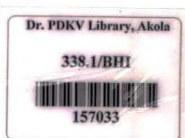


**DYNAMICS OF DISTRICTWISE ECONOMIC  
GROWTH IN AMRAVATI DIVISION**

**THESIS**

**Submitted to  
Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola  
in partial fulfilment of the requirements  
for the Degree of**

**MASTER OF SCIENCE  
IN  
AGRICULTURE  
(AGRICULTURAL ECONOMICS)**



**By  
BIHADE DHARTI PANJABRAO**

**DEPARTMENT OF AGRICULTURAL ECONOMICS  
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POST GRADUATE INSTITUTE, AKOLA**


**DR.PANJABRAO DESHMUKH KRISHI VIDYAPEETH,  
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## DECLARATION OF STUDENT

I hereby declare that the experimental work and its Interpretation of the thesis entitled. "**DYNAMICS OF DISTRICTWISE ECONOMIC GROWTH IN AMRAVATI DIVISION**" or part thereof has neither been submitted for any other degree or diploma at any university, nor the data have been derived from any thesis / publication of any university or scientific organization. The source of materials used and all assistance received during the course of investigation have been duly acknowledged.

**Place:** Akola

**Date:** 30/06/2014

  
(Bihade Dharti Panjabrao)

Enrolment No.: GG/11




## CERTIFICATE

This is to certify that the thesis entitled "DYNAMICS OF DISTRICTWISE ECONOMIC GROWTH IN AMRAVATI DEVISION " submitted in partial fulfilment of the requirements for the degree of "Master of Science in Agriculture (Agricultural Economics)" of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola is a record of bonafide research work carried out by **Bihade Dharti Panjabrao** under my guidance and supervision.

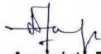
The subject of the thesis has been approved by the student's Advisory Committee.

Place: Akola

Date: 30/9/2014

  
Dr. V. K. Khobarkar  
Chairman  
Advisory Committee

### Countersigned



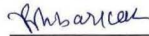
Associate Dean,

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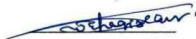
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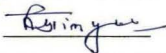
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**Place :** Akola.

**Date :** 30 / 06 / 2014



**(Bihade Dharti Panjabrao)**

Enrollment No. GG/11

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
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**D)****LIST OF ABBREVIATION**

%	: Per cent
/	: per
@	: At the rate of
Agril.	: Agricultural
CGR	: Compound Growth Rate
CV	: Coefficient of Variation
Dr. PDKV	: Dr. Panjabrao Deshmukh Krishi Vidyapeeth
e.g.	: for example (Exempli gratia)
Econ.	: Economics
<i>et al.</i>	: Et alia (and others)
Fig.	: Figure
GDP	: Gross Domestic Product
ha	: Hectare
HYV	: High Yielding variety
J.	: Journal
Kg	: Kilogram
PGI	: Post Graduate Institute
Qt	: Quintal
Res.	: Research
resp	: Respectively
Rev.	: Review
Sr. No.	: Serial Number
T	: tone
Univ	: University
viz.,	: Videlicet (Namely)

**F)****THESIS ABSTRACT**

- a) Title of the thesis : " DYNAMICS OF DISTRICTWISE ECONOMIC GROWTH IN AMRAVATI DIVISION"
- b) Full name of student : Bihade Dharti Panjabrao
- c) Name and address of Major Advisor : Dr. V. K. Khobarkar  
Assistant Professor, Department of Agricultural Economics and Statistics, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.) - 444104.
- d) Degree to be awarded : M.Sc. (Agriculture)
- e) Year of award of degree : 2014
- f) Major subject : Agricultural Economics
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- i) Signature of the student : 
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**ABSTRACT**

The research entitled "Dynamics of districtwise economic growth in Amravati division" was carried with objectives to study the growth performance of major crops, the contribution of selected crops in economic growth and the economic growth performance over the study period. The present study was based on secondary data collected from different government publications. The data covered a period of 31 years i.e. 1980-81 to 2010-11. In all 5 crops were considered for study. These crops covered more than 80 per cent of the total cropped area of the study area.

The growth rate and coefficient of variation was used to examine growth performance of major crops, multiple linear regression equation was used to examine the contribution of major crops in economic growth. In order to study the economic growth performance of major crops the compound growth at constant and current prices was computed for selected years.

Districtwise analysis showed that the area under kharif jowar and cotton has found to be decreased and area under soybean was increased in all the districts of Amravati division. Production of soybean and gram has found to be increased in Amravati division. Cotton and gram showed increasing trend in productivity in all districts of Amravati division.

Cotton, soybean and gram are the major contributors of gross value of output in Amravati division. Tur is the lowest contributor of gross value of output in Amravati and Yavatmal district. Kharif jowar has lowest contribution in gross value of output in Akola and Buldhana district. In overall crop production pulses contributed significantly in economic growth, cotton, kharif jowar and gram productivity contributed significantly in economic growth in Akola district.

Overall crop production at constant prices of cotton, tur, soybean and gram contributed significantly in economic growth in Amravati, Buldhana and Yavatmal district. Productivity of cotton and gram at constant prices contributed significantly in economic growth in Amravati, Buldhana and Yavatmal district. Growth rate at current prices is higher than at constant prices indicated the effect of monetary inflation. Significant positive growth in gross value of output for each crop at constant and current prices indicated that there is significant impact of production on gross value of output though the area under kharif jowar is declining.

# CHAPTER I

## INTRODUCTION

### 1.1 Background Information

Agriculture is the dominant sector of Indian economy, which determines the growth and sustainability. About 65 per cent of the population still relies on agriculture for employment and livelihood. India is the first in the world in the production of milk, pulses, jute and jute-like fibers; second in rice, wheat, sugarcane, groundnut, vegetables, fruits and cotton production; and is a leading producer of spices and plantation crops as well as livestock, fisheries and poultry.

In the past few years, Indian agriculture has done remarkably well in terms of output growth. The 11th Five Year Plan (2007-12) witnessed an average annual growth of 3.6 per cent in the gross domestic product (GDP) from agriculture and allied sector. Indian agriculture is benefitting huge from rising external demand and the sector's wider participation in the global economy. A dynamic change was recorded in food grains production, has increased about 3 times from 1960-61 to 2011-12, in 1960-61 it was 82 million tones while in 2011-12 it has increased to 252 million tones. Increased outputs, have been achieved chiefly by adopting, since mid sixties, a strategy aimed at increasing food grains production by concentrating public sector efforts and resources in regions with a high potential for quick and substantial productivity gains through increased cropping intensity and average yields. These were the areas favored by agro-climatic resource conditions and where irrigation facilities already existed or could be developed relatively rapidly. The main elements of this strategy were: (i) expansion of irrigation coverage, (ii) increased provision and utilization of key inputs mainly high yielding varieties (HYVs) of crops, mainly of wheat and rice and chemical fertilizers and plant protection chemicals, (iii) expansion and improvement of institutional support services such as research and extension and (iv) price policies favorable to producers of major food grains

According to Market Dynamics the country stands at 10th position in global agricultural and food exports, (Economic Survey 2012-13). Agriculture accounts for about 10 per cent of the total export earnings and provides raw material to a large number of industries. "Exports of agricultural products are expected to cross US\$ 22 billion mark by 2014 and account for 5 per cent of the world's agriculture exports," according to the Agricultural and Processed Food Products Export Development Authority (APEDA).

Maharashtra is an important state and has been considered as one of the progressive state in India. In India it is second largest state in population and third in geographical area. Since its formation in 1960, the state has secured higher growth rate vis-a-vis Indian economy for almost three decades and needs to move at a much faster pace. Planning commission's assessment indicate that the average annual growth rate for Maharashtra would be 10%. The compound growth rate achieved during 2009-10 was 8.59% it was envisaged that the growth rate could be achieved by adopting comprehensive policy package and institutional reforms.

Vidarbha is the eastern region of Maharashtra state , occupies 31.0 per cent of total area and holds 21.3 per cent of total population of Maharashtra. Vidarbha economy is primarily agricultural and region is rich in forest and mineral wealth. the main cash crop of the region are cotton and orange. Traditional crops are sorghum, bajara, and rice.

### **Concept of Economic growth**

Economic growth is a positive change in the level of production of goods and services by a country over a certain period of time. Economic growth is measured by GDP (gross domestic product. GDP is the value of all goods and services in an economy over a given period of time. If the value of all goods and services increases, economic growth increases.

The Economic growth in Agriculture is defined on the basis of value of gross output on the basis of constant MSP (Minimum Support

Price) over the study period. The output value for the selected crop will be calculated as sum of (Production × MSP constant over study period.).

### **Difference between economic growth and development**

Economic growth and development are important topics for study. Economic development differs from economic growth both are correlated and one is depend on other. We can say Growth is the part of development. Whereas economic development is a policy intervention endeavors with aims of economic and social well-being of people. Economic growth is a phenomenon of market productivity and rise in GDP. Consequently, as economist Amartya sen points out: economic growth is one aspect of the process of economic development.

Economic development as a process whereby total per capita income or output of a country increases over the long period. Economic growth is the increase in the market value of the goods and service produced by an economy over time. It is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP Of more importance is the growth of the ratio of GDP to population (GDP per capita), which is also called per capita income. An increase in per capita income is referred to as intensive growth. Growth may well imply not only more output and also more inputs and more efficiency, i.e., an increase in output per unit of input. Development goes beyond these to imply changes in the structure of outputs and in the allocation of inputs by sectors. For example, growth without development-more and more steel in the Soviet Union or more and more coffee in Brazil-leads nowhere It is virtually impossible to contemplate development without growth because change in function requires a change in size. Until an economy can produce a margin above its food, through growth, it will be unable to allocate a portion of its resources to other types of activity. Economic growth measures the changes in per capita income only Economic development on other hand measures other changes in addition to changes in per capita income. Economic growth takes into account quantitative changes in the economy

and economic development on other hand also take into account qualitative changes in economy.

### **1.2 Importance of study**

Economic growth is important because it provides a foundation for the future of society. Economic growth can contribute to advancements in all fields, creating beneficial outcomes and solutions to many economic problems. The improvement of mass consumption standards depends almost entirely on the growth of agricultural output. An analysis of the behavior of agricultural production in the past and estimation of growth rate provide a basis for future projections of agricultural output. Such exercise can be carried out at an aggregate level for country as a whole or at disaggregates level for each state as a measurement of growth in agriculture helps in knowing how agriculture has been doing over time and how different regions have responded to the changing economic conditions. Agriculture continues to be the most important sector of economy as it has the largest economic activities. The major crops in agriculture play important role in economic growth. Contribution of major crops help to increase the economic growth.

### **1.3 Objectives of Study**

1. To study the growth performance of major crops
2. To study the contribution of selected crops in economic growth
3. To study the economic growth performance over the study period

### **1.4 Hypothesis**

1. Production of selected crops increased significantly during study period.
2. Economic growth is positive over the study period.

### **1.5 Scope and limitations**

The study of Economic growth helps to keeps society moving in a positive, productive direction the more we grow, the better our society becomes. New advances in technology and industry have brought society a long way, and it will continue to grow and change as time goes on. We have improved greatly because of economic growth and expansion. it provides a foundation for the future of society. Economic growth can

contribute to advancements in all fields, creating beneficial outcomes and solutions to many economic problems. Result of this study would help to policy maker to formulate policies pertaining to the various aspects of increasing agricultural production. The analysis crop production is not only important for planning future agricultural growth strategy of the region but also for financial position of Amravati Division. Growth in agricultural productivity also results from promoting new activities and exploring additional market opportunities that increase the value addition of agricultural production.

The present research was conducted for Amravati division of Maharashtra state and restricted to only agricultural crops of Amravati division. Non availability of data in separate for Washim district before bifurcation of Akola to Washim in 1999,thereafter study was conducted by aggregating the data of bifurcated district into district.

## CHAPTER II

### REVIEW OF LITERATURE

A review of past research helps in identifying the conceptual and methodological issues relevant to study. It gives us the knowledge of the research work to be carried out and the guideline to be followed. For carrying out any systematic research work, the review of past literature forms integral part. Therefore, the literature closely related to present study is reviewed in this chapter. This would enable the researcher to collect accurate data and information and subject them to sound reasoning and meaningful interpretation keeping in view of objectives of study reviews are presented in this chapter.

Bhalla and Alagh (1979) in their study "Performance of Indian Agriculture: A District wise Study" analyzed the spatial pattern of Indian agriculture during 1962-65 to 1970-73. The district level analysis revealed great disparities in agricultural performance and high rates of growth were positively associated with high levels of growth in education. A large part of India is characterized by medium or low rates of growth. Only in 48 districts with high growth rates exceeding 4.5 per cent per annum were observed.

Venkatramanan and Prahaladachar (1980) estimated and analysed the growth rates in area, yield and output of major crops in six states including Maharashtra for the period 1955-51 to 1974-75. The result of the study showed that none of the crop in Maharashtra recorded significant growth rate in yields per hectare. A few of the crops registered negative growth rates in yield. The area growth rates for most of crops were low, except sugarcane with 4.6 per cent area growth rate.

Raja purohit (1983) studied the recent trends in the growth rates of important crops in Karnataka, concluded that since 1964-65, there had been a sharp decline in the percentage of area under food grains and simultaneous increase in the area under some newly emerging crops like coconut, mulberry, vegetables, etc.

Patel and Patel (1986) estimated the compound growth rates of area, production and productivity of tobacco were estimated for Andhra Pradesh, Karnataka state and India as a whole for the period 1960-61 to 1983-84. They concluded that the compound growth rates of area was 1071\*\* percent and 10.23\*\* percent in the period 1960-61 to 1983-84. The compound growth rate of production was 0.87\*\* percent in Andhra Pradesh and -3.68 \*\* percent in Karnataka. It revealed that Karnataka accounting 10.30 per cent in all India average had registered high growth rate of 10.23 per cent per annum in area because more area had been brought under tobacco cultivation during the period 1960-61 to 1983-84.

