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Study of Growth Rate in Area, Production and Productivity of Different Crops in Parbhani District Of Maharashtra

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ABSTRACT
The present study examines the growth action of area, production and productivity pattern of Parbhani district in Maharashtra. Using data from 2002-03 to 2016-17, linear and compound growth rate of area, production and productivity in Parbhani district was estimated for each period to study the growth performance. In the district, gross cropped area occupies major portion in total geographical area of the state followed by net sown area and forest area. Despite of this, area under current fallow, other fallow occupies prominent portion in total area. Area under the fallow is decreasing. Hence importance is given to prevent converting cropped area to waste land. The study suggests farmers to make use of available resource efficiently to convert cultivable waste land and fallow land into farm land.
Keyword: *Linear growth rate, Compound growth rate, Gross cropped area.*

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INTRODUCTION

The pattern of land use of country at any particular time is determined by the physical, economic and institutional framework taken together. Though technological progress in agriculture and agricultural intensification have mitigated the demand for land for non-agricultural purposes are posing a serious challenge to both researchers and policy makers. Intensive agriculture coupled with large-scale irrigation projects without utilized or unutilized. For sustainable utilization of the land ecosystems, it is essential to know the natural characteristics, extent and location, its quality, productivity, suitability and limitations of various land uses. The growth of population is greater than the rate of growth of food production. It is usually achieved through proper use of land resources with the application of bio-fertilizers, double cropping, modern methods of irrigation and manpower [1, 2].

In Parbhani, Net sown area, gross cropped area, land under non-agriculture use shows increase in percentage change with positive sign. Area under forest, permanent pastures, area sown more than once gross cropped, cultivable waste land, fallow land shows decrease in percentage change. It clearly shows that fallow land, land under non-agricultural use should be used properly to improve land utilization pattern of the state. In present study a comparison is done to analyze percentage change in area under Land utilization pattern for two different periods and growth rates were identified for the same period [3, 4]. To estimate growth rates of area, production and productivity of major crops grown in Parbhani district

MATERIAL AND METHODS

In the present study, Linear Growth Rate (LGR) and Compound Growth Rate (CGR) were estimated for each period to study the growth LUP.

For studying the growth rate in area, production and productivity, linear growth rate was estimated by using following linear functions.

$$Y= a+bx+e$$

Where
Y = Dependent variable for which growth rate is estimated
a= Intercept/Constant
b= Regression/trend coefficient

x= Period in years
e= Error term with zero mean and constant variance.
Compound Growth Rate was then estimated by using the following equation:

$$Y= a.b^x$$

Y= Dependent variable for which growth rate is estimated
a= Intercept or constant
b= Trend / Regression coefficient
x= Period in years
b= (1+r)
where, r = is compound growth rate
C.G.R. = (antilog of b-1) x 100

The necessary data for the selected cereals crops was purely based on secondary sources and it was collected from various issues of Statistical Hand Book of Parbhani, Season and Crop report of Parbhani. To work out triennium averages for base period i.e., 2002-03, period considered were 2000-01, 2001-02,2002-03 and for end period i.e., 2016-17, period for triennium considered were 2014-15, 2015-16, 2016-17 simple arithmetic averages, percentages of selected parameters of development were used for the comparison of situation in Tamil Nadu over three period of time.

Time period I, II and III represents time series data for 2002-03 to 2008-09, 2010-11 to 2016-17 and 2002-03 to 2016-17 respectively. The present study examines the growth performance of Land Utilization Pattern in Parbhani district. Table-1 reports the Land utilization pattern for the period of 2002-03 to 2016-17. It reveals that area under current fallow is constantly increasing throughout the period and area sown more than once is decreasing. Gross cropped area of the district increased. Area under forest is decreasing but change is minute when compared to other particulars.

