produces reliable yields when all other crops fail. However, has been hindered by the presence of the neurotoxin (beta-ODAP) in seeds which cause irreversible paralysis. Recently, some low-toxin lines have been developed that may prove safe for both animal and human foods. In Chhattisgarh it is grown in large area, To review closer relationship of *lathyrus sativus* production, area & productivity, we tested average growth rate model for *lathyrus* production, area & productivity for secondary collected time series data of Chhattisgarh and found that average growth rate of production, area & productivity for Chhattisgarh during last three decade is 0.98, 3.2 & 0.56% in 1974 to 1986, 5.33, 0.24 & 5.09% during 1987 to 1999 and 5.39, 3.52 & 2.29% during 2001 to 2013, respectively. The overall growth rate of *lathyrus* production, area & productivity in Chhattisgarh during 1974 to 2013 was 0.94, 0.75 & 1.08%, which is good growth rate for the last 37 years. The highest *lathyrus* produced period is 1990 to 1999 & lowest for 1984 to 1988 for Chhattisgarh, and for districts of Chhattisgarh maximum coefficient of variation is 69%, 66% & 63% for area, production & productivity in Jagdalpur respectively and minimum coefficient of variation for area, production & productivity is 11 & 23% for Bilaspur, and 19% for Rajnandgaon respectively. These indicate that Jagdalpur is less consistent or stable district for area, production & productivity of *lathyrus* crop and Bilaspur, Rajnandgaon are highly stable for *lathyrus* crop.

Keywords: *Lathyrus*, Tiwara, *Lathyrus* Area, Production, Productivity, Yield Etc.

I. INTRODUCTION

Lathyrus sativus (grass pea) is a high-yielding, drought-resistant legume consumed as a food in Northern India. Its development into an important food legume, and is thought of as an 'insurance crop' as it produces reliable yields when all other crops fail. However, has been hindered by the presence of the neurotoxin (beta-ODAP) in seeds which cause irreversible paralysis. Recently, some low-toxin lines have been developed that may prove safe for both animal and human foods.

Seed yields of grass pea crops range from 900-1,500 kg per hectare; while crops sown from inoculated seeds yielded up to 2,000 kg ha⁻¹ in the United States (Kay, 1979; Duke, 1981). "Yields are proportional to the seeding rates used. An average crop at a seeding rate of 40 kg per hectare yields about 925 kg per hectare of pulse and 3.2 metric tons per hectare of forage in India. At the seeding

rate of about 14 kg per hectare in mixed cultivation, yield per hectare is about 300 kg of pulse and 0.5 metric tons of straw. Ukrainian experiments with sewage irrigation gave yields of 3120 kg seeds per hectare. The sewage irrigation slightly decreased the 1,000-seed weight, but markedly increased seed N, P, and K concentrations and nutritive values of fresh forage and hay. In India, grass pea occupies about 4% of the total pulse crop and constitutes about 0.3% of the total pulse production, with about 1.6 million hectares, producing about 0.5 million metric tons of seeds" (Duke, 1981). With the identification of high yielding and low ODAP lines, production is expected to increase in the future" (Smart *et al.*, 1994). The major grass pea growing states in India are Madhya Pradesh, Maharashtra, Bihar, Orissa, West Bengal and Eastern Uttar Pradesh. It is grown on an area of approximately 1.5 million hectares with the annual production of 0.8 million tonnes. Nearly two-thirds of national acreage under grass pea is in southeastern Madhya Pradesh and in the Vidarbha region of Maharashtra.

II. MATERIALS AND METHODS

The study was mainly based on the secondary data. Time series were collected for the period from the financial year 1973-74 to 2012-13. For this period, data on gram crop production, area, productivity and support price were collected from various government publications.

