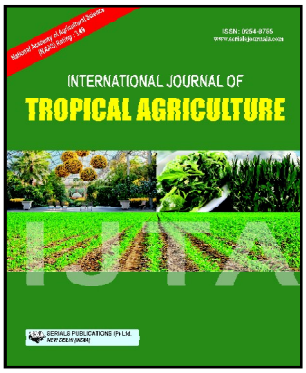

INTERNATIONAL JOURNAL OF TROPICAL AGRICULTURE

ISSN : 0254-8755

available at http: www.serialsjournals.com

Volume 36 • Number 4 • 2018

Regionwise Trends in Area, Production and Productivity of Pigeonpea in Maharashtra

R. D. Dhaigude, A. R. Kulkarni and R. B. Hile

Department of Agricultural Economics, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth Rahuri-413722, Dist- Ahmednagar, Maharashtra, India

Abstract: India is largest producer and as well producer, importer and consumer of pulses in India. The 68th United Nations General Assembly (UNGA) has declared year 2016 as the *International Year of Pulses* (IYP).Pulses can significantly contribute in addressing hunger, food security, malnutrition, environmental challenges and human health. Pulses have vital place in Indian diet as well as culture due to its nutritive, economic and social importance. Commonly known as poor man's meat, feeds daily protein dietary requirement of a largest vegetarian population of Indian subcontinent. The present investigation was aimed to study, "Regionwise trends in area, production and productivity of pigeon pea in Maharashtra". The data were obtained for the period of 52 years beginning with 1960-61 to 2011-12. The data obtained from secondary sources were analyzed to obtain estimates of annual compound growth rates of area, production and productivity of pigeon pea in Maharashtra during different time periods. The area allocation for pigeon pea have increased by 144.87 per cent and production by 313.48 per cent to the base year 1960-61 whereas, productivity increased by 69.98 per cent in Maharashtra. The area, production and productivity of pigeon pea increased at the rate of 1.7, 2.66 and 0.94 per cent per annum, respectively during the period from 1960-61 to 2011-12 in Maharashtra.

Inter-region comparison during overall period reflects, Vidarbha region was leading in growth of area while, Marathwada recorded highest growth in production and productivity. Period-II was characterized by the increase in area, production and productivity of pigeon pea as compared to period I, it might be due to technology mission on pulses with incentive minimum support price.

Keywords: Growth, area, production, productivity, pigeon pea

INTRODUCTION

Pulses are an important commodity group of crops that provide high quality protein complementing cereal proteins for pre-dominantly substantial vegetarian population of the country. Although, being the largest pulse crop cultivating country in the World, India's production of pulses is relatively were in comparison to total cereal crops productions. The contribution of pigeon pea in total pulses in respect of area was 15.9 lakh ha, for production it was 15.7 lakh tonne and productivity was 98 kg/ha. (Annual report, GoI, 2016-17).

Per capita net availability of pulses in India, however, has reduced from 51.1 gm/day (1971) to 41.9 gm/day (2013) as against WHO recommendation of 80gm/day. Pulses provide a vital source of plant-based proteins and amino acids for people around the globe, ensuring food security. As part of a healthy diet high in fiber, pulses fight obesity. Pulses also prevent and help manage chronic diseases such as diabetes, coronary conditions, and cancer. Pulses are an important source of plant-based protein for livestock. Pulses pull nitrogen from the air into the soil, increasing soil fertility. Pulses use less water than most other protein crops, making them a sustainable agricultural choice. (Crop Science, Society of America, 2016).

Of course, more protein does not necessarily mean more pulses. After all, there are other sources of protein including eggs, meat, poultry, and soya. But rough estimates suggest that for the average Indian consumer, pulses are the lowest cost source of protein (Arvind Subramanian 2016).

