


Original Research Article

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## Cropping Pattern, Growth Rate in Area, Production and Productivity of Pomegranate Cultivation in Chitradurga District of Karnataka, India

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### ABSTRACT

India is the world's largest producer of pomegranate followed by Iran, Turkey, Spain, China, Morocco, Afghanistan, Japan, Greece, France, Armenia, Egypt, Italy and Palestine. Karnataka stands second largest pomegranate producing state in the country with an area of 28,090ha, production of about 3,28,920 tonnes and productivity of 11.71 MT per hectare. The major producing districts are Chitradurga, Vijayapura, Tumkuru, Dharwad, Bagalkote and Koppal (Horticulture statistics at a glance, 2017). The present study was undertaken in Chitradurga district, where area under pomegranate was significant. Among the six taluks in Chitradurga district, three taluks Viz., Hiriyur, Hosadurga and Challakere were selected for the study based on the highest acreage under the crop. Primary data was collected from the 90 sample respondents in the study area and the secondary data related to district wise area, production and productivity was collected from District Horticulture office. Tabular analysis was adopted to compile the cropping pattern of the sample farmers, Simple statistical tools like averages and percentages were used to interpret results properly. The data obtained on area, production and productivity of pomegranate. The results indicated that there was positive growth under pomegranate area at state level (29.64%) and in the Chitradurga district (33.20%). With respect to production also a positive trend of 32.95 per cent in the state level and 34.93 per cent in Chitradurga. The positive growth in production observed was due to increase in area under pomegranate cultivation. Productivity growth was also shown positive but at an increased growth rate of 2.55 per cent in Karnataka state and 3.54 per cent in Chitradurga district.

#### Keywords

Pomegranate, Cropping pattern, Growth rate, Area, Production and Productivity

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### Introduction

A Pomegranate or *Punica granatum* belongs to family *Punicaceae* is one of the commercially grown fruit crops of India, which is native of Iran (Persia). India is the world's largest producer of pomegranate followed by Iran and other countries

like Turkey, Spain, China, Morocco, Afghanistan, Japan, Greece, France, Armenia, Egypt, Italy and Palestine. The fruits are very attractive with sweet acidic taste mainly used as fresh fruits and for dessert preparation (Hemalatha, *et al.*, 2013; Kumar, 2013). The fruits are also processed to make jam, jelly, juice, syrup, wine, flavor cakes, etc. Its

medicinal and nutritional values are given ample importance. It is ranked 10<sup>th</sup> in terms of fruit consumed annually in the world. There is a huge potential for Indian pomegranates in the global markets (Surajkumar, 2016).

Karnataka stands second largest pomegranate producing state in the country with an area of 28,090 ha, production of about 3,28,920 tonnes and productivity of 11.71 MT per hectare. The major producing districts are Chitradurga, Vijayapura, Tumkuru, Dharwad, Bagalkote and Koppal (Horticulture statistics at a glance, 2017). In Chitradurga district of Karnataka, pomegranate is being grown on commercial scale. The area under pomegranate in the district is 6,911 ha (37.55 % of total area under pomegranate in the state). A few years ago, a group of farmers from Hiriyur taluk and Chitradurga had decided to experiment growing pomegranate after they suffered heavy losses by cultivating traditional crops in dry conditions. The yield surprised their expectations and encouraged villagers of Hosadurga and Challakere taluks to take up pomegranate cultivation on a large scale (Sundaravaradarajan and Ramanathan, 2003). Besides, there is a continuous demand for pomegranate grown in the state in European countries because of the taste, color and higher number of seeds of pomegranate varieties (Ganesh, Dholka, Bedana, Bhagwa and Araktha) were being cultivated in India. A detailed study on cropping pattern Growth rate in Area, Production and Productivity of Pomegranate cultivation would help the farmers to have first-hand prior knowledge of the profitability of pomegranate cultivation.

## **Materials and Methods**

### **Location and geographical features of the study area**

Chitradurga district is situated in the central part of Karnataka state at 13° 34' to 15° 02' North latitude and 75° 37' to 77° 01' longitude at 524 m elevation from the mean sea level. The district comes under the transition zone and is bounded by Davangere

and Bellary districts in the north, Tumkur in the south, Andhra Pradesh in the east and Shimoga on west part. The geographical area of Chitradurga district is 7,70,702 ha spread over six taluks namely, Chitradurga, Molakalmuru, Challakere, Holalkere, Hosadurga and Hiriyur. The population of the district according to the year 2011-12 was 16,60,378 with 1000: 955 male to female ratio. Out of the total population, about 20 per cent were in urban areas and 80 per cent were in rural areas. The overall population density of the district was 197 per sq.km (Census, 2011).