Walia and Singh (1986) studied the growth analysis and trends of area, production and yield of potato in major potato growing states in India. For this study, the secondary data for period from 1950-51 to 1979-80 were divided in to three decades and each for the major potato growing areas like Assam, Bihar, Madhya Pradesh, Uttar Pradesh and Punjab during 1950-51 to 1969-70. In Punjab, increasing trends were observed in area but there were decreasing trends in production during 1950-51 to 1969-70. The decreasing trends in yields of potato were observed in Assam during 1950-51 to 1955-60. Decline in growth rates were observed in Bihar and Madhya Pradesh during 1970-71 to 1979-80.

Singh and Swarup (1988) analyzed the growth rates in area, yield and output of important pulses of Himachal Pradesh during the period 1972-73 to 1981-82 and studied the growth rates of different elements to output of pulses in each districts of state. They conclude that the relative average under pulses has decreased at the compound growth rate of 0.92 per cent per annum. While absolute area under all pulses declined at the rate of 0.79 per cent per annum. Among the pulses, only lentil showed growth in productivity to the tune of 0.23 per cent per annum. The growth in cropping pattern of gram, black gram and horse gram showed positive trend to the tune of 0.05 per cent to 0.60 per cent per annum, respectively.

Arya and Rawat (1989) studied Growth rates and relative contributions of different components towards the production of commercial crops in Haryana. The study considers the growth rates in area, production and productivity of oilseeds, sugarcane, potato and cotton in semi-arid

regions of Haryana. To measure the relative contributions of area, yield and prices to increases in crop production, decomposition analysis has been carried out. The study is based on secondary data for 1966/67 to 1980/81. The results revealed that among all the commercial crops, only potato registered positive and significant growth rates in area, production and productivity in all the districts representing different zones. In the case of oilseeds, growth rates in productivity were positive for all the districts irrespective of negative area and production growth rates in some districts. Hisar District had the highest positive growth rate in the case of cotton. Growth rates in area as well as production revealed the association and conformity of the area with production for almost all the crops in all three zones.

Narang et al. (1989) examined the Performance and prospects of major oilseeds crops in India. The study analyses growth rates of major oilseeds (groundnuts, rapeseed and mustard, and sesame) in India over the period 1967/68-1984/85. The analysis shows that in most states there was no significant expansion in area under groundnuts and sesame; however, the rapeseed and mustard area displayed a positive growth rate in almost all states. The same was true of production and productivity, with only rapeseed and mustard showing significant increases in most states. Instability in production and a high degree of variability in productivity of oilseeds was observed in most states. However, a comparison of productivity levels in 1967/68 and 1984/85 showed that, over the period, four out of seven low productivity states have shown remarkable increases in productivity. If the production of oilseeds is to be expanded and stabilized, and the growing gap between demand and supply reduced, constraints such as the non-availability of certain inputs need to be removed. The provision of price support and marketing infrastructures can also have a positive influence on production.

Chaudhari et.al. (1990) examined the growth in area, production and productivity of important pulse crops in Bihar for different pulse zone for the period 1970-71 to 1986-87. They concluded that growth rate of area as well as production in case of gram, arhar, masur, declined over the period of time in case of productivity. Among the compound

growth rate of area, production and productivity of all the three pulse crops, masur has performed better than other two pulse crops in the study area.

Naidu and Munikrishnudu (1991) examined Growth and instability in agricultural production in Chittoor district of Andhra Pradesh. This paper critically examines the growth and instability of agricultural output, during post- and pre-Green Revolution periods, in Chittoor district, Andhra Pradesh. The linear and compound growth rates of area, production and productivity are calculated for the principal crops during the periods, 1954-55 to 1985-86, 1954-55 to 1964-65 and 1965-66 to 1985-86. To measure instability the coefficient of variation and instability were used. The paper reports that yield fluctuations were the main cause of instability of all crops during the post Green Revolution period, this seems to have been brought on by drought and technical factors. Area rather than yield appeared to be the major contributor to growth. The paper concludes that high yield and stability varieties should be evolved for rainfed as well as irrigated areas; input sowing practices developed; optimal use of resources through out the year encouraged; water use technology introduced; and implementation of price support policies encouraged.

Gautam et al. (1992) studied Economic analysis of major kharif oilseed crops in Narmada valley: soyabean and sesame. The annual growth rate of production was positive for soyabeans but negative for sesame in Madhya Pradesh state as a whole as well as in Tawa Command area. Production costs and returns were obtained for the two crops. Average per ha gross farm income of soyabeans and sesame was Rs 3252 and Rs 3865, respectively.

Rao and Tewari (1992) studied Growth performance in niger crop: a state-wise analysis. Niger crop accounts for approximately 3.3% of total acreage and 1.7% of total oilseed production in India. Cultivation is concentrated in the hands of tribal farmers and production in Bihar, Madhya Pradesh, Maharashtra and Orissa accounts for 87% of India's niger output. This study examines the relative shares and trends in acreage, yields and production between 1964-88 in these four states, studies relative instability of production, analyses the impact of price

changes on the area under niger cultivation and describes trends in change in export earnings of Indian niger. Previous research on niger has failed to significantly boost production levels and the paper stresses the importance of generating advanced breeding materials and new knowledge through the establishment of advance research centers.

Singh et.al. (1993) estimated growth rates for area, production and productivity of gram in different districts of Bihar over a period of 30 years since 1960 to 1990. The compound growth rate of area in case of gram declined over the period of study, except in case of Ranchi (0.05 per cent), Dhanbad (1.35 per cent), Ranchi (1.50 per cent) and Singhbhum (0.11 per cent) and productivity of crop showed positive compound growth rates in all the districts.

Lal and pandey (1994) analyses was made on the growth rates of area, production and productivity of rice, wheat and maize in Bihar state over the period 1951-52 to 1987-88, which encompasses the pre and post green revolution period. The growth rate of production was significant growth in productivity. The contribution of area to production was not significant for rice.

Parmar et al. (1994) studied Economic performance of the pulses in South Gujarat. This study examines the growth and stability of the area, production, yield, prices and profitability of pulses grown in South Gujarat, India. Tur (a type of lentil) has emerged as one of the most efficient crops in areas where jowar and cotton are grown. It is concluded that, with a proper extension strategy, and improved varieties of seed, the production of tur can substantially boost this area's productivity and pulse processing industries.

Mundinamani *et al.* (1995) examined the growth performance of groundnut, sunflower, safflower, and sesamum for the selected districts of Karnataka and the state as a whole. The study was concluded for the period from 1955-56 to 1989-90. Growth rates were computed for two sub periods namely pre-green revolution period (1955-56 to 1965-66) and post green revolution period (1966-67 to 1989-90) they have fitted the exponential function i.e.  $Y_t = a \cdot b^t$  for the analysis. The result of the study showed that the growth in production was achieved mainly due to

expansion of acreage in the study area and to some extent by yield effect in the recent years. The improvement in yields in was observed in areas where irrigation facilities were extended. They have stated that the potentiality of the viable technology developed for the major oil seeds was not yet made a significant impact in increasing oil seeds productivity.

Jahagirdar and Ratnalikar (1996) studied the district wise growth rates of area, production and yield of *kharif* jowar in Maharashtra. The study covered the period of 30 years i.e. from 1960-61 to 1969-90. The entire period of study was divided into three periods. Namely (a) Pre-green revolution period (1960-61 to 1969-70). (b) Green revolution period (1970-71 to 1979-80) and (c) Post green period of technological break through a consistent and positive growth has been observed in area, production and yield. The compound growth rate of area indicated declining and or inconsistent area allocation during the decade undesirable trends in area, production and yield were observed in some of the districts.

Dhindsa and Anjusharma (1997) made an attempt to study the compound growth rates of area, production and productivity of pulses in Punjab for the period 1996-97 to 1991-92. The negative growth of production of pulses can be mainly attributed to a decline in area and stagnancy in the yield of various pulse crops. Gram has shown decline in its area and production in most of the regions. The yield of massar has shown significant positive growth rate in two regions and in the state as a whole during 1966-92. The area under moong crop has shown a very high growth rate of 13.79 per cent per annum during 1966-92 in Punjab state as a whole. The yield has also shown significant positive rates of growth in two regions of the state.

Prakash et al. (1997) examined Determinants of allocation of land among different crops under conditions of dynamic growth. A study is presented to disprove the hypothesis that farmers in developing countries, such as India, do not respond to changes in the economic environment in general and to changes in factor and/or product prices. In traditional subsistence farming, consumption, sales and stocking behaviour of farmers are highly interdependent. The study tests the twin hypotheses that changes in the prices of two crops will evoke responses in opposite

directions: (i) the area under crops with constant yields will either remain constant or will decline, while (ii) the area under crops with growing yields will rise. Results of the study show that changes in prices are neither the necessary nor sufficient condition of change in the area under cultivation; relative rather than absolute prices and yields govern the cropping pattern; the distinction between stationary and dynamic conditions of growth of the farm economy is essential for delineating the magnitudes and interrelations between price, area under cultivation and yield; and yield is the more decisive determinant of acreage than price in the case of crops such as rice, wheat and maize which have registered dramatic growths in yield under the impact of green revolution technologies.

Gaddi et al. (1999) an economic analysis of growth performance of oilseed crops in india.the study is an attempt to know the growth performance and stability in oilseeds sector using secondary data. The result of study indicated that positive and significant growth rates were observed in the case of area and production of all oilseeds except safflower and linseed, where growth rate was negative nonsignificant in safflower but significant in case of linseed. Growth rates of productivity were positive and significant in case of castor. Sesamum, linseed and rapeseed mustard area and production of sunflower and soybean were highly unstable when compared to other oilseed crops. Area was found to be the major contributor to the production of sunflower and soybean, whereas productivity was found to be the major contributor to the production of castor and sesamum. Both the area and productivity together influenced the productivity of castor, sesamum, rapeseed-mustard and soybean.

Kalamkar (2001) studied the growth in area, Production and productivity of major crops and major inputs used in Maharashtra for three periods Viz. Pre-green revolution period (Period I) 1961-62 to 1978-71, Green revolution period ( Period II ) 1977-72 to 1980-81, Post green revolution period(Period III) 1980-81 to 1997-98. A growth rate of area of kharif jowar, paddy, and wheat is higher for period II than period I and Period III. Bajara crop had higher growth rate during period I. for tur, gram, oilseeds and cotton crops growth rates were higher in third period. The growth in crop production of all cereals and pulses and total food grains

increased substantially over entire study period in the state. Growth rate of per hectare yield of most of the crops were higher during lind period. A higher growth rate of area under cultivation more than once and gross cropped area attribute for expansion of irrigation facilities in Maharashtra.

Mehetre et al. (2001) examined Trends and growth rates of area, production and productivity of 'white gold' in different districts of Maharashtra over different time period. An exponential model was used to evaluate the trends in the growth rates of area, production and productivity of cotton cv. Whitegold over 37 years (from 1961/92 to 1997/98) in 3 districts of Maharashtra, India, i.e. Western Maharashtra, Marathwada and Vidarbha. In general, average or high productivity was observed at different phases of the experimental period in the 3 districts of Maharashtra.

Goswami et al. (2001) Growth trend of principal crops of Maharashtra: an analytical approach. this study examined the growth trend, production and productivity of important crops in Maharashtra, India, over a span of 36 years (1960-61 to 1996-97). Results showed that both the area and productivity contributed to the enhancement of the production of the principal crops. However, the contribution of productivity was higher in increasing the production of the major crops as compared to that of area. The highest increase in area was noticed in sugarcane (232.90%), followed by cereals (86.32%). Significant increase in productivity of all the principal crops was also noted. Area under some crops like 'kharif jowar', wheat, and 'rabi jowar', have declined, despite the increase in productivity. Local seeds, infertile soil, poor agricultural technology, shortage of labour, uncertain rainfall, lack of irrigation facilities, and constraint in the availability of suitable markets might have caused the decrease in area under these crops. It is suggested that suitable marketing infrastructure and other facilities are essential for awarding remunerative prices to the farmers to make agriculture more attractive for bringing people into the agricultural profession.

Malik and Singh (2002) examined Crop diversification - an economic analysis. Crop diversification is a necessity for an agricultural based economy like Haryana, India since growing of staple food such as cereals alone cannot support the process of economic development and

growth. Therefore, the study was done to measure the extent of crop diversification at district level in Haryana using diversification measures, viz. crop diversification and entropy indices. The analysis concludes that more diversion of area towards vegetables, fruits and flowers in Sonapat, Rohtak and Gurgaon districts is required due to availability of market, increased demand of products and proximity to export facilities. Crops were diversified in Bhiwani district with the introduction of sprinkler-irrigation system. The other districts observed specialization in crops due to absence of proper markets, the risks involved, availability of irrigation facilities, etc.

Marawar *et al.* (2004) examined the performance of oilseeds in different district of Vidarbha for the period from 1980-81 to 2001-02. The study revealed that area under kharif groundnut decreased over the period of study in Vidarbha whereas summer groundnut showed mixed trends. The area under sunflower and soybean was increased significantly in all district of Vidarbha. In general the area under total oil seed was increased significantly. The production of kharif groundnut decreased over the year of study but the production of sunflower, summer groundnut, safflower and soybean increased significantly. The productivity of sunflower was more or less stagnant over the study period. During the period the productivity of safflower decreased at a growth rate of 1.80 per cent in Vidarbha.

Kumar (2004) examined the growth rate of area, production and yield of soybean district wise and zone wise in Madhya Pradesh, India during 191-92 to 1999-00. In aggregate, results indicate that both area and production growth were highly significant while yield growth was very small and insignificant. Income indices for soybean in the different parts of the state are also presented.

Jahagirdar *et al.* (2004) studied growth rate of cotton in Maharashtra, it is concluded in the study that the production and productivity of cotton were found to be high inconsistent over the entire period of study. The magnitude of variability in production and yield were low in the phase prior introduction of new technology but there after from 1970's it has increased considerably. Significant growth rate were not observed for almost all districts during any phase. Further projections for

the period 1996-97 to 2000-01 indicated inconsistency in area and or productivity in the selected districts except in Parbhani district.