Growth rate of area under different crops

The trend in area of different crops were studied and depicted in Table 1.The growth rate of area under paddy cultivation had been significant at 1 per cent for period II and III. Area under cultivation of Sesame, green gram, cotton, safflower, Sunflower were non-significant for overall period. The growth rate area under maize cultivation had decreased from 1.93 to 0.33 per cent in linear growth rate and 1.68 to 0.28 per cent in compound growth rate.

Table 1. Growth rate of area under different crops in Parbhani district of Maharashtra

S.No.	Particulars	LGR			CGR		
		I	II	III	I	II	III
1	Rice	-7.80**	-39.62**	-18.03**	-7.76**	-84.91**	-53.43**
2	Jowar	-0.55*	1.57*	2.35*	-0.18*	1.56*	2.84*
3	Maize	3.02*	8.85*	5.90**	2.56*	6.88*	4.91**
4	Wheat	5.08*	-9.85*	-3.94*	5.95*	-9.12*	-4.25*
5	**Total cereal**	**-1.45***	**-0.79****	**-2.27***	**-1.34***	**-1.39***	**-2.82***
6	Red gram	4.70*	-0.84*	2.74*	7.64*	-0.97*	4.40*
7	Green gram	-1.70*	-2.49*	-3.66*	3.86*	-2.25*	-1.08*
8	Black gram	16.33*	6.96*	-0.94*	15.38*	7.34*	-0.04*
9	Gram	2.08*	1.68*	1.96*	2.03*	1.23*	1.80*
10	**Total Pulses**	**-3.90***	**0.61***	**1.32***	**-2.32***	**0.61***	**2.86***
12	Sesamum	-7.06**	-28.83**	-10.77**	-7.16**	-62.44**	-35.01**
15	Sunflower	0.04*	-25.41**	-11.71**	-0.33*	-39.52**	-21.01**
16	Soybean	14.81**	10.26**	11.12**	18.69**	10.24**	13.24**
17	Safflower	-5.51*	-24.51**	-7.52**	-6.34*	-25.66**	-9.96*
18	Rape and Mustard	2.85*	-13.75*	-5.27*	3.08*	-68.21*	-43.33*
19	**Total oilseed**	**6.40****	**4.40***	**5.79****	**7.00****	**4.19***	**5.81****
20	**Total foodgrain**	**3.76***	**0.11***	**-0.41***	**5.31***	**0.03***	**-0.13***
21	Cotton	-29.57*	-2.14*	-5.56*	-18.82*	-2.61*	-1.95*

*Significant at 5 per cent; **Significant at 1 per cent

Growth rate of production of different crops

Growth rate of production of different crops in Parbhani district has been depicted in Table 2. Paddy, maize, Sesame, Green gram, Total pulses, sunflower production remains non-significant during overall period. Production of green gram remains negatively significant at 5 % for overall time period. The average production of maize has increased significantly in overall time period. It had increased from 0.32 to 0.34 per cent in linear growth rate decreased from 0.7 to 0.03 per cent in compound growth rate.

Table 2. Growth rate of production of different crops in Parbhani district of Maharashtra