Coefficient of Variation:

Time series data on production, area and productivity of *lathyrus* crop were analyzed to estimate their Co-efficient of Variation by using the following formula:

$$C.V. = \frac{\sigma}{X} \times 100$$

Where σ = standard deviation

X = Arithmetic Mean

Growth Rate Model:

Time series data on production, area and productivity of *lathyrus* crop were analyzed to estimate their growth rate by using the following growth model:

$$g_x = (X_T/X_0)^{1/T} - 1$$

Where:

g_x = Average Growth rate

X_0 = Initial value of variable X

X_T = Final value of variable X

0 = Base year

T = Final year

III. RESULT AND DISCUSSION

This study presents pattern of production, area, productivity & effect of growth and instability in *Lathyrus sativus* production of Chhattisgarh. Production, area and productivity of lathyrus crop in Chhattisgarh are showed in Fig. I and Fig. II respectively. The production of lathyrus is estimated at 134.3 thousand MT for the year 1974-75 which is lower the 2012-13, but this period not found higher differences in production. Such difference

may be acceptance of higher technology of cultivation, using resistance variety. And area of lathyrus generally shows consistent in Fig. I. Fig. I and II show overall increasing trend of lathyrus in Chhattisgarh during 1974-75 to 2012-13, but ups and down occur due to water shortage, heavy rainfall, low temperature or frost, heavy rainfall which promote bacterial activities, favorable climate for insect growing and spreading, since the inception of data for the period 1990 to 1999, the maximum output level of production, area and yield & minimum for 1984 to 1988, of lathyrus crop in Chhattisgarh.

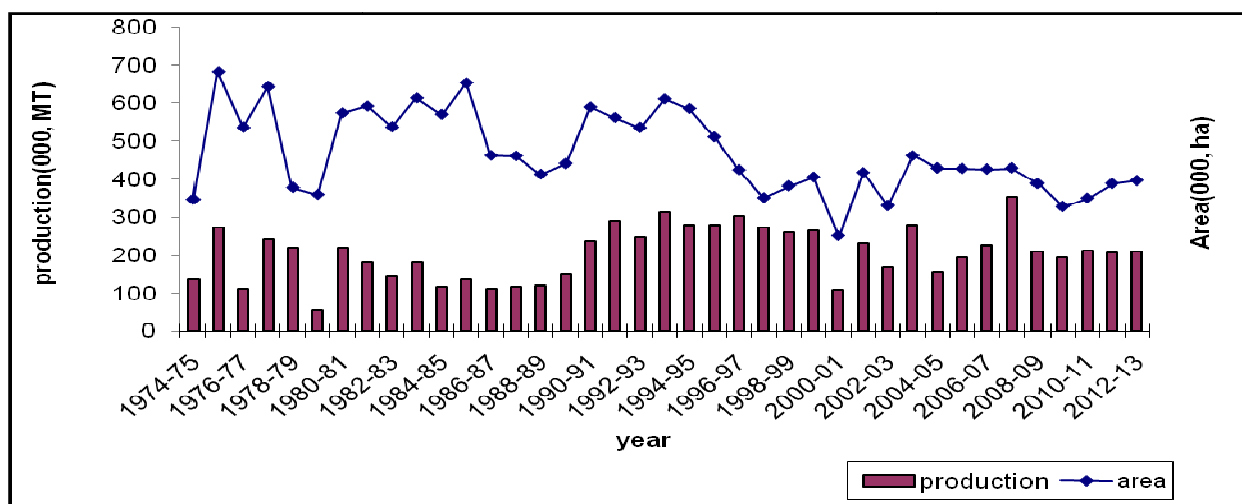


Fig I: Area and production of lathyrus crop in Chhattisgarh during 1974 -75 to 2012-