Tingre et al. (2007) studied Growth rates and cropping pattern changes in Nagpur division of Vidarbha. This study has examined the growth rates of area, production and yield of major crops, changes in cropping pattern and the trend in crop diversification and cropping intensity in Nagpur division of Vidarbha. The study was based on secondary data collected from various Government publications and pertains to a period of 31 years i.e. from 1970-71 to 2000-2001. The compound growth rates of area, production and yield of major crops were estimated for two sub-periods. The first period was 1970-71 to 1985-86 (Period I) and second period 1986-87 to 2001-02 (Period II). The results showed that in Nagpur division the area growth rates in majority of cereal crops declined significantly during (period II). In pulses, area growth rates of tur and gram increased significantly during (Period II), whereas it was declined significantly in other pulses. The area growth rate of Soybean increased significantly at the rate of 17.83 per cent during period II. The growth rates of production in kharif jowar and rabi jowar increased significantly during period I. On the other hand reverse trend was observed in period II. In remaining crops, production growth rate of cotton increased significantly in period I. Production growth rate of Soybean increased significantly by 25.01 per cent during period II. Higher yield growth rates observed in majority of the cereal crops during period I as compared to period II. Only other cereals showed significant increase in yield growth during period II. During the study period the crop diversification trend was not significantly increased whereas trend in cropping intensity increased significantly.

Deshmukh et al. (2008) studied Economic performance of cotton in Akola and Washim districts. economic performance of cotton in Akola and Washim districts in Maharashtra, India, revealed that the analysis of compound growth rate in area, production and productivity for cotton were positively significant. The variation in production and productivity was higher as compared to area. Cotton growers retained 47% of the previous year cotton area and area from kharif jowar and other pulses was diverted to cotton crop. The cropping pattern of cotton growers

indicate that small farmers diverted 51.61 area whereas medium and large farmers diverted 46.83% and 42.95% area. The input-output ratio on all farms indicated that cotton production was profitable at cost 'A' to all size groups while it was profitable at cost 'B' to large farmers. However, cotton production could not be found profitable at cost 'C' to all the size groups.

Gudmewad *et al.* (2008) studied Dynamics of area, production and productivity of oilseed crops grown in Nanded, India. The present study was undertaken (i) to examine the trends in area, production and productivity of oilseed crops grown in Nanded district, Marathwada region, Maharashtra, India, over a period of 22 years from 1980-81 to 2001-02; and (ii) to study the variability in different oilseed crops over the period. The period of 22 years was divided into two parts: the 1st period covered 1980-81 to 1990-91, and the 2nd period covered 1991-92 to 2001-02. Linear and compound growth rates were worked out to determine the trends in area, production and productivity over the years under study. Coefficients of variation were worked out for all crops and sub-periods to determine the relative development and fluctuations. The productivity of kharif and rabi sunflower showed a significant growth in Nanded district. The growth rates of production and productivity of total oilseeds in Nanded district were significant. In general, productivity and production trends for major oilseed crops were not encouraging even during the post-globalization period, i.e. after 1991. Hence, it can be concluded that the impact of globalization was not observed during the study period in Nanded district.

Borkar and Patil (2009) studied Growth and instability of cotton in Amravati division of Vidarbha. An attempt was made to study the growth rates of area, production and yield of cotton and instability of cotton production in Amravati division of Vidarbha. The study was based on secondary data collected from various, government publications and pertains to a period of 25 years i.e. from 1980-81 to 2004-05. The compound growth rate of area, production and yield of cotton were estimated for two sub-periods. The first period was 1980-81 to 1992-93 (Period I) and second period 1993-94 to 2004-05 (Period II). From this

study it is concluded that, the instability in cotton was observed in all the districts of Amravati division which is a disturbing significant.

Shende and Suryawanshi (2009) studied Growth, instability and decomposition of cotton production in Maharashtra. Maharashtra is the largest cotton growing State in the country. Cotton crop is grown in the entire State except Konkan and eastern Maharashtra. In this study, the growth and instability were estimated. Also assess the relative contribution of area and yield to change in the, output of cotton in Maharashtra. For the study the secondary time series data for 45 years were collected. The results indicate that the compound growth rate of area under crop was more over one per cent for the entire district of all three regions and also the region as a whole during the overall period. It was the proof of the fact that the cotton crop was a traditional crop in the region as well as the State as a whole and also there was no alternate substitute crop in the State. In almost all the studied districts the yield effect was found to be most responsible factor for increasing production in the State. But till there is a scope to increase yield in rainfed farming by introducing new development programme and increasing the technical efficiency at farm level.

Chaudhari and Pawar (2010) studied performance of major cereals in Marathwada region in respect of area, production and productivity. Major cereals viz; *Kharif* Sorghum, Pearl millet, Wheat and *Rabi* Sorghum and total cereals were selected. During 1985-86 to 2004-05, the result revealed that majority of districts showed decline in area under *Kharif* Sorghum, *Rabi* Sorghum and total cereals, where as the area production increased in case of Pearl millet and Wheat. Stagnation in productivity of *Kharif* Sorghum was observed, while productivity of Pearl millet, wheat and total cereals raised in region and state.

Raju *et al.* 2010 studied Growth Performance of Major Rainfed Crops in India in this he examine the performance of major rainfed crops in India during the last decade. The growth rates in area, production and yield were computed by fitting an exponential time trend equation for the period 1998-99 to 2008-09. The relative contribution of area and yield to the change in production (between TE 1998-99 and TE 2008-09) was examined by decomposing the total change in production into area effect,

yield effect and interaction effect. Productivity of coarse cereals has significantly increased (30%) during the decade followed by oilseeds (13%). Growth in productivity of pulses (3%) is a bit stagnant in comparison to coarse cereals and oilseeds. Nevertheless the productivity of food grains excluding rice and wheat (coarse cereals + pulses) has recorded a rise of 20% during the decade, where as growth in productivity of wheat is as low as 9% and rice has shown 14% increase in its productivity. Coarse cereals, pulses and oilseeds together recorded 18% rise in productivity.

Ardeshna and Shivani (2011) studied Spatio-temporal growth performance of pulses: a case of Gujrat. The present paper explores the growth of area, production and yield of arhar, gram and total pulses in different districts of Gujarat. The data were collected and analyzed for the period from 1960-61 to 2007-08. The acreage under arhar significantly increased in Gujarat at the rate of 1.38 per cent per annum during 1960-61 to 2007-08. Similarly the area under pulses also significantly increased in Gujarat but at a lower rate during 1960-61 to 2007-08. The production of arhar significantly increased at the rate of 5.35 per cent per annum while the production of pulses significantly increased at the rate of 2.95 per cent per annum in the state during 1960-61 to 2007-08. The compound growth rates of productivity of arhar and gram were negative and that of total pulses were positive but non-significant in Gujarat during 1990-91 to 2007-08. The study implies needs for development of pulses through technological breakthrough.

Bera *et al.* (2011) studied Growth and instability of food grains production of India and West Bengal. The present study is an attempt to examine the growth and instability in food grains production both at the country as well as state level (West Bengal) for the period ranging from 1950 to 2006 and also to find out the impact of modern crop production practices designated as green revolution technology occurred during mid-sixties on the same. The study revealed that India attained an overall growth rate of area, production and productivity of 284.22, 3028.02 and 22.29 percent and their corresponding instability measured in terms of adjusted co-efficient of variation were accounted to be 2.91, 0.36 and 0.05 percent respectively. The state West Bengal

witnessed acceleration at the rate of 29.29, 224.08 and 29.37 percent associated with the variability of 3.14, 01.47 and 1.90 percent respectively.

Gajbhiye and Kakade (2011) studied Performance of chickpea production in Akola district of Maharashtra. Chickpea (*Cicer arietinum* L.) is the premier pulse crop of Indian subcontinent. India alone has nearly 75 per cent of the world acreage and production of gram. The present study is an attempt to evaluate the growth and instability of such important crop i.e. chickpea. For the present study, Akola district from Maharashtra state was chosen purposively as area under chickpea is reported highest in this district. The study was based on secondary data pertained to the year 1985-86 to 2005-06. The results revealed that chickpea is a most important crop in Akola district, the growth rates for area and production of chickpea were found significant. Instability studied in chickpea indicates that productivity under chickpea exhibited less variation. It means that production of chickpea over the period has been almost constant.

Shende *et al.*(2011) studied Growth and instability of selected crops in western Vidarbha. An attempt has been made to study the growth and instability of major crops in western Vidarbha. The study was based on the secondary data on area, production and productivity of jowar, cotton and soybean collected from the various Government publications. The study revealed that the compound growth rates for area and production of jowar were recorded near about equal which may be due to the compound growth rates of productivity. The growth rate for area and production for soybean was recorded very high during period I, which may be due to introduction of soybean in the year of the period I. The coefficient of variation and Coppock's instability index with regards to both area (8.43 and 10.47 per cent) and productivity (20.29 and 12.40 per cent) were lowest in Yavatmal district among the jowar growing districts of Amravati division. Coefficient of variation and instability for area, production and productivity were high for soybean as compared to jowar and cotton at overall period. At overall period, the area effect was most stronger factor for increase in production of jowar in all the districts and division as a whole, except Akola district i.e.-305.22 per cent. At overall

period, the results clearly indicated that the yield effect was most responsible for production of cotton in all the districts of Amravati division as a whole and the area effect was most responsible factor for increasing soybean production in Amravati division i.e. 46.98 per cent with positive yield and interaction effect i.e. 1.91 and 51.41 per cent, respectively.

Acharya et al.,(2012) Growth in area, production and productivity of major crops in Karnataka. The analysis of growth is usually used in economic studies to find out the trend of a particular variable over a period of time and used for making policy decisions. The growth in the area, production and productivity of different crops in Karnataka was estimated using the compound growth function. The necessary secondary data were collected for a period of 26 years from 1982-83 to 2007-08. Growth rates showed a significant positive growth in area under pulses, vegetables and spices and fruits and nuts while cereals showed significant negative growth. The area under jowar, bajra, ragi and minor millets are experiencing a substantial annual decrement. The area under rice has recorded a mild annual increment. The growth in area under oilseeds and commercial crops was negative and insignificant. Similarly the production of cereals, pulses, vegetables and fruits showed a significant positive growth. The production of oilseeds and commercial crops registered insignificant positive growth. The productivity of different crops recorded significant growth in the case of cereals, pulses and fruits. Productivity of oilseeds recorded moderately positive growth. The productivity of commercial crops registered insignificant positive growth and for vegetables the growth in productivity was insignificant and negative.

Reddy et al. (2012) An analysis of growth and instability of cotton production in Maharashtra. examined Compound growth rates of area, production and productivity were calculated by fitting exponential function for the period 1980-1981 to 2009-2010 as well as sub periods. It was found that during 2000-2001 to 2009-2010 cotton performed very well in most of the cotton growing districts and production increased at a significant high rate due to the increase in the productivity. Though there was a significant growth in area during 1990-1991 to 1999-2000 but it did

not make any significant effect on production. Decomposition analysis revealed that change in the yield was the major source of output growth.

Narayana (2012) An economic analysis of agriculture in Andhra Pradesh, This paper seeks to examine the growth and instability in agriculture covering pre and post-economic reform periods and also the impact of economic reforms on the productivity of agricultural crops in Andhra Pradesh state by using an interaction variable during 1974-75 to 2007-08. The results of the study show that the growth rates of yield declined for rice, blackgram, cotton and chillies except for jowar and maize crops, became negative for greengram and groundnut and became positive for sugarcane(gur) crop during post-economic reform period. On the whole, one can conclude that economic reforms had negatively affected the growth rates of area (except for maize crop) and yield [except for jowar, maize and sugarcane(gur)] and thereby production either by making the growth rates into negative or by reducing the positive growth rates in post-economic reform period. The instability was higher in the yield of maize, greengram, cotton and chillies during pre-economic reform period as compared to posteconomic reform period, whereas the yield of groundnut registered high degree of instability during post-economic reform period.

Reddy (2013) studied Agricultural productivity growth in Orissa, India: crop diversification to pulses, oilseeds and other high value crops. The extent of India's regional disparities has been an issue since many decades, and this concern has been partly motivated by a desire to alleviate poverty. Agriculture remains an important feature of the economic, cultural and political landscape in India. Orissa is one of the poorest States in India. Over the last four decades, there has been stagnation in agriculture in Orissa. During the period 1991 to 2008 the growth rate of agriculture in Orissa is lower than all India. Orissa agriculture is highly concentrated in low productive and high water consuming paddy cultivation with little diversification towards pulses, oilseeds and other high value crops (HVCs): included sugarcane, fruits and vegetables etc., which fetch higher net returns. Significant income gains are possible through crop diversification from paddy to pulses, oilseeds and HVCs in upland rain fed

areas in kharif (rainy) season, if proper drainage, institutional and policy support is provided in Eastern Ghats and Northern Plateau of Orissa.

Choudhari et al. (2013) Study of growth analysis and trend of area, production and yield of selected crops grown in Western Maharashtra. Agriculture is an important primary sector and any developing economy dependent primarily on agriculture has to undergo the process of agricultural development for accelerating the economic growth. Productivity growth has focused the agricultural development programmes which has assumed significance as growth due to expansion has reached a plateau. Therefore, the objective is to estimate the trends in area, production and productivity and to analyze growth in area, production and productivity of selected crops in the study area. Based on finding the area, production and productivity of important crops fluctuated widely during the period under consideration for all divisions in Western Maharashtra. The results had shown that there were no systematic trends in changes in area and productivity of crops under consideration in Nasik and Pune divisions. Productivity was lower in these division during 1994 mainly because major areas were covered by scarcity zone. While the results of changes in Kolhapur division had shown moderate trends for all the crops

## CHAPTER III

### METHODOLOGY

This chapter deals with method of conducting research. In any scientific study, it is necessary for investigator to get well acquainted with the method of conducting research. He should also follow appropriate steps in carrying out research to get desired results. In the field of research in agricultural economics, the steps involved are selection of research topic, formulation of objectives, nature and source of data to be collected, deciding methods of collection of data and analysis of data. The methodology adopted for the present study is discussed in this chapter.

