



AN ANALYSIS OF AGRICULTURAL AREA PRODUCTION AND PRODUCTIVITY IN MAHARASHTRA DURING 1961-2014

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ABSTRACT

The introduction and rapid spread of high yielding varieties in the late 60s and early 70s resulted in steady output growth for food crops in India. District wise trend in area, production and productivity have examined in this paper. To analyzed the trends linear regression has been used to check the rate of change. As well as for significance student t test statistics has been used. The correlation in between Area and production also tested from 1961 – 2014. The analysis revealed that growth of the production at macro level is mainly yield led due to development and spread of high yield varieties and technology intervention. This paper seeks to examine the nature and extent of inter-district variation in the growth of Area, production and productivity of major crops over the study period i.e. from 1961-2014.

KEYWORDS: production and productivity, technology intervention.

INTRODUCTION

Agriculture is still an important economic activity in the developing countries and its role as well as impact on their economies is highly significant. Sustained growth in agricultural production and productivity is essential for overall stability of the Indian economy. Maharashtra is located in the north centre of peninsular India and the dominant physical characteristics of the state are plateau character. The state is divided into two unequal parts. 1) Coastal strip konkan and 2) Deccan plateau. The western ghat plays a significant role in the monsoon circulation over the state which gives abundant rainfall along the coast and on the Ghats but eastern side has pockets of rain shadow areas. The state comprising of 35 districts with total area of 3, 07,713 square kilometers is the third largest state and are divided into 4 meteorological subdivisions.

The climate is tropical and its major portion is semi – arid with 3 distinct seasons. The major portion of annual rainfall confined to southwest monsoon.

The important crops grown in the state are Jowar, Wheat, Rice, Bajara, Groundnut, Tur, Gram, and cotton, Sugarcane, Soyabean, Sunflower and Safflower. Analysis of agricultural growth in the post-green revolution period unfolds interesting dimensions of the new trends and patterns emerged in 1980. In the growth of aggregate production and Productivity be attributed merely to a favorable Weather. The fact that the role played by yield improvement in higher output growth has been far more important than that of expansion in area indicates that the process of growth has been technologically more dynamic too. While acceleration in yield growth in recent years has been significant for crops like rice, maize, other pulses, soya bean, rubber and cotton. This is an indication of a much wider diffusion of technology. Finally, it is critical to understand the implications of all this to agriculture. Crops are sensitive to



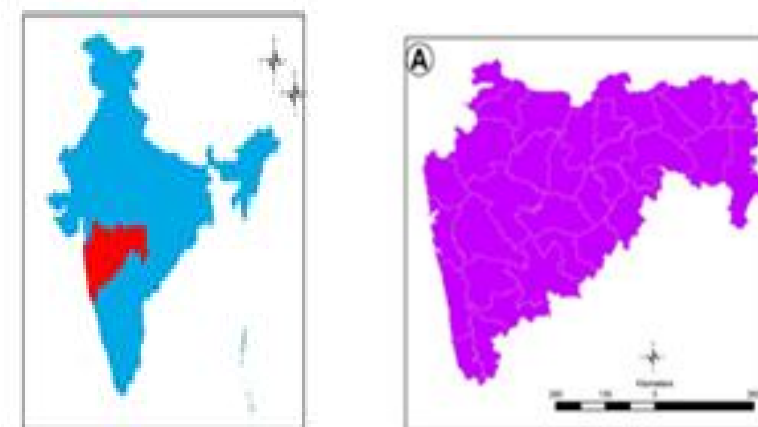
shortages in water and heat stresses during key periods during their development (i.e. Flowering, fruit filling). Therefore, lack of skill in representing seasonal and inter-annual variability is expected to produce a significant obstacle to agricultural impact assessment of climate change.