Pomegranate is gradually becoming a popular crop of Chitradurga district because of frequent droughts, consequently the failure of seasonal crops and also due to non-availability of laborers during peak seasons for cultivating seasonal crops. The area under pomegranate cultivation was 6911 ha in Chitradurga district during the year 2013-14. In Karnataka, the major pomegranate growing districts viz. Chitradurga, Bijapur, Bagalkot, Koppal and Bellary was having 6911, 2478, 2293, 1917 and 1846 ha of area under pomegranate, respectively.

### **Sampling procedure**

The present study was purposively undertaken in Chitradurga district of Karnataka, where area under pomegranate was significant. In Chitradurga district, among the six taluks, three taluks Viz., Hiriyur, Hosadurga and Challakere were selected for the study based on the highest acreage under the crop. From each taluk, three villages were selected and a random selection of ten sample respondents of pomegranate cultivators was made from each village to constitute a total of 90 respondents.

### **Primary data**

Primary data was collected from the 90 sample respondents in the study area. Data regarding socio-economic characteristics, demographic features, various aspects of agriculture like size of land holding, asset position, cropping pattern, input utilization, cost of cultivation, yield, returns,

constraints faced by the sample farmers and other related information in particular to pomegranate was collected in the study are through a well-structured and pre-tested schedule to work out the economics of pomegranate cultivation.

### **Secondary data**

The information about the study area regarding total geographical area, cropping pattern, sources of irrigation and other related information was obtained from District Statistical Office, Chitradurga. The data related to district wise area, production and productivity of pomegranate in Karnataka was collected from District Horticulture office, Chitradurga.

### **Analytical tools and techniques employed**

Tabular analysis was adopted to compile the cropping pattern of the sample farmers, Simple statistical tools like averages and percentages were used to compare, contrast and interpret results properly (Sahana, 2017; Manjunath, *et al.*, 2019).

### **Compound annual growth rate analysis**

The data obtained on area, production and productivity of pomegranate for the period 2000-01 to 2017-18 for Karnataka, Chitradurga district and selected taluks were used for the estimation of compound growth rates. The data were computerized to get the compound growth rates in area, production and productivity of pomegranate. This became useful for studying the changes in the performance of pomegranate during the reference period.

In order to assess the trends in area, production and productivity of pomegranate crop in the study district and in Karnataka, the compound growth rate analysis was employed. Compound growth rates were computed using the exponential function of the form,

$$Y_t = abt^{ut} \dots (1)$$

Where,

$Y_t$ : Dependent variable for which growth rate was estimated (area/production/yield)

a: Intercept (constant)

b: Regression coefficient

t: The reference period in years which take values, 1, 2, ..., n

ut: Disturbance term for the year t

For the purpose of estimation, equation (1) was transformed into log linear form and was estimated using Ordinary Least Square (OLS) technique. The compound growth rate (g) in percentage was then computed from the following form,

$$g = (\text{Antilog } b - 1) \times 100.$$

### **Results and Discussion**

#### **Cropping pattern followed in study area**

The cropping pattern followed by the sample farmers is given in Table 1. The table reveals that Groundnut, Jowar and Finger millet were major crops grown by sample farmers in *Kharif* season.

The highest area was under Groundnut (118.68 ac.) followed by Jowar (69.00 ac.) in *Kharif* season. Further, Finger Millet, Pigeon Pea, Onion, Green Gram and other crops occupied 48.10, 35.00, 14.50 and 11.50 and 48.25 acres of land respectively. The total area under all crops in *kharif* season was found to be 351.40 acres.

In *rabi* season, the major portion of area was devoted to Bengal gram cultivation (49.80 ac.) followed by Jowar (38.00 ac.) and Finger Millet (37.00 ac.). The total area under *rabi* season was found to be 135.60 acres.

The total area under perennial crops was about 48.25 acres and the highest area was under Pomegranate

(30.48%) followed by coconut (12.09%) and Arecanut (6.70%). Further, the gross cropped area was found to be 947.33 acres and cropping intensity was about 117.46 per cent.

**Growth rate in area, production and productivity of pomegranate cultivation in Karnataka and Chitradurga district**

Growth rates in area, production and productivity of Pomegranate cultivation in Karnataka and Chitradurga district during the period 2001-02 to 2017-18 and 2002-03 to 2017-18 are depicted in the table 2 and table 3. (Anonymous, 2017).