#### **3.1 Selection of area**

The study has been confined to the Amravati division of Vidarbha region of Maharashtra state. Five district of Amravati division namely Buldhana, Yavatmal, Amravati and Akola including Washim were selected purposively for study. Amravati division covers western Vidarbha region hence selection of all district in this division was done. For analysis purpose the Washim district was included in Akola due to non availability of separate data for Washim district because Washim district was bifurcated from Akola in the year 1999.

#### **3.2 Selection of Crops**

For the present study, the crops namely Cotton, Soybean, Tur, *Kharif* Jowar, and Gram were selected. These are the major crops of Amravati division were selected to analyses the economic growth and variability of area, production and productivity.

#### **3.3 Collection of data**

The study was based on secondary data. The secondary data on the area, production, and productivity of selected crops of Amravati division were collected from

- 1) Divisional Agriculture Office Amravati.
- 2) District Superintendent Agriculture Office Akola (DSAO).

### 3.4 Period of study

The secondary data on the area, production and productivity of selected crops were collected for the period from 1980-1981 to 2010-2011. The entire study was split into sub-periods. The sub-periods were formed as follows:

Period-I :	1980-1995
Period-II :	1996-2010
Overall Period :	1980-2010

### 3.5 Concept of Economic growth

The Economic growth in Agriculture is defined on the basis of value of gross output on the basis of constant MSP (Minimum Support Price) over the study period.

The output value for the selected crop was calculated as sum of (Production × MSP constant over study period.)

### 3.6 Analytical tools and Techniques

The methods analysis adopted in the present study are elaborated under the following headings.

#### 1) Analysis of compound growth rate

For examining performance of different crops growth rates of area, production, and productivity were estimated using exponential model.

$$Y = ab^t$$

Where,

Y = area, production, yield

a & b = are the parameters to be estimated from exponential model.

CGR = [Antilog (log) - 1] × 100

#### Analysis of coefficient of variation (C.V.)

Coefficient of variation in area, production and yield was calculated by using following formula.

$$C.V. = S.D. / \text{Mean} \times 100$$

#### 2) Analysis of contribution of each crop in gross output

The contribution of each crop in gross output was worked out by using Multiple linear Regression equation.

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5$$

Where,

- Y = Gross output
- X1 = Production under cotton
- X2 = Production under Tur
- X3 = Production under soybean
- X4 = Production under kharif jowar
- X5 = Production under Gram

a is constant and  $b_1, b_2, b_3, b_4, b_5$  are the regression coefficients.

- 3) The district wise gross output of Agricultural produce were workout in value term by comparing growth rate was at constant as well as at current prices using simple tubular analysis.

## CHAPTER IV

### SOCIO-ECONOMIC STATUS OF AMRAVATI DIVISION

#### 1. Location of Amravati Division

Amravati Division falls under Vidarbha region of Maharashtra. It comprises of five districts namely Amravati, Yavatmal, Buldana, Akola including Washim. Amravati district lies between  $20^{\circ}32'$  and  $21^{\circ}46'$  North latitude and  $76^{\circ}-37'$  and  $78^{\circ}-27'$  East longitude. There is the boundary of the Wardha district on east, south Yavatmal district. Akola district is on west side and Baitul district of Madhya Pradesh on north side of Amravati district. The Buldhana district lies between  $19^{\circ},51'$  to  $21^{\circ},17'$  north latitudes and  $76^{\circ},38'$  to  $76^{\circ},40'$  East longitudes the district is surrounded by the spatula ranges in east side. The Yavatmal district lies between  $19^{\circ}, 26''$  and  $28^{\circ}, 42''$  of North Latitude while  $77^{\circ}, 18''$  and  $79^{\circ}, 18''$  of Eastern Longitude. It covers area of 13584 sq. km. accounting for 4.41 per cent of the total area of Maharashtra. The Akola District lies between  $20^{\circ} 17'$  and  $21^{\circ} 18'$  North latitudes and  $76^{\circ} 17'$  and  $77^{\circ} 14'$  East longitudes. It covers area of 5417 sq. km. accounting for 1.76 per cent of the total area of Maharashtra. Akola district is surrounded by Amravati district in North, part of Amravati and Yavatmal district in East, Washim and Yavatmal district to the South and Buldhana district towards the West.

#### 2. Administrative set up

Maharashtra State has six revenue divisions viz., Mumbai, Pune, Nasik, Aurangabad, Amravati and Nagpur. Vidarbha area includes Amravati and Nagpur revenue divisions comprising eleven districts viz., Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Gondia, Chandrapur, and Gadchiroli. Washim and Gondia are newly formed districts bifurcating Akola and Bhandara districts respectively. The present study is confined to Amravati Division of Vidarbha.

### **3. Agro-climatic conditions**

#### **3.1 Topography and soil**

Amravati district is widely cultivated tract possessing rich deep black soil generally called as 'Black Cotton Soil'. The pH of soil is 7.5 to 8.5 on the side of Wardha River and Purna River, the tract is fertile. Near the hills on the Southern border, there is shallow and inferior soil.

The eastern part of Buldhana district lies in Purna valley, which itself is a part of Tapi river. The Purna which is the chief tributary of the river Tapi has formed fertile soil. The eastern Part of the district has medium type soil. The district has 363 meters above mean sea level. The soils of district are suite fertile. Rich black cotton soil is found in Eastern part of district. The central part has also good soils on the plateau. In the north, the soils are shallow with murum substratum, medium black soil is found in the rivers valleys.

South-West part of Yavatmal district is a hilly region. The hills of Ajanta and Pusad are situated here. Pusad, Umarkhed and Mahagaon talukas and some parts of Digras and Arni occupies this region. The Northen part of Yavatmal district is a plateau. It covers Darwha, Ner and Yavatmal taluka and some parts of Arni and Digras taluka. The soils are severely eroded & shallow. . The soils of the district are 50% light (7.5 – 25 cm i.e. Entisol), 30% medium (26-50 cm i.e Inceptisol) and 20% black cotton soils (91 – 100 cm i.e. Vertisol).

The northern part of the Akola district lies in Purna valley which itself is a part of Tapi river basin. River Purna has formed fertile basin in Akola, Balapur and Murtizapur tahsils of Akola. The soil of the district is basically derived from volcanic trap rock and it is quite fertile. It is classified into categories as coarse soil found in south, medium black soil found in the plain and deep black soil found in river valley.

#### **3.2 Climate and rainfall**

Amravati Division comprises of five districts namely Amravati, Yavatmal, Buldana, Akola including Washim. So its climate and temperature is different in different district.

The climate of the Amravati District remains very hot in summer and cold in winter. The temperature in the month of May is generally high, average maximum and minimum temperature in 2011 on Amravati division was 40.1°C and 12.4°C respectively. Amravati division falls in medium and assured rainfall zone of Maharashtra state having an average annual rainfall 918.08mm during 2011. The rainfall is comparatively more in northern part than the south. The rainy season spreads over June to September. There has not been regularity in rainfall during last few years.

The climate of the Buldhana district is hot and humid. In some parts of the district i.e. khamghaon, Jalgaon (Jamod) and Shegaon Tahsils the climate is severe i.e. very hot in summer which reaches upto 44°C in the months of May and much cold in the winter, during the month of December which comes down to 8-10°C.

Buldhana district falls in western zone of Vidarbha region having an average rainfall between 750-800 mm.

The climate of the Yavatmal district during winter is too cool, while in summer it is too hot. The average minimum and maximum temperature extremities observed throughout the year were 10°C and 45.5°C, respectively. The district Yavatmal falls under Agro-climatic Zone No. 8 i.e. Moderate Rainfall Zone. Only small western part of Darwaha & Ner Tahsils falls under assured rainfall zone No. 7. The Average rainfall received in this Zone usually exceeds 900 m. m. The climate is hot and dry. More than 75% rainfall in this zone is received in Kharif season, hence Kharif cropping system Predominates in the zone.

The climate of the Akola district during winter is too cool, while in summer it is too hot. The average minimum and maximum temperature extremities observed throughout the year were 10°C and 46.5°C, respectively. Akola district falls in assured rainfall zone of Maharashtra state having average rainfall between 750 to 1000 mm.

## 4. Demographic features

### 4.1 Population

The important demographic features of the district as per official census 2011. The Akola district population was 18,18,617 which constitute about 1.62 per cent of state population. Out of the total population 51.48 per cent were males and 48.52 per cent were females. The sex ratio was 942 females for every 1000 males. The density of the population for the district was 321 persons per sq.km. The population growth was recorded at 11.60 per cent when compared to 2001 census which was 20.58 per cent.

The Yavatmal district population was 2,772,348 which constitute about 2.47 per cent of state population. Out of the total population 1,419,965 (51.21%) were males and 1,352,383 (48.78 %) were females. The sex ratio was 952 females for every 1000 males. The density of the population for the district was 204 persons per sq.km. The population growth was recorded at 12.78 per cent when compared to 2001 census which was 18.35 per cent.

**Table 4.1. Demographic particulars of Amravati Division**

District	Population lakhs			Density (person/km)	Sex Ratio No of female/1000 male			Literacy (%)			Population growth since 2001-2011
	Rural	Urban	Total		Rural	Urban	Total	Rural	Urban	Total	
Akola	10.96 (60.31)	7.21 (39.69)	18.17 (100)	321	931	951	942	85.22	91.07	87.55	11.60
Amravati	18.51 (64.10)	10.36 (35.90)	28.87 (100)	237	945	952	947	88.22	85.89	92.37	10.71
Buldhana	20.38 (18.55)	5.49 (21.23)	25.87 (100)	268	926	938	928	80.36	88.37	82.09	15.92
Yavatmal	21.76 (18.41)	5.99	27.75	204	944	954	947	77.96	96.71	80.70	12.90

(Source: Directorate of census operations in Maharashtra, 2011)

## 5. Land Holding

The details of land holding of Amravati Division are presented in district wise in Table 4.4.

**Table 4.4. Land holding of Amravati Division**

Sr. No.	Land holding (ha)	Land holders (%)	Area (%)
<b>Akola</b>			
1.	0-2	52.93	24.12
2.	2-5	32.68	33.61
3.	5-10	11.28	27.23
4.	10-20	2.02	12.98
5.	20-50	1.09	2.06
6.	Total holding	100	100
<b>Amravati</b>			
1.	0-2	34.56	37.80
2.	2-5	27.21	24.58
3.	5-10	22.74	21.76
4.	10-20	13.28	14.01
5.	20-50	2.21	1.85
6.	Total holding	100	100
<b>Buldhana</b>			
1.	0-2	26.92	7.73
2.	2-5	36.32	23.80
3.	5-10	24.02	29.58
4.	10-20	11.40	30.01
5.	20-50	1.34	8.88
6.	Total holding	100	100
<b>Yavatmal</b>			
1.	0-2	4.15	0.87
2.	2-5	35.60	15.78
3.	5-10	34.35	28.22
4.	10-20	22.32	39.35
5.	20-50	3.58	15.78
6.	Total holding	100	100

(Source: District Socio-economic Review, 2008-09)

## 6. Land Utilization Pattern

The geographical area of the Akola district was 5,40,481 ha. During the year 2009-10 the cultivable land (i.e., net area sown, current fallows and other fallow lands) was 4,47,331 ha and it is accounted for 82.76 per cent of the total geographical area of the district.

The information in respect of land utilization pattern in Amravati district is the total geographical area 12217 ha during the year 2010-11.

The information in respect of land utilization pattern in Buldana district is the total geographical area (967100 ha) 69.11 per cent area is under cultivation.

The geographical area of Yavatmal district was 13, 51,900 ha. During the year 2009-10 the cultivable land (i.e., net area sown, current

fallows and other fallow lands) was 1186500 ha and it is accounted for 87.76 per cent of the total geographical area of the district.

The details of land use pattern of Amravati Division is presented in Table 4.5

**Table 4.5. Land utilization pattern of Amravati Division**

Sr. No.	Particular	Akola		Amravati		Buldhana		Yavatmal	
		Area (ha)	% to total area	Area (ha)	% to total area	Area (ha)	% to total area	Area (ha)	% to total area
1.	Total geographical area	540481	100	12217	100	967100	100	1351900	100
2.	Area under forest	36414	6.73	3101	25.38	883	9.13	25430	1.88
3.	Barren and uncultivable land	18280	3.38	195	1.59	483	4.99	39400	2.91
4.	Permanent pastures and other grazing land	5292	0.97	531	4.35	13391	138.46	60800	4.49
5.	Land under miscellaneous tree crops	8098	1.49	70	0.57	10	0.10	60800	4.49
6.	Cultivable waste land	5958	1.10	93	0.76	263	2.72	25400	1.87
7.	Land put under non-agricultural use	5801	1.07	435	3.56	511	5.28	41600	3.07
8.	Current fallow	7911	1.46	136	1.12	174	1.80	299900	22.18
9.	Other Fallow	5262	0.97	143	1.18	272	2.81	28700	2.12
10.	Net sown area	447331	82.76	7513	61.49	6684	69.11	857900	63.45
11.	Area sown more than once	37086	6.86	2776	22.72	1695	17.53	79000	5.84
12.	Gross cropped area	484417	89.62	10289	84.21	8379	86.64	936900	69.30
13.	Cropping intensity (%)	108.29	-				125.36	101.06	-

(Source : District Socio-economic Review, 2009-10)

## 7. Cropping Pattern

Cotton, *Kharif* sorghum, soyabean and mung etc crops were grown in the Amravati Division followed by tur, gram, wheat, udid, sunflower, maize, bajra and sugarcane. The area under different crops grown in different district was furnished in the table 4.6.