DeosthaliVrishali and NikamChandrashekhar (2004), Rice, Regionwisegroth trends in Maharashtra. It is clear that production and area of rice in Maharashtra have increased by 47.5 % and 12% respectively. Indicating increased in production mainly yield led due to the development and spread of HYV led technology.Pradumna Kumar and Mark W Rosegrant (1994), Productivity and sources of growth for rice in India. They suggested that the increase in area and production of the crop in highly associated with their relative profitability. The author examine the changes in input use, productivity, cost of production and identify the potential region for further productivity gains and suggest ways of increasing rice productivity.S. Nareshkumar,P.K.Agarwal al (2011), Impact of climate change on crop productivity in western ghat coastal and north eastern regionsin India.This research paper was published in current science and according to them the simulation analysis indicates that the productivity of kharif crops such as irrigated rice in the western ghat region is likely to change by +5% to -11% in the PRECIS Alb 2030 scenario depending upon the location. Majority of the region is projected to lose the yield by about 4%. Climate change is likely to reduce yield of Maize and Sorghum by upto 50% depending upon the region.It can be concluded that the climate change in the western ghat, coastal district and north east region is projected to significantly after crop production. The impacts are crop specificand simple adaptation strategies such as change in variety and altered agronomy, high input delievery and use efficiency can offset the negative impact of climate change.Maximilian Auffhammer, V. Ramnathan el,(2011), Climate change, the monsoon and yield in India.According to their statistical analysis of state level Indian data confirms that drought and extreme rainfall negatively affected rice yield in rain fed areas during 1966- 2002 With drought having much greater impact than extreme rainfall. Climate change already negatively affected India hundreds of millions of rice producers and consumers.AmarrenderReaddy (2013), Agricultural productivity growth in Orrisa, India: crop diversification to pulses, oilseeds and other high value crops.According to his research paper over the last four decade there has been stagnation in agriculture in Orissa. Hence there is a need for increase in area under certified seed, irrigation and other productivity enhancing input to increase farmers income in all crops.S.D.Sawant and C.V.Achuthan (2015), Agricultural growth across crops and regions emerging trends and patterns. In this paper they attempted evaluation of agricultural growth performance in the post green revolution period.

STUDY AREA:

Maharashtra is located in the western part of India along the Arabian Sea. It lies between 15° 44' to 22° 6' N Latitude and 72° 36' to 80° 54' E Longitude. The total area of Maharashtra State is 307,000 sq. km, which is 9.36% of the country. Considering the area and population, Maharashtra state is the third largest state in India. The population of the state is 80 million which is 9.47% of the country's total population

Location Map



DATA AND METHODOLOGY

The research work would examine the trends in Area, production and productivity of Agriculture of 35 districts in Maharashtra. Major 18 crops of Maharashtra were used for further analysis. The Agricultural data has been collected from Agricultural department Pune. The data covers period from 1961-2014. The trends for Agricultural data were evaluated by linear regression method. Linear regression model (LRM) was applied for temporal trend analysis. The test has been widely used for several climatological studies for assessment of long term tendency in climatic parameters (De and Rao 2004, Dash et al. 2007) Magnitude of trend was obtained from the slope (value of 'b') of the regression line. Significance of trends was checked with the application of Student's t test at 95% confidence level.

RESULT AND DISCUSSION

Rice –Rice is a staple food in Maharashtra especially in the Konkan region. Over the study periodAs (table 1) indicates production of rice has increased with the rate of 298100, tones per decade. The production had been steadily increased up to 1975, but after this it showed the gradual increase upto recent period. This increase in production is mostly due to the constant increase in the area under rice (45560 ha. per decade), which is highly correlated (**0.857**) with production. Productivity of rice is highly correlated with the production than area under crop. The productivity has suddenly increased by (164.1 kg/ha.) after green revolution with effecting use of fertilizers, HYV Seeds and irrigation facilities. Here overall the trend of area, production and productivity is increasing for the rice crop.

Kh. JAWAR - Initially JAWAR had been a major crop in Maharashtra due to its nutritional value as well as its capability to sustain in the less rainfall area. Maharashtra comes under semi arid region therefore farmers gave more preference to cultivate Jawar. The recent scenario is different than previous. As table 1 reported area under jawar is decreasing due to the increase in the irrigation facilities and introduction of cash crops hence production of Jawar decreasing. The reason of decrease in area under jawar is farmer gives more importance to the cash crop because of the cost benefit ratio. Even productivity is increasing significantly over the study period though the production has decreased after 1980 due to sudden decrease in area under jawar.