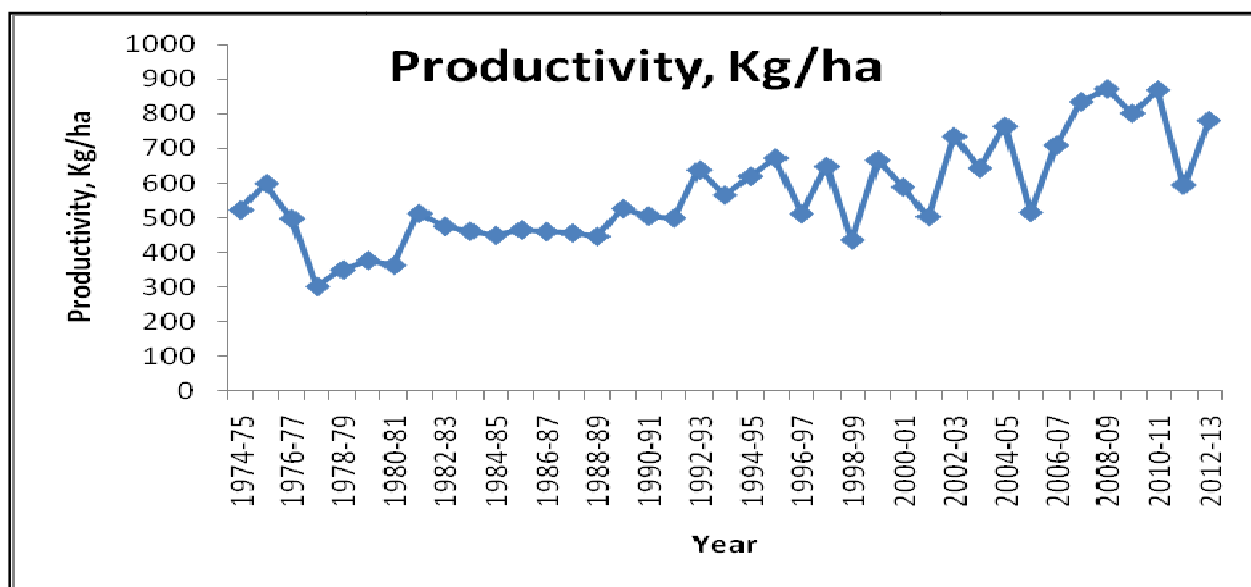


Fig II: Productivity of lathyrus crop in Chhattisgarh during 1974 -75 to 2012-13

Table I: District wise Coefficient of variation of *Lathyrus sativus* for Chhattisgarh

No.	District	Area		Production		Productivity	
		Average	C.V.%	Average	C.V.%	Average	C.V.%
1	Raipur	70	22	34	35	482	25



2	Mahasamund	8	27	4	37	495	27
3	Dhamtari	23	15	14	35	606	35
4	Durg	123	23	73	54	585	47
5	Rajnandgaon	50	16	21	27	419	19
6	Kawardha	13	36	5	49	410	28
7	Bilaspur	73	11	46	23	632	20
8	Jajgir	22	22	14	26	649	22
9	Korba	3	24	1	36	537	23
10	Raigarh	3	30	1	40	480	20
11	Jashpur	0.2	22	0	36	449	23
12	Sarguja	0.4	21	0	33	469	22
13	Koriya	0.5	12	0	27	427	26
14	Jagdalpur	0.01	69	0	66	546	63
15	Dantewara	0	0	0	0	0	0
16	Kanker	2	14	1	35	696	27
17	Bijapur	0	0	0	0	0	0
18	Narayanpur	0	0	0	0	0	0

In the table .I we have found that the maximum co-efficient of variation is 69%, 66% & 63% for area, production & productivity in Jagdalpur respectively and minimum co-efficient of variation for area, production & productivity is 11 & 23% for Bilaspur, and 19% for

Rajnandgaon respectively. These is indicate that Jagdalpur is less consistent or stable district for area, production & productivity of lathyrus crop and Bilaspur , Rajnandgaon are highly stable for lathyrus crop.

Table II: Growth rate of Production area, and productivity of *Lathyrus sativus* during 1974 -75 to 2012-13.

Year	Annual growth rate, %		
	Production, 000 MT	Area, 000 ha	Productivity, Kg/ha
1973-74 to 1985-86	0.98	3.2200	0.56
1986-87 to 1998-99	5.33	0.24	5.09
1999-2000 to 2012-13	5.39	3.52	2.29
1973-74 to 2012-13	0.94	0.75	1.08

To review closer relationship of *lathyrus sativus* production, area & productivity, we tested average growth rate model for lathyrus production, area & productivity for secondary collected time series data of Chhattisgarh and found that average growth rate of production, area & productivity for Chhattisgarh during last three decade is 0.98, 3.2 & 0.56% in 1974 to 1986, 5.33, 0.24 & 5.09% during 1987 to 1999 and 5.39, 3.52 & 2.29 % during 2001 to 2013, respectively(table II). The overall growth rate of lathyrus production, area & productivity in Chhattisgarh during 1974 to 2013 was 0.94, 0.75 & 1.08 %, which is good growth rate for the last 37 years.

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