**Table 4.6. Cropping pattern of Amravati Division**

Sr. No.	Crop	Area (ha)	Percentage to total
<b>A. Akola</b>			
1.	Wheat	18871	3.89
2.	Kharif jowar	84922	17.53
3.	Bajra	1210	0.24
4.	Maize	2451	0.50
5.	Other cereals.	21	0.004
	<b>Total cereals.</b>	<b>107367</b>	<b>22.16</b>
6.	Gram	20087	4.14
7.	Tur	25634	5.29
8.	Mung	43334	8.94
9.	Udid	14082	2.90
10.	Other Pulses	1038	0.21
	<b>Total Pulses</b>	<b>104308</b>	<b>21.53</b>
	<b>Total food grains</b>	<b>211675</b>	<b>43.69</b>
11.	Sugarcane	335	0.06
12.	Cotton	192994	39.84
	<b>Total Fibre crops</b>	<b>194166</b>	<b>40.08</b>
13.	Soyabean	40613	8.38
14.	Sunflower	3550	0.73
15.	Groundnut	1332	0.27
16.	Other oilseeds	8497	1.75
	<b>Total oilseeds</b>	<b>55877</b>	<b>11.53</b>
17.	Total fruits and Vegetables	6924	1.42
18.	Other crops	15598	3.22
	<b>Gross cropped area</b>	<b>484417</b>	<b>100.00</b>
<b>B. Amravati</b>			
1.	Paddy	103	1.00
2.	Wheat	1318	12.80
3.	Jowar	245	2.39
4.	Other cereals	306	2.99
	<b>Total cereals</b>	<b>1972</b>	<b>19.18</b>
	<b>Pulses</b>		
1.	Gram	562	5.46
2.	Tur	1087	10.56
3.	Other pulses	986	9.58
	<b>Total pulses</b>	<b>2635</b>	<b>25.60</b>
	<b>Total Food Grain</b>	<b>4607</b>	<b>44.78</b>
	<b>C. Non Food Grain</b>		
1.	Groundnut	167	1.62
2.	Safflower	163	1.58
3.	Sunflower	148	1.44
4.	Soybean	1664	16.17
5.	Total Oilseeds	2142	20.81
6.	Cotton	3488	33.76
7.	Sugarcane	52	0.51
	<b>Total Non Food Grain</b>	<b>5682</b>	<b>55.22</b>
<b>C.</b>	<b>Gross cropped Area</b>	<b>10289</b>	<b>100.00</b>
<b>C. Buldhana</b>			
1	Rice	368	4.39

2	Wheat	214	2.55
3	Jowar (kharif+Rabi)	151	1.80
4	Bajara	641	7.65
5	Maize	145	1.73
6	Other millet	472	5.63
	Total cereals	1991	23.76
7	Gram	131	1.56
8	Tur	382	4.56
9	Mung	765	9.12
10	Udid	704	8.40
12	Other pulses	43	2.49
	Total pulses	2025	24.16
	Total food grain	4016	47.92
13	Sugarcane	374	4.46
14	Chilli	60	0.72
15	Other spices	192	2.29
	Total spices	626	7.47
16	Fruits	61	0.73
17	Vegetables	37	0.44
18	Cotton	162	1.93
19	Other fiber crop	30	0.35
	Total fiber crop	288	3.46
20	Groundnut	126	1.50
21	Sesamum	34	0.41
22	Sunflower	38	0.45
22	Other oilseed crop	201	2.39
	Total oilseed crop	399	4.76
	Total non-food crops	3050	36.40
23	Gross cropped area (GCA)	8379	100
<b>D. Yavtmal</b>			
1.	Wheat	19037	2.03
2.	Kharifjowar	68775	7.3
3.	Maize	401	0.042
4.	Other cereals.	47	0.005
	Total cereals.	88485	9.44
5.	Gram	31228	3.33
6.	Tur	97031	10.35
7.	Mung	10931	1.16
8.	Udid	7364	0.78
9.	Other Pulses	1050	0.11
	Total Pulses	146574	15.64
	Total food grains	235059	25.08
10.	Sugercane	5950	0.63
11.	Cotton	457357	50.95
12.	Soybean	228928	24.43
13.	Groundnut	18	0.001
14.	Other oilseeds	1560	0.16
	Total oilseeds	229059	24.44
15.	Total fruits and Vegetables	7253	0.77
16.	Gross cropped area	9,36,900	100.00

## 8. Crop Season and Crop Rotation

There are two important crop seasons i.e. *kharif* and *Rabi* where as in summer season land generally remains fallow and preparatory tillage operations are carried out. The manner in which crop rotations are commonly followed is presented in Table 4.7.

**Table 4.7. Crop season and crop rotation in Amravati Division**

Sr. No.	Kharif	Rabi
1.	Cotton	-
2.	Cotton + Tur + Jowar	-
3.	Jowar	Gram
4.	Cotton + Mung + Udid	Wheat
5.	Cotton + Tur + Mung	Gram
6.	Jowar	Safflower / wheat
7.	Cotton + Tur	Safflower
8.	Cotton + Tur + Jowar + Mung	Sunflower
9.	Mung	Safflower
10.	Cotton + Mung	-
11.	Cotton + Soybean	Gram
12.	Soybean + Tur	Wheat / Gram
13.	Cotton + Jowar	-

(Source: District Socio-economic Review, 2008-09)

## 9. Input Supply

Agricultural inputs like seed, manure, fertilizers, insecticides, pesticides etc. required to the farmers are made available to them through number of agricultural service centers established at district level and block levels.

Maharashtra State Seed Corporation and other private seed companies supply quality seeds to the farmers. The farm input are made available to the farmers by co-operative societies functioning at block level, Panchayat Samiti also provides inputs to the farmers. Co-operative society supply input against the loan sanctioned by DCCB to individual cultivator.

## 10. Credit Supply

The credit supply in Amravati division is done by Primary Agriculture Co-operative Credit Society, Non-agricultural credit Society, Panan Sanstha, Production Society and Social Service Society.

## 11. Markets

For the marketing of agricultural produce, agricultural market committees are functioning in the district. All the districts of Amravati Division having facilities of regulated markets. These sub-markets are connected with roads and having facilities of banking, electricity etc.



**Fig.1. Map of Amravati Division**

## CHAPTER V

### RESULTS AND DISCUSSION

The present study on "Dynamics of districtwise economic growth in Amravati division" was conducted in Amravati division of Vidarbha region. The chapter deals with the study of growth performance of major crops, their contribution in economic growth and economic growth performance over the study period. The study was based on secondary data and the result obtain from investigation were presented in this chapter.

#### 5.1 Growth performance of major crops

The districtwise growth performance of major crops of Amravati division can be examined through studying the growth in area, production and productivity for the period 1980-2010 and two sub periods, period-I (1980-1995) and period-II (1996-2010) and results were presented in table 5.1 to 5.4.

##### 5.1.1 Growth rate of area, production and productivity of major crops in Akola district

Compound growth rate of area, production and productivity of major crops were worked out and presented in table 5.1,

**Table 5.1 Compound growth rate of area, production and productivity of major crops in Akola district**

CROPS	PERIOD-I (1980-1995)			PERIOD-II (1996-2010)			OVERALL (1980-2010)		
	A	P	Y	A	P	Y	A	P	Y
1) Cotton	-0.417	6.96*	7.41*	-4.12*	2.85	7.27*	-1.37	3.42*	4.85*
2) Tur	5.99*	5.61*	-0.36	2.78*	1.33	-1.40	3.37*	4.05*	0.659
3) Soybean	12.1*	14.2*	1.85	19.3*	13.90*	-4.52	23.51*	24.6*	0.910
4) Kh. Jowar	-0.93	4.98*	5.97*	-6.34*	-6.69*	-0.374	-4.19	-2.31*	1.95
5) Gram	9.37*	17.003*	6.97*	10.3*	14.7*	3.98	8.92*	12.9*	3.73*

\*\* , \* denote significance at 5 and 1 per cent, respectively.

A , P, and Y denote Area, Production and Productivity.

It is revealed from table 5.1 in Akola district that at overall level area under soybean was significant at one per cent level of significance indicated increasing area under soybean by 23.51 per cent similar trend was observed in case tur and gram, area under tur increased by 3.37 per

cent and area under gram increased by 12.9 per cent respectively. area under Kharif jowar was negative but significant indicated decreasing area under kharif jowar by 4.19 per cent same result was observed in cotton, area under cotton decreased by 1.37 per cent. In period-I growth rate of area under tur, soybean and gram was positively significant indicated increasing area by 5.99, 12.1 and 9.37 per cent respectively where as the cotton and kharif jowar showed negative growth rate indicated area by 0.417 and 0.93 per cent. In period-II same results was found as in overall period, growth rate of area under soybean, tur and gram was positively significant indicated increasing in area by 19.3, 2.78 and 10.3 per cent respectively while cotton and kharif jowar shows negative growth rate indicated decreasing area by 4.12 and 6.34 per cent.

In case of production, at overall period most of the crops have positively significant growth rate indicated increasing production, The growth rate for cotton, tur, soybean and gram was 3.42, 4.05, 24.6 and 12.9 per cent respectively. Kharif jowar shows negative growth rate indicated decreasing production by 4.19 per cent at overall level. In period-I all crops shows positively significant growth rate indicated increasing production in cotton by 6.96 per cent, tur by 5.61 per cent, soybean by 14.2 per cent, kharif jowar by 4.98 per cent and gram by 17.0 per cent respectively. Where as in period-II soybean and gram shows positively significant growth rate as 13.90 and 14.7 per cent. Growth rate of Production of cotton and tur was nonsignificant while kharif jowar shows negative significant growth rate indicated decreasing production by 6.69 per cent.

In case of productivity, at overall period productivity registered significant positive growth rate in cotton and gram indicated increasing productivity by 4.85 and 3.73 per cent. Whereas tur, soybean and kharif jowar crops recorded non significant result. In period-I cotton, kharif jowar and gram shows positively significant growth rate indicated increasing productivity by 7.41, 5.97 and 6.97 per cent respectively. Growth rate of productivity of soybean shows non significant result whereas tur shows negative growth rate indicated decreasing productivity by 0.36 per cent. In period-II cotton and gram shows positively significant growth rate as 7.27

and 3.98 per cent while the other crops shows negative growth rate indicated decreasing productivity in tur by 1.40 per cent, soybean by 4.52 per cent, and kharif jowar by 0.37 per cent.

### 5.1.2 Growth rate of area, production and productivity of major crops in Amravati district

Compound growth rate of area, production and productivity of major crops were worked out and presented in table 5.2

**Table 5.2. Compound growth rate of area, production and productivity of major crops in Amravati District**

CROPS	PERIOD-I (1980-1995)			PERIOD-II (1996-2010)			OVERALL (1980-2010)		
	A	P	Y	A	P	Y	A	P	Y
1) Cotton	-0.091	7.20*	7.30*	-5.88*	3.27*	9.73*	-2.36*	2.17*	4.64*
2) Tur	6.23*	7.21*	0.924	1.29*	0.336	-0.943	2.65*	2.93*	0.28
3) Soybean	20.23*	32.5*	10.28*	7.57*	7.68**	0.101	15.28*	20.4*	4.47*
4)Kh.Jowar	-1.70**	-0.146	1.58	-6.81*	-9.71*	-3.10*	-4.35*	-4.54*	-0.198
5) Gram	10.16*	16.74*	5.96*	6.22*	10.12*	3.67**	6.61*	10.2*	3.45*

\*\* , \* denote significance at 5 and 1 per cent, respectively.

A, P, and Y denote Area, Production and Productivity.

It is observed from the table 5.2 In Amravati district that at overall period the growth rate of area of soybean, tur and gram was positively significant indicated increasing area of soybean by 15.28 per cent, tur by 2.65 per cent and area of gram by 6.61 per cent. It is also observed from table that the area under cotton and kharif jowar was negative but significant indicated decreasing area by 2.36 and 4.35 per cent. In period-I same trend was recorded, area under tur, soybean and gram was increased by 6.23, 20.23 and 10.16 per cent respectively while area of cotton and kharif jowar was decreased by 0.091 and 1.70 per cent. In period-II same result was found as observed in overall period and period-I that tur, soybean and gram shows positive, cotton and kharif jowar shows negative growth rate of area.

As regards to production it is observed that at overall period the growth rate of production of cotton, soybean and gram shows significant growth rate indicated increasing production by 2.17, 20.4 and

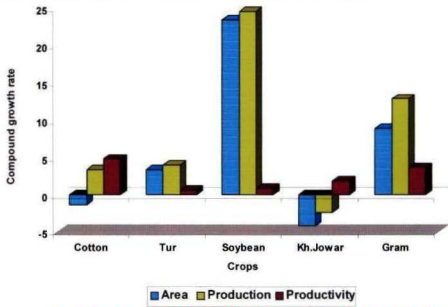


Fig.2.Compound growth rate of area, production and productivity of major crops in Akola district (overall)

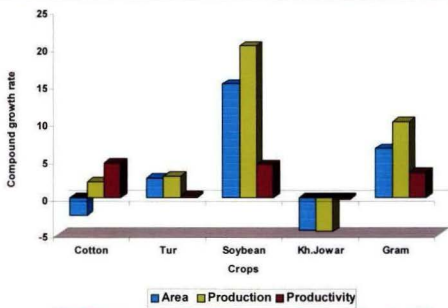


Fig.3.Compound growth rate of area, production and productivity of major crops in Amravati district (overall)

10.2 per cent followed by tur 2.93 per cent. Kharif jowar shows negative but significant growth rate indicated decreasing production by 4.54 per cent. In period-I similar trend was found as in overall period, cotton, tur, soybean and gram shows increasing production by 7.20, 7.21, 32.5 and 16.74 per cent respectively. Growth rate of kharif jowar was negative but significant at 5 per cent level of significance. In period-II production of cotton, soybean and gram was indicated increasing by 3.27, 7.68 and 10.12 per cent while tur shows non significant result and kharif jowar shows negative but significant at 1 per cent level indicated decreasing production by 9.71 per cent.