Major crops	Rate of change per decade with their significance		
	Area in "ooo" Ha.	Production in "ooo" tonnes	Productivity (Av. Yield in Kg/Ha)
Rice(Total)	45.56	298.1	164.1
Kh. Jowar	-338	32.04(insignificant)	180.2
Bajara	-135.6	124.1	132.4
Ragi	-21.37	-6.56	70.75
Tur	143.2	136.7	54.13
Kharif Groundnut.	-170.9	-75.48	107.5
Kharif Sunflower.	28.69	13.89	124.7
Soyabean.	607.4	724.1	333.7
Cotton (Lint)	194.5	1191	41.98
Sugarcane.	-----	13650	3.28
Rb. Jowar	-132.4	137.5	50.02
Wheat	7.62(insignificant)	251.5	251
Gram	196	226.5	106.3
Safflower	-38.52	-100.4	68.76
Rabi Sunflower	44.61	-23.48	144.7
Su. Gr.Nut	24.29	-76.52	376.9
Su. Sunflower	3.05 (insignificant)	10.28	235.5

Table 1. Rate of Change in Area, Production and Productivity of selected Crops

As per table 1 almost all values shows significant changes in the area, production and their productivity. Those are insignificant clearly mentioned in the above table.

Correlation between Area and Production:

Crop	Correlation values	crop	Correlation values
Rice(Total)	0.857	Cotton	0.866848
Kh. Jowar	0.530322919	Sugarcane	0.987114
Bajara	-0.19303368	Rb. Jowar	0.198364
Ragi	0.540861774	Wheat	0.576889
M	0.97727839	Gram	0.986444
Tur	0.89355304	Safflower	0.731123
Kharif Groundnut.	0.797593017	totalfood grain	0.513539
Khseas	0.908189127	Tot pulses	0.921334
Kharif Sunflower	0.956342441	totalcerels	-0.24388
Soyabean	0.955050506		

Table 2. Correlation between Area and Production

Table 2 depicts the correlation between the area and the production of the crops in Maharashtra.

Bajara – Bajara is one of the important crop with high nutrient value in Maharashtra. Since 1961 till 1997 the area under the crop production and the productivity is steadily increasing but after 2002 area and production sharply decline. However the productivity of the Bajara shows continuous steadily increasing trend. Thus area and the production of Bajara shows negative correlation. We need to put effort to increase the production of Bajara as it was in the previous years. Bajara is very high energy value crop in winter people consider it as a boon.

Ragi– It is one of the very important crops with high nutritional value very useful for the diabetic patient, children and all others. But unfortunately since the 1961 till today it shows sharp decline trend in the area under crop as well as the production. May be this is because of negligence towards this crop. But due to irrigation and other facilities productivity shows high growth rate and area and production shows significantly negative trend with positive correlation.