The results indicated that there was positive growth under pomegranate area at state level (29.64%) and in the Chitradurga district (33.20%). With respect to production also a positive trend of 32.95 per cent in

the state level and 34.93 per cent in Chitradurga district was noticed. The positive growth in production observed was due to increase in area under pomegranate cultivation. Productivity growth was also shown positive but at an increased growth rate of 2.55 per cent in Karnataka state and 3.54 per cent in Chitradurga district. The area under pomegranate in Karnataka during 2001-02 was 10.8 thousand acre which was increased to 28.09 thousand acre during 2017-18. Chitradurga district also showed an increasing trend from 551 acre of area during 2002-03 to 5971 acre during 2017-18.

The annual compound growth rate is comparatively high in Pomegranate production in Chitradurga district, the concerned government authorities should take appropriate policy measures towards economic stability in Pomagranate production.

**Table.1** Cropping pattern followed in study area

Sl. No.	Particulars	Area (ac.)	Per cent
<b>I.</b>	<b><i>Kharif</i></b>		
1	Green gram	11.50	1.21
2	Ground nut	118.68	12.53
3	Jowar	69.00	7.28
4	Finger millet	48.10	5.08
5	Onion	14.50	1.53
6	Pigeon pea	35.00	3.69
7	Others	48.25	5.09
	Total	351.40	
<b>II</b>	<b><i>Rabi</i></b>		
1	Bengal gram	49.80	5.26
2	Finger millet	37.00	3.91
3	Jowar	38.00	4.01
4	Others	10.80	1.14
	Total	135.60	
<b>III</b>	<b>Perennial crops</b>		
1	Arecanut	63.50	6.70
2	Pomegranate	288.70	30.48
3	Coconut	114.50	12.09
	Total	466.70	
	Gross cropped area (acres)	947.33	
	Net cropped area (acres)	806.47	
	Cropping intensity (%)	117.46	

**Table.2** Growth rate in area, production and productivity of pomegranate cultivation in Karnataka from 2001-02 to 2017-018

Year	Area (000' ac)	Production (000' t)	Productivity (t/ac)
2001-02	10.8	112.2	10.39
2002-03	14.5	143.6	9.90
2003-04	12.7	124.6	9.81
2004-05	11.1	116.8	10.52
2005-06	13.7	134.6	9.82
2006-07	13.6	135.5	9.96
2007-08	13.9	134.1	9.65
2008-09	14.3	138.1	9.66
2009-10	13.2	138.5	10.49
2010-11	13.6	142.6	10.49
2011-12	15.1	151.6	10.04
2013-14	16.1	130.2	8.09
2014-15	18.4	198.6	10.79
2015-16	23.23	261.8	11.27
2016-17	27.26	319.3	11.71
2017-18	28.09	328.9	11.71
<b>CAGR</b>	<b>29.64</b>	<b>32.95</b>	<b>2.55</b>

**Table.3** Growth rate in area, production and productivity of pomegranate cultivation in Chitradurga district from 2001-02 to 2017-018

Year	Area (ac.)	Production (t)	Productivity (t/ac.)
2002-03	551	4959	9.00
2003-04	423	3831	9.06
2004-05	1094	10053	9.19
2005-06	1217	12254	10.07
2006-07	1044	10524	10.08
2007-08	1909	17635	9.24
2008-09	1155	9924	8.59
2009-10	1266	10547	8.33
2010-11	1909	17635	9.24
2011-12	3926	37605	9.58
2012-13	6305	40677	6.45
2013-14	6911	88862	12.86
2014-15	5816	49675	8.54
2015-16	5462	56785	10.40
2016-17	5963	52430	8.79
2017-18	5971	64881	10.87
<b>CAGR</b>	<b>33.20</b>	<b>34.93</b>	<b>3.54</b>

**Fig.1** Map showing study area



Periodic and intensive entrepreneurship development and capacity building programmes need to be organized by the Government and other extension agencies for creating awareness about entrepreneurial opportunities in Pomegranate farming.

There is also need of establishing a separate Entrepreneurial Development Centre (EDC) in the traditional belts of Pomegranate growing areas to train growers on different components of entrepreneurship for the development of pomegranate production in the district by government. Organized market system has to be established by the government for fair marketing of the produce for the better price by eliminating obstacles.

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