S.No.	Particulars	LGR			CGR		
		I	II	III	I	II	III
1	Rice	-11.25**	-44.12**	-19.27**	-10.76**	-76.16*	-51.13**
2	Jowar	-4.08*	23.74*	7.58*	-3.34*	5.91*	0.72*
3	Maize	10.23**	6.92*	4.53*	11.16**	2.67*	2.58*
4	Wheat	10.53*	-14.57*	-4.47*	10.24*	-17.16*	-7.28*
5	**Total cereal**	**4.09***	**-4.94***	**-1.64****	**-4.26***	**-8.21***	**-2.90***
6	Red gram	4.77*	-0.54*	-0.17*	4.95*	-12.88*	-2.97*
7	Green gram	-3.10*	-4.00*	-0.92*	-3.36*	-9.28*	-3.42*
8	Black gram	-4.72*	-7.05*	-2.74*	-5.05*	-10.67*	-4.79*
9	Gram	3.72*	-1.18*	2.76*	3.988	-4.24*	1.75*
10	**Total Pulses**	**-0.33***	**-0.04***	**0.19***	**-11.71***	**-6.49***	**0.10***
11	Sesamum	-6.29**	-0.82**	2.01**	-9.10**	-4.12*	0.17**
12	Sunflower	1.32*	-5.20**	-1.14**	1.23*	-25.58**	-8.46**
13	Soybean	-6.84*	-10.85*	-3.64*	-5.55*	-17.44*	-6.04*
14	Safflower	2.21*	-5.83**	-1.20**	2.84*	-9.58**	-2.72**
15	Rapeseed and Mustard	19.95*	-30.52**	-5.15*	13.89*	-93.36**	-61.03**
16	**Total oilseed**	**0.25***	**-9.97***	**-0.95***	**0.61***	**-15.56***	**-3.13***
17	**Total foodgrain**	**2.94***	**-9.16***	**-2.57***	**3.20***	**-13.21***	**-4.14***
18	Cotton	9.15*	8.65*	-3.44**	15.47**	3.16*	-2.61**

*Significant at 5 per cent
**Significant at 1 per cent

Growth rate of productivity of different crops

Trend in productivity of different crops has been depicted in Table 3. Productivity of total food grain remains non-significant for entire time period I, II and III. Growth rate of Cotton increased from 0.05 to 0.6 per cent from period I to II in linear growth rate. Sesame productivity had decreased from 0.78 to 0.44 per cent from time period I to II.

Table 3. Growth rate of productivity of different crops in Parbhani district of Maharashtra

Sr.No.	Particulars	LGR			CGR		
		I	II	III	I	II	III
1	Rice	-3.47*	-6.18*	-3.61*	-3.08*	-6.29*	-4.69*
2	Jowar	-0.63*	-7.89*	-2.90*	-0.23*	-10.56*	-4.13*
3	Maize	0.76*	4.81*	1.69*	0.64*	2.25*	0.51*
4	Wheat	7.49*	-6.64*	-0.69*	7.44*	-8.80*	-1.57*
5	**Total cereal**	**4.09***	**-4.94***	**-1.64***	**4.26***	**-8.21***	**-2.90***
6	Red gram	4.77*	-9.58*	-1.28*	4.95*	-12.88*	2.97*
7	Green gram	-3.10*	-4.00*	-0.92*	-3.36*	-9.28*	-3.42*
8	Black gram	-4.72*	-7.05*	-2.74*	-5.05*	-10.67*	-4.79*
9	Gram	3.72*	-1.18*	2.76*	3.98*	-4.24*	1.75*
10	**Total Pulses**	**-6.29***	**-0.82***	**2.01****	**-11.7***	**-6.49***	**0.10***
11	Sesamum	-3.29*	-0.70*	1.01*	-7.18*	-4.10*	0.17*
12	Sunflower	1.32*	-5.20*	-1.14*	1.23*	-25.58*	-8.46*
13	Soybean	-6.84*	-10.85*	-3.64*	-5.55*	-17.44*	-6.04*
14	Safflower	2.21*	-5.83*	-1.20*	2.84*	-9.58*	-2.72*
15	Rapeseed and Mustard	19.95*	-23.52**	-5.15*	13.89*	-93.36**	-61.02**
16	**Total oilseed**	**0.25***	**-9.97***	**-0.95***	**0.61***	**-15.56***	**-3.13***
17	**Total foodgrain**	**2.94***	**-9.16***	**-2.57***	**3.20***	**-13.21***	**-4.14***
18	Cotton	9.15*	8.65*	-3.44*	15.04*	3.16*	-2.61*

*Significant at 5 per cent
**Significant at 1 per cent

CONCLUSION

Research activities should focus more on increasing the productivity and profitability of less water-intensive crops so as to reduce the stress on water resources as well as to increase the area that could be

cultivated with a given quantum of water. Institutional arrangements need to focus on the prevention of idling of fertile agricultural lands located close to urban areas for speculative purposes.

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