METHODOLOGY

Estimation of growth rates in area, production and productivity of pigeon pea

Ongoing through the available literature on growth rates, it was revealed that, the compound growth rates obtained from exponential trend equation give the best fit to the time-series data and have been used widely for estimating growth rates in area, production and productivity of different crops. In order to analyze the growth in area, production and productivity of the crops under study, Compound Growth Rates (CGR) were computed by using the following form of the relationship.

$$Y = ab^t$$

Where,

Y = Area/ Production/ Productivity

a = Constant

b = Regression coefficient

t = Time period in years

CGR (%) = (Antilog b-1) x100

The compound growth rates were estimated for the time periods *i.e.* Period-I (1960-61 to 1980-81, pre pulse mission technology period), Period-II (1981-82 to 2011-12, post pulse mission technology period) and the Overall Period-(1960-61 to 2011-12). The significance of the estimated compound growth rates were tested with the help of student's t-test.

RESULTS AND DISCUSSION

I. Regionwise trends in area, production and productivity of pigeon pea

The main objective of the present study was, to estimate compound growth rates in area, production and productivity of pigeon pea in Maharashtra in general, and those in different divisions in particular, it was necessary to examine whether changes had occurred in pigeon pea area during the different time periods selected for the study in various regions and for the entire state. Similarly, whether changes had occurred in productivity and production of pigeon pea in different districts of each of the region were also examined. Whatsoever, changes had occurred in area, production and productivity of pigeon pea in different regions and their rate of changes were

also evaluated. The decadewise data on area, production and productivity of pigeon pea in Maharashtra have been analyzed and changes have been worked out for the period of last 52 years i.e. from 1960-61 to 2011-12.

II. Changes in area, production and productivity of pigeon pea in Maharashtra

The pigeon pea production is determined by agro-climatic factors such as soil type, temperature and rainfall pattern. Besides, the agro climatic factors, other factors such as relative price of pigeon pea, expansion of irrigation facilities, provision of technological inputs, institutional facility are also responsible for pigeon pea production. The changes in area, production and productivity of pigeon pea in Maharashtra state at different points of time is given in the Table 1.

It is evident from the Table 1 that, the area allocation for pigeon pea have increased by 144.87 per cent, production of pigeon pea increased by 313.48 per cent to the base year 1960-61 whereas, productivity increased by 69.98 per cent in Maharashtra. The area under pigeon pea has increased continuously over the base year except in Western Maharashtra region. The production of pigeon pea was increased mainly due to area expansion.

III. Western Maharashtra

It is evident from the Table 2 that, Dhule district showed highest i.e. 1.61 and 2.0 per cent per annum rise in area and productivity, respectively, while productivity shows its potential for production rise at 2.24 per cent per annum in Pune district. During period-II area increased at 2.58 per cent per annum in Nasik district and production increased at 2.08 per cent per annum in Jalgaon district, resulting in non-significant decrease in productivity. During overall period area and production of pigeon pea significantly increased in Jalgaon district at 2.09 per cent and 2.35 per cent per annum, respectively among all districts of Western Maharashtra. At regional level in western Maharashtra during Period-II, the production and productivity showed significant and positive growth i.e. 3.6 per cent and 1.69 per cent per annum, respectively. During period-II, the area, production and productivity of pigeon pea in Western Maharashtra showed negative growth, it may be due to frequent drought condition, uneven rainfall and diversion of area to other competing crop. At overall period, production and productivity increased at the rate of 0.88 per cent and 0.55 per cent per annum, respectively in spite of area showed positive but non-significant trend.

IV. Marathwada

In Marathwada region during period-I, the area and production increased at the rate of 3.71 and 6.36 per cent per annum, respectively in Beed district while productivity increased significantly in Aurangabad district. During period-II increase in area showed in Jalna district i.e. 1.86 per cent per annum while production and productivity is highest in Latur district i.e. 5.3 and 3.63 per cent per annum. At overall period significant area expansion recorded in Beed district with 2.46 per cent per annum while Latur district showed significant growth in production and productivity with 5.3 and 3.63 per cent per annum, respectively. At regional level in Marathwada area, production and productivity is significant, while in period-II area expansion of pigeon pea occur at the rate of 1.73 per cent per annum. During period-II production and productivity though increased at 3.9 and 2.13 per cent per annum, respectively it was less than production and productivity during period-I. At overall period of Marathwada area expansion, production rise and increase in productivity at 1.84, 3.65 and 1.78 per cent per annum, increase in productivity at 1.84, 3.65 and 1.78 per cent per annum, respectively over the base period. Compare to period-I and period-II the production and productivity get declined at overall period, while area