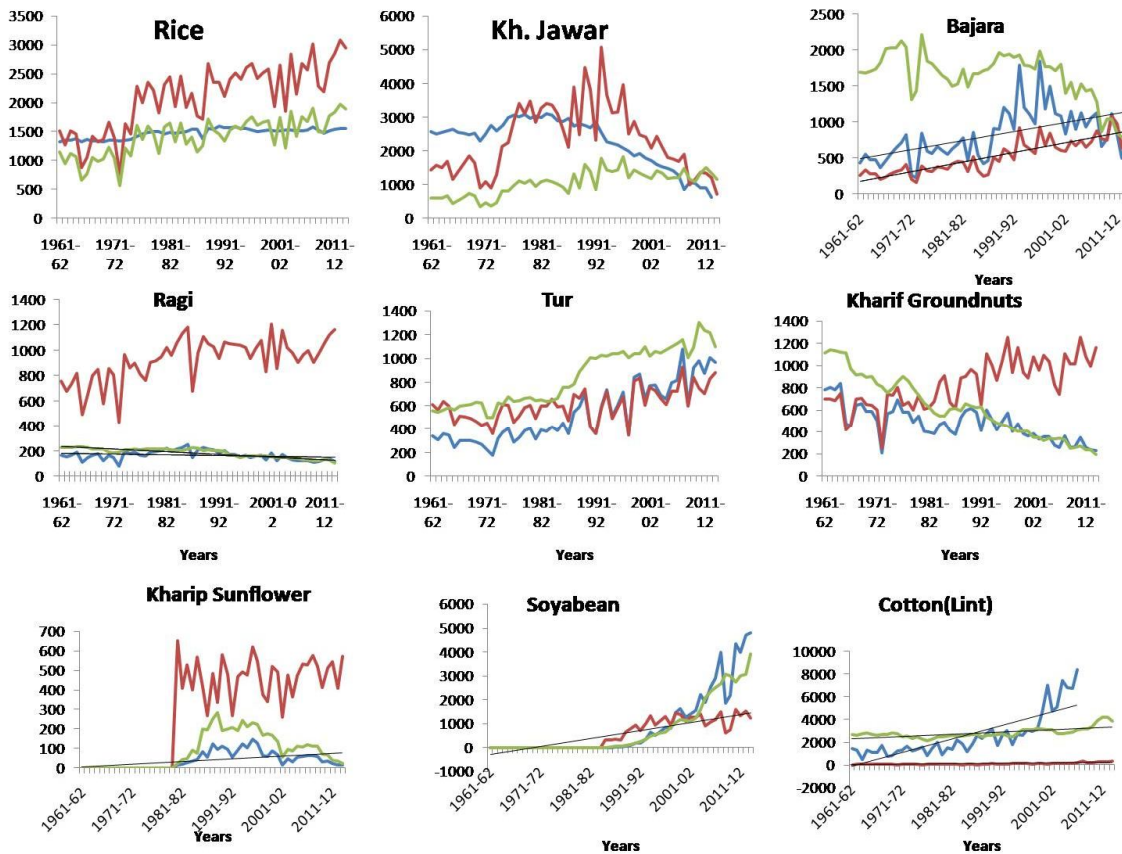


Fig. 1 Trends in Area, Production and Productivity of selected Crops

Maize –Maize one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions.

This is one of the leading crops now because in season it having great demand as well as in others season also sweet corn is very famous so there is significant positive correlation in between area and the production of maize. Here area, production and the productivity is steadily increasing since 1961 and after 2002 in recent years it shows sharply increasing trend in the growth of maize. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals.

Tur– This is one of the important pulses in Maharashtra with high source of proteins in it. Since 1961 there is steadily increase in the area, production and productivity. Only during the 1990 decade the productivity was slow down but after 2000 it again increases.

Kharif groundnut – After studying the rate of change of the growth of the kharif groundnut the trend shows there is sharply decrease in the area and the production of kharif groundnut after 1970 and sharp increase in the productivity because of the fertilizers and other measures. There is positive correlation in between the area and the production of the kharif groundnut.

Kharif sunflower–In previous years that are from 1961 – 1980 there was not a growth of kharif sunflower. After 1980 there is slowly increasing trend in the area and production but sharply increasing trend in the productivity. Now in the recent years again the area and production shows decline but the productivity shows increasing trend.

Soya bean – Soybean is one of the highest nutritional value crops in Maharashtra. Till 1990 there was a lack of awareness of this nutritional value crops but nowadays everyone recommended soybean crop to eat in the form of soya sauce, soya milk, and soya flour etc n numberof product available in the market due to its nutritional value and as per the doctor recommendation. Hence area and the production of soybean has increased in recent years but the productivity shows slight increase hence need to put effort to increase the productivity. There is strong positive correlation in between area and the production of Soybean.

Cotton – Cotton is largely grown over a Marathwada and the Vidharbha in Maharashtra since long period. If we observed the productivity of Cotton there is slight change over the study period and it is increasing very slightly. The area under the crop is constant for several years but in recent decade it is slightly increased. The cumulative effect of area and production has reflected in total production of Cotton. The production has increased significantly over the study period but in the recent decade it shows tremendous increase because new variety of cotton that is BT- Cotton.