In case of productivity, at overall period significant growth rate was observed in cotton, soybean and gram indicated increasing productivity by 4.64, 4.47 and 3.45 per cent respectively. Whereas tur and kharif jowar shows non significant result. In period-I similar trend was observed in overall period in case of all crops, growth rate of cotton, soybean and gram was positively significant indicated increasing productivity by 7.30, 10.28 and 5.96 per cent respectively while growth rate of tur and kharif jowar was non significant. In period-II productivity of cotton and gram was increased by 9.73 and 3.67 per cent whereas productivity of tur and kharif jowar was decreased by 0.94 and 3.10 per cent. The Soybean productivity shows non significant results.

### 5.1.3 Growth rate of area, production and productivity of major crops in Buldhana District

The compound growth rates of area, production and productivity of major crops were worked out and presented in table 5.3

**Table 5.3 Compound growth rate of area, production and productivity of major crops in Buldhana District**

CROPS	PERIOD-I (1980-1995)			PERIOD-II (1996-2010)			OVERALL (1980-2010)		
	A	P	Y	A	P	Y	A	P	Y
1) Cotton	0.073	3.05*	2.98*	-0.311	7.90*	8.23*	-0.303	5.37*	5.69*
2) Tur	4.81*	6.42*	1.53	0.86	1.87	1.003	2.07*	2.52*	0.43
3) Soybean	22.001*	20.4*	-1.30	18.4*	17.1*	-1.09	20.1*	18.3*	-1.45
4)Kh.Jowar	-3.88*	-1.15	2.83	-8.41*	-9.82*	-1.53	-5.34*	-4.78*	0.588
5) Gram	11.93*	17.36*	4.85**	8.73*	12.05	3.05	7.61*	10.57*	2.74*

\*\* , \* denote significance at 5 and 1 per cent, respectively.

A, P, and Y denote Area, Production and Productivity.

It is observed from the table 5.3 In Buldhana district that at overall period the area under tur, soybean and gram was positively significant indicated that increasing area by 2.07, 20.1 and 7.61 per cent respectively whereas area under cotton and kharif jowar was negative indicated decreasing area by 0.30 and 5.34 per cent. In period-I Area under tur, soybean and gram was increased by 4.81, 22.00 and 11.93 per cent respectively while area under kharif jowar was decreased by 3.88 per cent and area under cotton shows non significant result. In period-II growth rate of area under soybean and gram was positively significant indicated that increasing area by 18.4 and 8.73 per cent. Growth rate of area under cotton and kharif jowar was negative indicated decreasing area by 0.31 and 8.41 per cent while area under tur shows non significant result.

As regards to production it is observed at overall period the growth of production of cotton, tur, soybean and gram was positively significant indicated that increasing production by 5.37, 2.52, 18.3 and 10.57 and per cent. Whereas kharif jowar shows negative growth indicated decreasing production by 4.78 per cent. In period-I same trend was found as in overall period in case of all crops, growth rate of production of cotton, tur, soybean and gram was 3.05, 6.42, 20.4 and 17.36 per cent respectively whereas kharif jowar shows negative production. In period-II cotton, soybean and gram shows positively significant growth rate indicated increasing production by 7.90, 17.1 and 12.05 per cent respectively while tur shows non significant result. Growth rate for kharif jowar was negative indicated decreasing production by 9.82 per cent.

In case of productivity it is revealed that cotton and gram productivity registered growth of 5.69 per cent and 2.74 per cent. While tur, soybean and kharif jowar shows non significant result. In period-I in case of all crops similar trend was found as in overall period, the growth rate of productivity of cotton and gram was positively significant indicated increasing productivity by 2.98 and 4.85 per cent at 1 per cent and 5 per cent level of significance. While other crops shows non significant result. In period-II the growth rate of productivity of cotton was positively significant indicated increasing productivity by 8.23 per cent whereas tur and gram shows non significant result. Growth rate in soybean and kharif jowar was

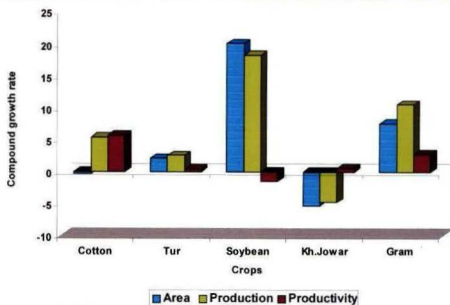


Fig.4.Compound growth rate of area, production and productivity of major crops in Buldhana district (overall)

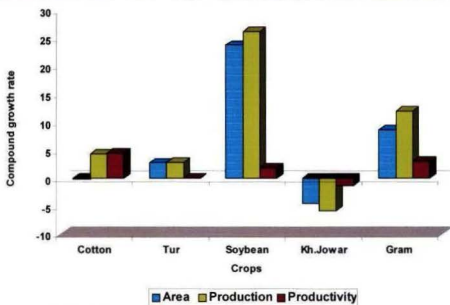


Fig.5.Compound growth rate of area, production and productivity of major crops in Yavatmal district (overall)

recorded negative indicated decreasing productivity by 1.09 and 1.53 per cent.

#### 5.1.4 Growth rate of area, production and productivity of major crops in Yavatmal District

The compound growth rates of area, production and productivity of major crops were worked out and presented in table 5.4

**Table 5.4 Compound growth rate of area, production and productivity of major crops in Yavatmal District**

CROPS	PERIOD-I (1980-1995)			PERIOD-II (1996-2010)			OVERALL (1980-2010)		
	A	P	Y	A	P	Y	A	P	Y
1) Cotton	0.140	4.82**	4.67**	-0.83	8.14*	9.05*	-0.105	4.40*	4.52*
2) Tur	7.03*	6.04*	-0.92	-0.250	-2.27	-2.02	2.82*	2.85*	0.029
3) Soybean	16.8*	23.1*	5.41*	17.5*	9.94*	-6.46**	23.9*	26.3*	1.89*
4)Kh.Jowar	-2.56*	-1.83	0.753	-6.84*	-10.5*	-4.002**	-4.55*	-5.85*	-1.35**
5) Gram	12.7*	18.2*	4.88*	8.77*	14.3*	5.08	8.79*	12.1*	3.05*

\*\* , \* denote significance at 5 and 1 per cent, respectively.  
A, P, and Y denote Area, Production and Productivity.

It is revealed from the table 5.4 in Yavatmal district that, at overall period the area under tur, soybean and gram was positively significant at 1 per cent level of significance indicated that increasing area under tur, soybean and gram by 2.82, 23.9 and 8.79 per cent. Whereas cotton and kharif jowar shows negative growth rate indicated declining area under cotton and kharif jowar by 0.10 and 4.55 per cent. In period-I same results found in case of tur, soybean and gram, it shows positively significant growth rate as increasing area under tur, soybean and gram by 7.03, 16.8 and 12.7 per cent. While cotton shows non significant results. The area under kharif jowar was decreasing by 2.56 per cent. In period-II the area under cotton, tur and kharif jowar shows negative growth rate indicated decreasing area by 0.83, 0.25 and 6.84 per cent respectively. Whereas soybean and gram shows positive growth rate indicated increasing trend by 17.5 and 8.77 per cent.

In case of production it is observed at overall period that the production of all crops was increased except kharif jowar. The growth rate of cotton, tur, soybean and gram was positively significant at 1 per cent

level indicated that increasing production of cotton by 4.40 per cent, tur by 2.85 per cent, soybean by 26.3 per cent and gram by 12.1 per cent but kharif jowar shows negative growth rate showed decreasing production by 5.85 per cent. In period-I same results was found as in overall period positively increased in production was observed in cotton, tur, soybean and gram by 4.82, 6.04, 23.1 and 18.2 per cent respectively while production of kharif jowar was decreased by 1.83 per cent. In period-II cotton, soybean and gram shows increasing trend while tur and kharif jowar shows decreasing trend, indicated increasing production of cotton by 8.14 per cent, soybean by 9.94 per cent and gram by 14.3 per cent respectively and decreasing production in tur by 2.27 per cent and in kharif jowar by 10.5 per cent.

In case of productivity the table revealed that the productivity of cotton, soybean and gram registered significant growth rate at 1 per cent level indicated increasing productivity by 4.52, 1.89 and 3.05 per cent repetitively. Whereas tur shows non significant result and kharif jowar shows negative but significant growth rate indicated decreasing productivity of kharif jowar by 1.35 per cent. In period-I similar trend was found in case of cotton, soybean and gram shows increasing productivity by 4.67, 5.41 and 4.88 per cent respectively while tur and kharif jowar shows non significant result. In period-II cotton and gram shows positively significant growth rate whereas other crops shows negative growth rate. Growth rate of cotton and gram was indicated increasing productivity by 9.05 and 5.08 per cent. In Tur, soybean and kharif jowar growth rate indicated that decreasing productivity by 2.02, 6.46 and 4.00 per cent respectively.

### **5.1.2 Coefficient of Variation**

Coefficient of variation indicated the variation in Area, production and productivity of major crops, the districtwise coefficient of variation was worked out for the period 1980-2010 and two sub periods i.e. period-I (1980-1995) and period-II (1996-2010).

#### **1) Coefficient of variation of major crops in Akola district**

Coefficient of variation of area, production and productivity was worked out and are presented in table 5.5.

**Table 5.5 Coefficient of variation in area, production and productivity of major crops in Akola district**

CROPS	PERIOD-I (1980-1995)			PERIOD-II (1995-2010)			OVERALL (1980-2010)		
	A	P	Y	A	P	Y	A	P	Y
1) Cotton	6.31	47.0 6	49.3 3	18.8 1	34.3 2	45.4 7	14.7 5	44.2 0	56.2 5
2) Tur	27.5 2	41.2 6	25.7 1	13.6 4	24.8 9	23.9 4	29.4 1	43.3 2	26.2 5
3)Soybean	82.4 1	85.3 2	27.2 6	62.9 3	65.5 0	36.8 3	93.8 5	96.6 1	35.6 5
4)Kh.Jowar	10.7 9	39.6 6	36.6 7	28.5 8	39.1 4	24.3 3	34.7 6	43.8 2	31.9 7
5) Gram	51.3 2	82.2 2	45.1 4	53.4 2	82.0 5	38.0 6	83.5 1	123. 3	47.5 6

A, P, and Y denote Area, Production and Productivity.

It is seen from table that the coefficient of variation of area at overall period was highest in soybean i.e. 93.85 per cent followed by gram i.e.83.51per cent , kharif jowar i.e. 34.76 per cent and tur i.e.29.41 per cent. It was observed that the higher inconsistency in area of soybean. The coefficient of variation of area was lowest in cotton i.e. 14.756 per cent. In period-I similar result was observed, the coefficient of variation for area was highest in soybean i.e. 82.41 per cent and lowest in cotton i.e. 6.31 per cent. In period-II the coefficient of variation for area was highest in soybean i.e. 62.93 per cent followed by gram i.e. 53.42 per cent and lowest in tur i.e. 13.64 per cent.

In case of production coefficient of variation at overall period was highest in gram i.e.23.3 per cent followed by soybean i.e. 96.61 per cent, cotton i.e. 44.20 per cent, kharif jowar i.e. 43.82 per cent and it was observed lowest in tur i.e. 43.32 per cent. Coefficient of variation in production of gram denotes higher inconsistency in production of gram. In period-I the coefficient of variation was highest in soybean i.e. 85.32 per cent and lowest in kharif jowar i.e. 39.66 per cent. In period-II coefficient of variation was highest in gram i.e. 82.05 per cent and lowest in tur i.e. 24.89 per cent.

In case of production revealed from table that the coefficient of variation of production was highest in gram i.e. 92.66 per cent followed by soybean, kharif jowar and cotton i.e. 81.30, 40.54 and 36.38 per cent. The coefficient of variation of production was lowest in tur i.e. 32.28 per cent. In period-I similar trend was observed in overall period it is observed that the coefficient of variation was highest in gram i.e. 84.05 per cent followed by soybean i.e. 80.31 per cent, cotton i.e. 41.68 per cent, tur i.e. 40.74 per cent. The coefficient of variation of production was lowest in kharif jowar i.e. 22.52 per cent. In period-II the coefficient of variation was highest in gram i.e. 62.38 per cent followed by soybean i.e. 61.10 per cent and lowest in tur i.e. 14.50 per cent.

In case of productivity the table revealed that coefficient of variation of productivity at overall period was highest in cotton i.e. 56.60 per cent followed by gram i.e.39.44 per cent The coefficient of variation of productivity was lowest in tur i.e. 19.60 per cent. In period-I the coefficient of variation was highest in soybean i.e. 52.70 per cent followed by gram i.e. 44.60 per cent. The coefficient of variation was lowest in kharif jowar i.e. 22.21 per cent. In period-II coefficient of variation of productivity was highest in cotton i.e. 49.89 per cent indicated higher inconsistency in productivity of cotton. Coefficient of variation was lowest in tur i.e 16.96 per cent.

### 3) Coefficient of variation of major crops in Buldhana district

Coefficient of variation of area, production and productivity was worked out and are presented in table 5.7

**Table 5.7. Coefficient of variation in area, production and productivity of major crops in Buldhana district**

CROPS	PERIOD-I (1980-1995)			PERIOD-II (1995-2010)			OVERALL (1980-2010)		
	A	P	Y	A	P	Y	A	P	Y
1) Cotton	6.48	44.02	44.25	13.44	48.0	43.08	10.35	61.79	59.66
2) Tur	24.79	43.40	28.58	13.04	60.56	42.83	23.24	57.82	35.99
3)Soybean	91.04	83.10	23.14	66.34	90.01	34.90	90.97	113.09	37.86
4)Kh.Jowar	18.15	34.63	34.33	36.56	54.62	24.46	42.45	51.16	29.36
5) Gram	58.70	89.34	38.44	51.44	82.1	34.52	72.32	112.4	40.50

A, P, and Y denote Area, Production and Productivity.