Table 1
Changes in area, production and productivity of pigeon pea in Maharashtra

Area (A) = '00' ha, Production (P) = '00' tones, Productivity (Y) = kg/ha

Period	*Western Maharashtra*			*Marathwada*			*Vidarbha*			*Overall*		
	A	*P*	*Y*	*A*	*P*	*Y*	*A*	*P*	*Y*	*A*	*P*	*Y*
1960-61	926.00 (100.00)	309.00 (100.00)	333.69 (100.00)	1720.00 (100.00)	434.00 (100.00)	252.33 (100.00)	2270 (100.00)	1307 (100.00)	576 (100.00)	4916.00 (100.00)	2050.00 (100.00)	1161.79 (100.00)
1981-82	1386.00 (49.68)	755.00 (144.34)	544.73 (63.24)	2727.00 (58.55)	1380.00 (217.97)	506.05 (100.55)	2387 (5.15)	1775 (35.81)	744 (29.15)	6500.00 (32.22)	3910.00 (90.73)	1794.39 (54.45)
2011-12	901.00 (-2.70)	491.08 (58.92)	545.04 (63.33)	5076.00 (195.12)	3508.79 (708.48)	691.25 (173.95)	6061 (167.00)	4476 (242.50)	739 (28.27)	12038.00 (144.87)	8476.29 (313.48)	1974.85 (69.98)

(Figures in parentheses indicates the percentage change over the base year 1960-61)

Table 2
Annual compound growth rates in area, production and productivity of pigeon pea in Western Maharashtra

Sr. No.	*District*	*Period-I (1960-61 to 1980-81*			*Period-II (1981-82 to 2011-12)*			*Overall (1960-61 to 2011-12)*		
		A	*P*	*Y*	*A*	*P*	*Y*	*A*	*P*	*Y*
1.	Nasik	-1.37**	-0.77	0.62	2.58***	1.97***	-0.59	1.14***	0.87**	-0.26
2.	Dhule	1.61***	2*	0.4	-1.82*	-2.86**	-1.06	1.22***	0.76	-0.45
3.	Jalgaon	-0.71***	0.05	0.88	1.96***	2.08**	0.11	2.09***	2.35***	0.28
4.	Ahmednagar	-0.66	-0.53	0.14	-1.37	-1.24	0.13	-0.66	-0.95	-0.3
5.	Pune	0.14	2.37	2.25**	-3.12***	-2.96***	0.17	-1.73***	-1.52***	0.22
6.	Solapur	2.16	-4.16	-6.45***	-3.68***	-3.91***	-0.24	-2.05***	-2.6***	-0.67
7.	Satara	-0.79	0.75	1.56	-2.08***	-3.16***	-1.1	-0.51**	-1.54***	-1.03***
8.	Sangli	-0.57	-2.72	-2.16	-2.17***	-3.64***	-1.5*	-1.22***	-2.54***	-1.33***
9.	Kolhapur	-2.29***	-2.02	0.28	-1.26	-2.58**	-1.33*	-1.79***	-3.06***	-1.29***
	Western Maharashtra	**1.95**	**3.6***	**1.61***	**-0.32**	**-0.35**	**-0.03**	**0.33**	**0.88****	**0.55****

(*, ** and *** indicate significance level at 10, 5 and 1 per cent level, respectively)

showed better growth is a result of various pulse crop promotion programmes including rise in minimum support price.

V. Vidarbha

It is evident from the Table 4that, during Period-I in Vidarbha region Akola district showed highest growth in area (1.39 %) among all nine districts, while production and productivity varied in all districts showing negative and non-significant growth. During period-II, area and production showing highest growth at 7.06 per cent and 8.18 per cent in Gadchiroli district, while Nagpur district showed positively significant rise in productivity (1.44 %). Area and production rise is significant in period-II compared to period-I, it might be due to introduction of high yielding verities of pigeon pea and major emphasis on pulse production programme.