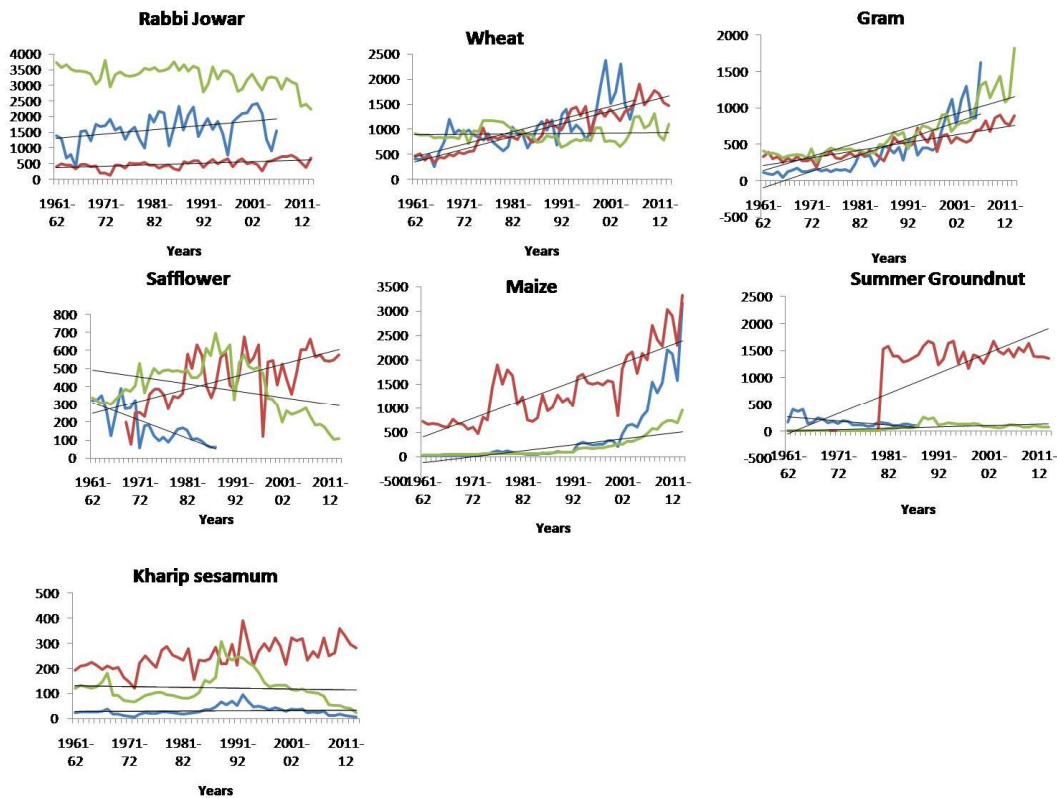


Fig. 2 Trends in Area, Production and Productivity of selected Crops

Rabbi Jawar- Figure 2 illustrates the trend of Area, Production and Productivity of major crop As discussed earlier that jawar is very nutritional crop in among food grain. There is slight up and down in the area production and productivity. In the recent decade the area and the production shows decreasing trend.

Wheat – wheat is one of the high nutritional value crops. Since 1961 the area, production and the productivity is slightly increasing. In 2000 there is sudden increase in the production again it came down in 2002 and there is again uplift in 2004 and in recent years production is decreasing.

Gram – There is increasing trend in area, production and the productivity since 1961 in the crop Gram.

Summer groundnut – By observing the trend summer groundnut productivity is increasing after 1980, later it shows the stable onwards, but area and the production shows decreasing trend for the whole study period.

Safflower – The trend of area under Safflower shows increasing trend up to 1990 and further it decline constantly. Productivity has increase in the beginning of study period and remain constant for remaining period. Use of fertilizers and hybrid seed are the major causes of sudden increase in productivity during 1970 to 1980. In case of production, along with decrease in area under crop decrease has been observed over the time period.

CONCLUSION

Present study gives an impression of rate of change per decade for the major crops in Maharashtra. As per the result of above research work some crops like kharif Jawar, Bajara, Kharif Groundnut, Safflower, Rabbi Jawar and Raggi shows negatively significant trend in Area because of Land use pattern has changed. People used cultivated land either for infrastructure or for some another reason due to increasing urbanization. Under all these crops Area has been decreased from 1961 to 2014 which is not so good for the Agriculture of the Maharashtra state.

As the area has been decreased the production of some crops like Raggi, Kharif Groundnut, Summer Groundnut, Safflower, Rabbi Sunflower shows significantly negative trend. In case of Rice, Tur, Soyabean, cotton and Gram shows increasing trend in both area and the production of the Maharashtra state. This is quite surprising that though Area and the Production significantly decreased in case of some major crops but their productivity is continuously significantly increased throughout the study period because of the high yield varieties and the technology intervention.

In an agrarian country like India with staggering increase in population and food demands, even a slight decline in annual food production is a matter of great concern. Therefore attention has been focused to visualize the food scenario in the light of climate change.

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