It is seen from table 5.7 that the coefficient of variation of area at overall period was highest in soybean i.e. 90.97 per cent Followed by gram i.e. 72.32 per cent, kharif jowar i.e. 42.45 per cent and tur i.e. 23.24 per cent. The coefficient of variation of area was lowest in cotton 10.35 per cent. In period-I similar trend was observed in case of soybean and gram, area of soybean shows highest coefficient of variation i.e. 91.04 per cent followed by gram i.e. 58.70 and lowest in cotton i.e. 6.48 per cent. In period-II also similar trend was found in case of coefficient of variation of area of soybean and gram was highest in soybean i.e. 66.34 and in gram i.e. 51.44 per cent and lowest in tur i.e. 13.04 per cent.

In case of production, the coefficient of variation of production at overall period was highest in soybean i.e. 113.09 per cent followed by gram i.e. 112.4 per cent, cotton i.e. 61.79 per cent, tur i.e. 57.82 per cent respectively. The coefficient of variation was lowest in kharif jowar i.e. 51.16 per cent. In period-I highest coefficient of variation of production was observed in gram i.e. 89.34 per cent followed by soybean i.e. 83.10 per cent and it was observed lowest in tur i.e. 43.40 per cent. In period-II similar result was found as in overall period, the coefficient of variation was highest in soybean i.e. 90.01 per cent followed by gram i.e. 82.1 per cent and it was lowest in cotton i.e. 48.0 per cent.

As revealed from table 5.7 that the coefficient of variation of productivity at overall period was highest in cotton i.e. 59.66 per cent followed by gram i.e. 40.50 per cent and it was lowest in kharif jowar i.e. 29.36 per cent. In period-I the coefficient of variation of productivity was highest in cotton i.e. 44.25 per cent followed by gram i.e. 38.44 per cent and it was lowest in soybean i.e. 23.14 per cent. In period-II similar trend was observed in case of cotton, coefficient of variation of productivity was highest in cotton i.e. 43.08 per cent followed by tur i.e. 42.83 per cent. The coefficient of variation was lowest in kharif jowar 24.46 per cent.

### **3) Coefficient of variation of major Yavatmal district**

Coefficient of variation of area, production and productivity was worked out and are presented in table 5.8.

**Table 5.8. Coefficient of variation in area, production and productivity of major crops in Yavatmal district**

CROPS	PERIOD-I (1980-1995)			PERIOD-II (1995-2010)			OVERALL (1980-2010)		
	A	P	Y	A	P	Y	A	P	Y
1) Cotton	6.10	36.50	36.86	9.12	53.8	54.17	7.60	60.40	60.67
2) Tur	31.98	36.74	18.64	7.12	25.41	23.84	27.25	38.21	21.76
3)Soybean	102.5	98.20	31.39	71.42	64.59	35.0	101.19	94.86	37.86
4)Kh.Jowar	14.33	26.38	24.83	30.03	50.40	27.85	37.48	49.55	26.90
5) Gram	57.57	79.17	35.15	79.00	102.6	30.31	103.7	138.8	37.14

A, P, and Y denote Area, Production and Productivity.

It is seen from table 5.8 that the coefficient of variation of area at overall period was highest in gram i.e. 103.7 per cent followed by soybean i.e. 101.19 per cent, kharif jowar i.e. 37.86 per cent, tur i.e. 27.25 per cent. The coefficient of variation was lowest in cotton i.e. 7.60 per cent. In period-I the coefficient of variation of area was highest in soybean i.e. 102.5 per cent followed by gram i.e. 57.57 per cent and it was lowest in cotton i.e. 6.10 per cent.

As revealed from table coefficient of variation of production, similar trend was observed in case of gram and soybean crop in overall period of area that the coefficient of variation of production was highest in gram i.e. 138.8 per cent followed by soybean i.e.94.86 per cent. The coefficient of variation of production was lowest in tur i.e. 38.21 per cent. In period-I the coefficient of variation was highest in soybean i.e. 98.20 per cent followed by gram i.e. 79.17 per cent and it was lowest in kharif jowar i.e. 26.38 per cent. In period-II coefficient of variation was highest in gram i.e. 102.6 per cent followed by soybean i.e. 64.59 per cent and it was lowest in tur i.e. 25.41 per cent.

In case of productivity the coefficient of variation of productivity at overall period was highest in cotton i.e. 60.67 per cent followed by soybean i.e. 37.86 per cent, gram i.e. 37.14 per cent and kharif

jowar i.e. 26.90 per cent respectively. The coefficient of variation was lowest in tur i.e. 21.76 per cent. In period-I highest coefficient of variation was observed in cotton i.e.36.86 per cent followed by gram i.e. 35.15 per cent and it was lowest in tur i.e. 18.64 per cent. In period-II similar trend was found in case of cotton, the coefficient of variation was highest in cotton i.e. 54.17 per cent followed by soybean i.e. 35.0 per cent and it was observed lowest in tur i.e. 23.84 per cent.

## 5.2 Contribution of selected crops in economic growth

The contribution of major crops in value of gross output were worked out for selected district of Amravati division and presented in table 5.9, 5.10, 5.11 and 5.12

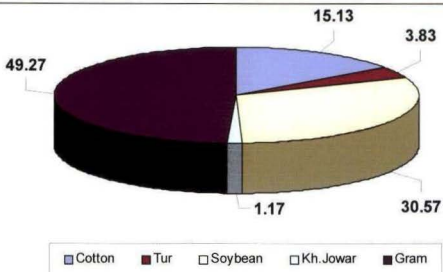
**Table 5.9. Contribution of major crops in value of gross output in Akola district**

Serial no.	Particulars	Coefficient	Std. error	Contribution (%)
1	Cotton	480.7	152.8	15.13*
2	Tur	482.6	697.3	3.83
3	Soybean	677.0	178.5	30.57*
4	Kh. Jowar	-77.9	117.9	1.17
5	Gram	3076.2	483.9	49.27*

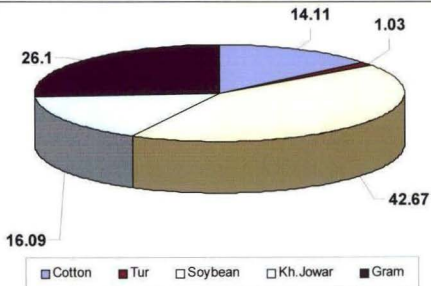
Coefficient of determination ( $R^2$ ) = 0.968\*\*

\*\* , \* denote significance at 5 and 1 per cent, respectively

It is observed from the table in Akola district that the Value of coefficient of determination i.e.  $R^2$  was 0.968 means cotton, soybean, tur, kharif jowar and gram shows 96.8 per cent contribution in value of gross output. Gram shows significant contribution and was the highest contributor in gross output shows 49.27 per cent contribution followed by soybean and cotton i.e. 30.57 and 15.13 per cent respectively. It is also observed from table that Kharif jowar and tur were the lowest contributors in value of gross output indicated 1.17 per cent and 3.83 per cent contribution.



**Fig.6.Contribution of major crops in value of gross output in Akola district**



**Fig.7.Contribution of major crops in value of gross output in Amravati district**

**Table 5.10 Contribution of major crops in value of gross output in Amravati district**

Serial no.	Particulars	Coefficient	Std. error	Contribution (%)
1	Cotton	629.8	196.8	14.11*
2	Tur	241.2	614.3	1.03
3	Soybean	757.3	179.5	42.67*
4	Kh. Jowar	-694.9	214.6	16.09*
5	Gram	2027.4	1010.4	26.10**

Coefficient of determination ( $R^2$ ) = 0.953\*\*

\*\* , \* denote significance at 5 and 1 per cent, respectively

It is observed from the table in Amravati district that the Value of coefficient of determination i.e.  $R^2$  was 0.953 means cotton, soybean, tur, kharif jowar and gram shows 95.3 per cent contribution in value of gross output.

It is seen from table that, soybean shows significant contribution and has highest contribution in value of gross output among all crops i.e. 42.67 per cent contribution followed by gram, kharif jowar and cotton shows 26.10, 16.09 and 14.11 per cent respectively. Meager contribution of 1.03 per cent was exhibited by tur in the district.

**Table 5.11 Contribution of major crops in value of gross output in Buldhana district**

Serial no.	Particulars	Coefficient	Std. error	Contribution (%)
1	Cotton	544.3	181.7	27.08*
2	Tur	531.5	449.5	2.62**
3	Soybean	839.4	187.1	36.18*
4	Kh. Jowar	-75.0	103.6	2.34
5	Gram	2939.7	718.8	31.77*

Coefficient of determination ( $R^2$ ) = 0.953\*\*

\*\* , \* denote significance at 5 and 1 per cent, respectively

It is observed from the table in Buldhana district that the Value of coefficient of determination i.e.  $R^2$  was 0.953 means cotton, soybean, tur, kharif jowar and gram shows 95.3 per cent contribution in value of gross output.

It is observed from table that, soybean shows significant contribution and was the highest contributor in gross output shows 36.18 per cent contribution followed by gram, cotton and tur i.e. 31.77, 27.08 and 2.62 per cent respectively. Meager contribution of 2.34 per cent was exhibited by kharif jowar among all crops in the district.

**Table 5.12 Contribution of major crops in value of gross output in Yavatmal district**

Serial no.	Particulars	Coefficient	Std. error	Contribution (%)
1	Cotton	820.6	130.9	55.37*
2	Tur	135.1	526.8	0.728
3	Soybean	708.9	371.2	21.59**
4	Kh. Jowar	-573.5	215.5	15.89*
5	Gram	2414.6	3657.4	6.39

Coefficient of determination ( $R^2$ ) = 0.937\*\*

\*\* , \* denote significance at 5 and 1 per cent, respectively

It is observed in Yavatmal district from the table that the Value of coefficient of determination i.e.  $R^2$  was 0.937 means cotton, soybean, tur, kharif jowar and gram shows 93.7 per cent contribution in value of gross output.

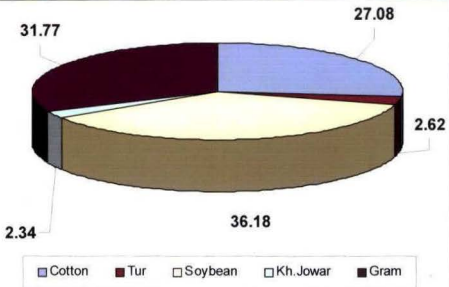
It is also observed that the cotton was highest contributor in all crops of Yavatmal district shows significant contribution i.e. 55.37 per cent followed by soybean, kharif jowar and gram i.e. 21.59, 15.89 and 6.39 per cent contribution in value of gross output. Tur crop indicated meager contribution of 0.72 per cent in the district.

### **5.3 To study the economic growth performance over the study period**

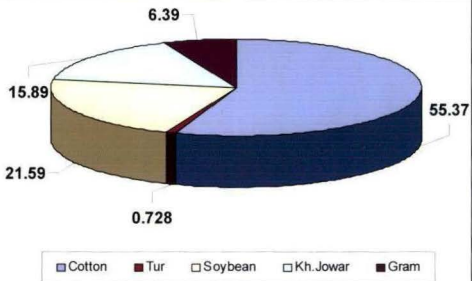
The economic growth performance of major crops of five district of Amravati division can be examined through studying the growth in production and productivity at constant and current prices. Compound growth rate of production and productivity of major crops at constant and current prices were worked out for period 1980-2010 and two subperiod as period-I (1980-1995) and period-II (1996-2010).

#### **1) Growth rate of production and productivity at constant and current prices of major crops in Akola district**

Growth rate of production and productivity at constant and current prices for major crops were worked out and presented in table 5.13



**Fig.8.Contribution of major crops in value of gross output in Buldhana district**



**Fig.9.Contribution of major crops in value of gross output in Yavatmal district**

In case of production from table 5.13 it is observed that the growth rate of production at overall period of all crops was positively significant at current prices indicated increase in production in cotton by 11.5 per cent, tur by 13.1 per cent, soybean by 33.4 per cent, kharif jowar by 5.14 and gram by 22.60 per cent. And at constant prices tur, soybean, gram shows positively significant growth rate indicated increasing production by 4.05, 24.6 and 12.9 per cent but cotton and kharif jowar shows non significant result.

From table it is revealed that the growth rate at period-I of all crops was positively significant at 1 per cent level at constant prices it shows increasing production in cotton by 6.96 per cent, tur by 5.61 per cent, soybean by 14.2 per cent, kharif jowar by 4.98 per cent and gram by 17.0 per cent and at current prices similar trend was found in case of all crops, significant growth rate indicated increasing production in cotton by 17.2 per cent, tur by 16.9 per cent, soybean by 24.7 per cent, kharif jowar by 12.8 per cent and gram by 28.5 per cent at current prices.

It is also revealed from table that the growth rate of production at period-II, at constant prices soybean and gram shows positively significant growth rate indicated increasing production by 13.90 and 14.7 per cent while cotton and tur shows non significant result. Kharif jowar have negative growth rate indicated decreasing production by 6.69 per cent. at current prices all crop shows positively significant growth rate accept kharif jowar. Cotton, tur, soybean and gram shows significant growth rate indicated increasing production by 8.23 per cent, 8.92 per cent, 19.4 per cent and 22.4 per cent respectively while production of kharif jowar was decreased by 0.32 per cent.