At overall period highest growth in area and production (2.81 and 2.97 %, respectively) was observed in Chandrapur district, while highest productivity recorded in Bhandara district (0.93 %). At regional level in Vidarbha area, production and productivity showing positive and significant growth at 2.36, 2.85 and 0.47 per cent per annum, respectively. It might be due to major emphasis on pulse production to achieve self-sufficiency and nutritional needs of the population as well as previous trends of the cropping pattern and suitable soil conditions favor's the farmer to cultivate pulses.

VI. Maharashtra

During period-I, Marathwada region showed positive and significant growth in area (1.48%), production (4.40%) and productivity (2.87%) among all the four regions of Maharashtra. During period-II Vidarbha region showed highest rise in area (2.65%) while, production and productivity increased significantly at higher rate of 3.9 and 2.13 per cent per annum, respectively in Marathwada region. Area, production and productivity of pigeon pea significantly increased at 1.86, 2.9 and 1.01 per cent per annum during period-II in Maharashtra.

During overall period, the area increased significantly at 2.36 per cent per annum in Vidarbha region, while production and productivity rise was seen in Marathwada region at 3.65 per cent and 1.78 per cent per annum, respectively. At overall level in

Table 3
Annual compound growth rates in area, production and productivity of pigeon pea in Marathwada region

Sr. No.	*District*	*Period-I (1960-61 to 1980-81*			*Period-II (1981-82 to 2011-12)*			*Overall (1960-61 to 2011-12)*		
		A	*P*	*Y*	*A*	*P*	*Y*	*A*	*P*	*Y*
1.	Aurangabad	-0.14	3.01**	2.9*	0.97**	4.13***	3.13***	-0.48**	1.16**	1.46***
2.	Jalna	—	—	—	1.86***	4.2***	2.3**	1.86***	4.2***	2.3**
3.	Beed	3.71***	6.36**	2.59	1.06***	1.98**	0.91	2.46***	4.6***	2.11***
4.	Latur	—	—	—	1.61***	5.3***	3.63**	1.61***	5.3***	3.63**
5.	Osmanabad	2.11***	1.88	-0.2	1.63***	4.53***	2.85**	0.15	1.18**	1.04**
6.	Nanded	1.02***	-0.05	-1.06	1.9***	3.19***	1.27	1.13***	2.41***	1.27***
7.	Parbhani	1.65***	4.06***	2.33**	0.91**	0.87	-0.04	1.28***	1.5***	0.19
	Marathwada	**1.48*** **	**4.4*** **	**2.87****	**1.73*** **	**3.9*** **	**2.13****	**1.84*** **	**3.65*** **	**1.78*** **

(*, ** and *** indicate significance level at 10, 5 and 1 per cent level, respectively.)

Table 4
Annual compound growth rates in area, production and productivity of pigeon pea in Vidarbha

Sr. No.	*District*	*Period-I (1960-61 to 1980-81)*			*Period-II (1981-82 to 2011-12)*			*Overall (1960-61 to 2011-12)*		
		A	*P*	*Y*	*A*	*P*	*Y*	*A*	*P*	*Y*
1.	Buldhana	1.1***	0.99	0.05	1.9***	1.92**	0.02	2.6***	2.69***	0.19
2.	Akola	1.39***	0.82	-0.89	0.38	0.36	-0.02	1.62***	2.3***	0.65*
3.	Amravati	0.25	-1.86*	-1.91	2.71***	2.98***	0.26	2.6***	2.62***	0.13
4.	Yavatmal	0.65***	-1.36	-1.77	2.66***	2.65***	-0.01	2.74***	2.6***	-0.01
5.	Wardha	0.02	-0.37	-0.16	2.88***	2.05***	-0.8	2.2***	1.69***	-0.36
6.	Nagpur	-0.52	-1.94	-1.33	1.48***	2.94***	1.44**	1.03***	1.78***	0.8**
7.	Bhandara	0.8***	-1.52	-2.93**	-0.11	0.96*	1.09*	0.65***	1.49***	0.93***
8.	Chandarpur	0.31	-2.15**	-2.39**	3.32***	4.37***	1.02	2.81***	2.97***	0.2
9.	Gadchiroli	—	—	—	7.06***	8.18***	1.05*	—	—	—
	Vidarbha	0.16	0.63	0.47	2.65***	2.95***	0.29	2.36***	2.85***	0.47***

(*, ** and *** indicate significance level at 10, 5 and 1 per cent level, respectively.

'#' – Newly formed district, area so far recorded is under Latur district)

Table 5
Annual compound growth rates in area, production and productivity of pigeon pea in Maharashtra

Sr. No.	*Regions*	*Period-I (1960-61 to 1980-81)*			*Period-II (1981-82 to 2011-12)*			*Overall (1960-61 to 2011-12)*		
		A	*P*	*Y*	*A*	*P*	*Y*	*A*	*P*	*Y*
1	Western Maharashtra	1.95	3.6*	1.61*	-0.32	-0.35	-0.03	0.33	0.88**	0.55**
2	Marathwada	1.48***	4.4***	2.87**	1.73***	3.9***	2.13**	1.84***	3.65***	1.78***
3	Vidarbha	0.16	0.63	0.47	2.65***	2.95***	0.29	2.36***	2.85***	0.47***
	Maharashtra	0.44	1.09	0.65	1.86***	2.9***	1.01**	1.7***	2.66***	0.94***

(*, ** and *** indicate significance level at 10, 5 and 1 per cent level, respectively.

'#' – No area under this crop has been recorded so far)

Maharashtra rise in area 1.7 per cent and productivity 0.94 per cent per annum helped to raise the production at 2.66 per cent per annum. The performance of pigeon pea in area, production and productivity was quite satisfactory during overall period; this may perhaps be due to the impact of technology mission on pulses.

CONCLUSIONS

1. Maharashtra stands in better position for pigeon pea with expansion of area by three fold by (144.87 per cent), increased production by four fold (313.48 per cent) (to the base year 1960-61) whereas, productivity enhancement by near about only two fold (69.98 per cent) in

Maharashtra. Marathwada region recorded leading position in all aspect i.e. area, production and productivity showing potential for pigeon pea crop in Marathwada.

2. Inter-region analysis depicts, the highest increase in area of pigeon pea was recorded in Vidarbha region while, Marathwada region noted top position in production and productivity rise. Growth in area, production and productivity of pigeon pea showed highest increase in Period-II as compared to period-I, this may be the result of promotion of technology mission on pulses.

REFERENCES

Agarwal, P. K., Singh, O.P., Verma, D.K., Ku, S., Sen, C., (2012), Growth and Instability of Pulses Production in India. *The Allahabad Farmer,* LXVII (2), 41-53.

Asmatoddin, Mohd., Jawale, S. V. and Perke, D.S. 2009. Economic analysis of pulses on medium farms in Marathwada region of Maharashtra. *Agriculture Update,* 49 (1): 262-265.

Devraj, Singh S.K., and Aditya P., 2014. Growth and instability analysis of chickpea production in Maharashtra: A district-wise analysis, *Current Advances in Agricultural Sciences,* 6(2), 169-172.

Gajbhiye, S., Wankhade, R.N. and Kakde. S. J. 2002. Growth and instability of chickpea production in Vidarbha region of Maharashtra. *International Journal of Commerce and Business Management,* 3(2) : 172-174.

Gajbhiye, S. R. and S.J. Kakde. 2011: Performance of chickpea production in Akola district of Maharashtra. *International Journal of Forestry and Crop Improvement*, 2(1) : 30-32.

Government of Maharashtra, 2013, "Economic Survey of Maharashtra 2012-13", Directorate of Economics & Statistics, Mumbai, PP. 07.

Meena V. S., Sharma S. and Dagar V. 2016. Production and Growth in Pulses in India. *Agricultural Situation in India*, LXXII (2):27-31.

Reddy, A. A. and Mishra, D., 2009, "Growth and instability in chickpea production in India", Indian Agricultural Research Institute (IARI) November 4, 2009, Agricultural Situation in India, pp. 230-145.