From table it is observed that the growth at constant prices during period-I indicated that production growth of all the crops contributed significantly towards economic growth. Decline in area under cotton, tur

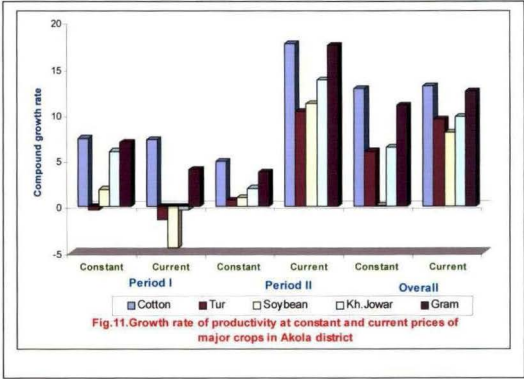
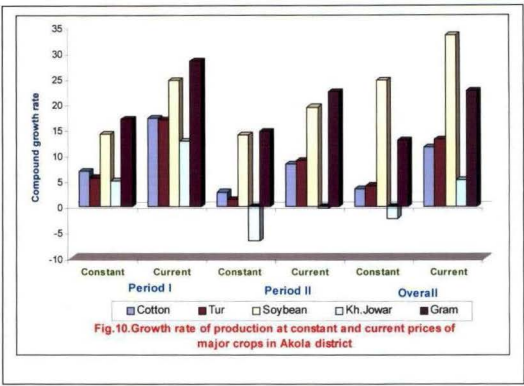
**Table 5.13. Growth rate of production and Productivity at constant and current prices of major crops in Akola district**

Crops	Production						Productivity					
	Period-I		Period-II		Overall		Period-I		Period-II		Overall	
	Constant	current	constant	current	constant	current	Constant	current	constant	current	Constant	current
Cotton	6.96*	17.2*	2.85	8.23*	3.42	11.5*	7.41*	17.7*	7.27*	12.8*	4.85*	13.10*
Tur	5.61*	16.9*	1.33	8.92*	4.05*	13.1*	-0.364	10.3*	-1.40	5.97*	0.65	9.49*
Soybean	14.2*	24.7*	13.90*	19.4*	24.6*	33.4*	1.85	11.2*	-4.52 *	0.120	0.910	8.02*
Kh.jowar	4.98*	12.8*	-6.69	-0.326	-2.31	5.14*	5.97*	13.8*	-0.37	6.42*	1.95*	9.74*
Gram	17.0*	28.5*	14.7*	22.4*	12.9*	22.60*	6.97*	17.5*	3.98	11.03*	3.73*	12.5*

\*\* , \* denote significance at 5 and 1 per cent, respectively.

A, P, and Y denote Area, Production and Productivity.





and kharif jowar could not contribute significantly in economic growth of production. The overall picture of crop production indicated that pulses contributed significantly in economic growth in district.

In case of productivity from table 5.13 It is revealed that the growth rate of productivity at overall period, at constant prices cotton, kharif jowar and gram shows positive growth rate indicated increasing productivity by 4.85 per cent, 1.95 per cent and 3.73 per cent respectively. While tur and soybean shows non significant result. At current prices all crops shows positively significant growth rate indicated increasing productivity in cotton by 13.10 per cent, tur by 9.49 per cent, soybean by 8.02 per cent, kharif jowar by 9.74 per cent and gram by 12.5 per cent.

It is also revealed from table that the growth rate of productivity at period-I, at constant prices cotton, kharif jowar and gram shows positive growth rate indicated increasing productivity by 7.41, 5.97 and 6.97 per cent. Whereas soybean shows non significant growth rate and tur shows negative growth rate indicated decreasing productivity by 0.36 per cent. At current prices similar result was found as in overall period, all crops shows positively significant growth rate indicated increasing productivity in cotton by 17.7 per cent, tur by 10.3 per cent, soybean by 11.2 per cent, kharif jowar by 13.8 per cent and gram by 17.5 per cent respectively.

It is revealed from table that the growth rate of productivity at period-II, at constant prices cotton shows positively significant growth rate among all crops indicated increasing productivity by 7.27 per cent while tur, soybean and kharif jowar shows negative growth rate indicated that decreasing productivity by 1.40, 4.52 and 0.37 per cent respectively. Gram productivity shows non significant result. At current prices all crops shows positively significant result accept soybean indicated increasing productivity in cotton by 12.8 per cent, tur by 5.97 per cent, kharif jowar by 6.24 per cent and gram by 11.03 per cent respectively whereas soybean shows non significant result.

From table it is observed that the growth rate at constant prices during overall period and period-I indicated that productivity growth of cotton, kharif jowar and gram contributed significantly towards economic

growth. The overall picture of crop productivity indicated that tur and soybean shows non significant contribution in economic growth in district.

**2) Growth rate of production and productivity at constant and current prices of major crops in Amravati district**

Growth rate of production and productivity at constant and current prices for major crops were worked out and presented in table 5.14

In case of production from table 5.14 It is observed that the growth rate of production at overall period, at constant prices the growth rate of all crops was positively significant except kharif jowar, indicated increasing production in cotton by 2.17 per cent, tur by 2.93 per cent, soybean by 20.4 per cent and gram by 10.29 per cent respectively while kharif jowar shows negative but significant growth rate indicated decreasing production by 4.54 per cent. At current prices all crops shows positively significant growth rate indicated increasing production in cotton by 10.20 per, tur by 11.97 per cent, soybean by 28.92 per cent, kharif jowar by 2.75 per cent and gram 19.67 per cent respectively.

It is revealed that the growth rate of production of major crops at period-I, at constant prices all crops shows positive growth rate except kharif jowar indicated increasing production in cotton by 7.20 per cent, tur by 7.21 per cent, soybean by 32.5 per cent and gram by 16.7 per cent respectively whereas kharif jowar shows negative growth rate indicated decreasing production by 0.14 per cent. At current prices similar trend was observed as in overall period, all crops shows positively significant growth rate at 1per cent level indicated increasing production by 17.50 per cent in cotton, 18.7 per cent in tur, 44.8 per cent in soybean, 7.31 per cent in kharif jowar and 28.2 per cent in gram.

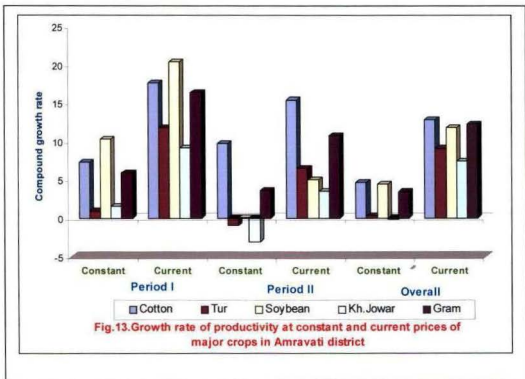
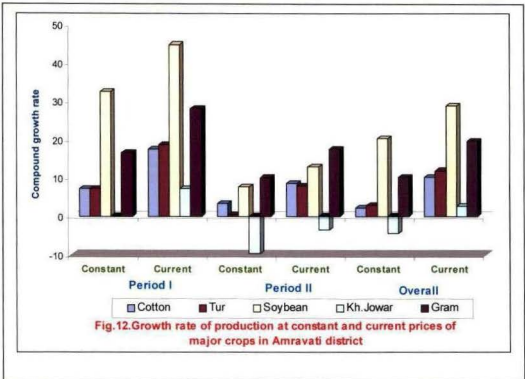
It is also revealed from table that the growth rate of production of major crops at period-II at constant prices the production of soybean and gram was increased by 7.68 and 10.12 per cent while production of kharif jowar was decreased by 9.71 per cent, cotton and tur shows non significant result. At current prices all crops shows positively significant growth rate except kharif jowar, indicated increasing production

**Table 5.14. Growth rate of production and Productivity at constant and current prices of major crops in Amravati district**

Crops	Production						Productivity					
	Period-I		Period-II		Overall		Period-I		Period-II		Overall	
	Constant	current	constant	Current	Constant	Current	Constant	current	constant	current	constant	Current
Cotton	7.20*	17.50*	3.27	8.67*	2.17*	10.20*	7.30*	17.61*	9.73*	15.4*	4.64*	12.8*
Tur	7.21*	18.7*	0.336	7.84*	2.93*	11.97*	0.92	11.78*	-0.943	6.47*	0.28	9.08*
Soybean	32.5*	44.8*	7.68**	12.92*	20.4*	28.92*	10.28*	20.44*	0.101	4.96	4.47*	11.8*
Kh.jowar	-0.146	7.31*	-9.71*	-3.54*	-4.54*	2.75*	1.58	9.17*	-3.10*	3.51*	-0.19	7.42*
Gram	16.7*	28.2*	10.12*	17.5*	10.29*	19.67*	5.96*	16.4*	3.67**	10.70*	3.45*	12.2*

\*\* , \* denote significance at 5 and 1 per cent, respectively.

A , P, and Y denote Area, Production and Productivity.



in cotton by 8.67 per cent, tur by 7.84 per cent, soybean by 12.92 per cent and gram by 17.5 per cent respectively.

From table it is observed that the growth at constant prices during period-I, period-II and overall indicated that production growth of all the crops contributed significantly towards economic growth except kharif jowar. Decline in area under kharif jowar could not contribute significantly in economic growth of production.

In case of productivity from table 5.14 It is revealed that the growth rate of productivity at overall period, at constant prices cotton, soybean and gram shows positive growth but tur and kharif jowar shows non significant result. it was indicated increasing productivity of cotton by 4.64 per cent, soybean by 4.47 per cent and gram by 3.45 per cent respectively. At current prices all crops have positive growth rate indicated increasing productivity in cotton, tur, soybean, kharif jowar and gram by 12.8, 9.08, 11.8, 7.42 and 12.2 per cent respectively.

It is observed that the growth rate of productivity at period-I at constant prices similar result was found , cotton, soybean and gram shows positive growth but tur and kharif jowar shows non significant result. it was indicated increasing productivity of cotton, soybean and gram by 7.30, 10.28 and 5.96 per cent respectively. Whereas at current prices all crops have positive growth rate indicated increasing productivity in cotton, tur, soybean, kharif jowar and gram by 17.61, 11.78, 20.44, 9.17 and 16.4 per cent respectively.

It is also observed from table that the growth rate of productivity at period-II, at constant prices cotton and gram shows positively significant growth rate among all crops at 1 per cent and 5 per cent level of significance indicated increasing productivity by 9.73 and 3.67 per cent whereas tur and kharif jowar shows negative growth rate indicated decreasing productivity by 0.94 and 3.10 per cent, the growth rate of soybean shows non significant result. At current prices all crops shows positively significant growth rate accept soybean, cotton, tur, kharif jowar and gram shows increasing productivity by 15.4, 6.47, 3.51 and 10.70 per cent respectively while soybean shows non significant result.

From table it is observed that the growth rate at constant prices during all period indicated that productivity growth of tur and kharif jowar was not contributed significantly towards economic growth. The overall picture of crop productivity indicated that cotton, soybean and gram shows significant contribution in economic growth in district.

### **3) Growth rate of production and productivity at constant and current prices of major crops in Buldhana district**

Growth rate of production and productivity at constant and current prices for major crops were worked out and presented in table 5.15

In case of production from table 5.15 it is observed that the growth rate of production at overall period, at constant prices similar results was found in Akola and Amravati district that the all crops shows significant growth rate except kharif jowar, cotton, tur, soybean and gram shows positively significant growth rate indicated increasing production by 5.37, 2.52, 18.3 and 10.5 per cent respectively whereas kharif jowar shows negative but significant result indicated decreasing production by 4.78 per cent. At current prices all crops shows positively significant growth rate indicated increasing production in cotton, tur, soybean, kharif jowar and gram by 13.6, 11.5, 26.7, 2.49 and 19.9 per cent respectively.

It is revealed that growth rate of production of major crops at period-I, at constant prices similar trend was observed. The growth rate of cotton, tur, soybean and gram was positively significant indicated increasing production by 3.05, 6.42, 20.4 and 17.3 per cent respectively whereas kharif jowar shows negative growth rate indicated decreasing production by 1.15 per cent. At current prices the growth rate of all crops was positively significant indicated increasing production in cotton, tur, soybean, kharif jowar and gram by 12.9, 17.8, 31.50, 6.22 and 28.9 per cent respectively.

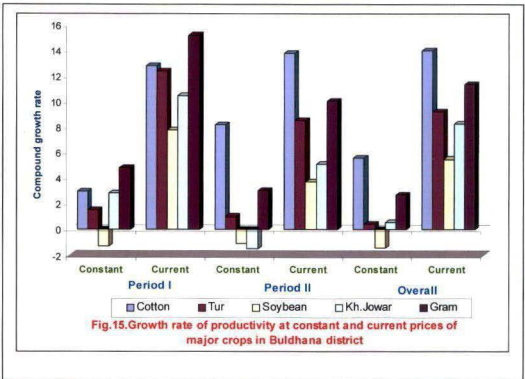
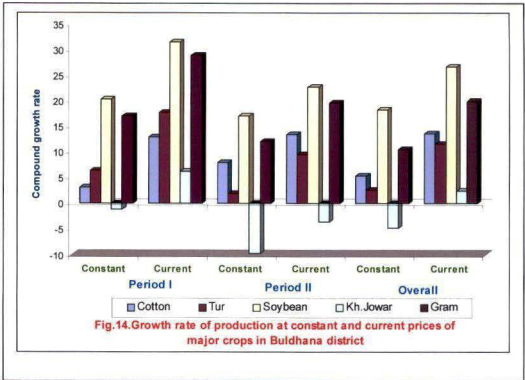
From table It is also revealed that growth rate of production of major crops at period-II, at constant prices the growth rate of cotton, soybean and gram shows positively significant result indicated increasing production by 7.90, 17.1 and 12.05 per cent respectively whereas kharif jowar shows negative but significant growth rate indicated decreasing

**Table 5.15. Growth rate of production and Productivity at constant and current prices of major crops in Buldhana district**

Crops	Production						Productivity					
	Period-I		Period-II		Overall		Period-I		Period-II		Overall	
	Constant	current	constant	current	constant	Current	Constant	current	constant	current	constant	Current
Cotton	3.05*	12.9*	7.90*	13.5*	5.37*	13.6*	2.98*	12.8*	8.23*	13.8*	5.6*	14.003*
Tur	6.42*	17.8*	1.87	9.50*	2.52**	11.5*	1.53	12.4*	1.003	8.56*	0.43	9.25*
Soybean	20.4*	31.50*	17.1*	22.8*	18.3*	26.7*	-1.30	7.79*	-1.09	3.71*	-1.45	5.48*
Kh.jowar	-1.15	6.22**	-9.82*	-3.66**	-4.78*	2.49*	2.83*	10.5*	-1.53	5.1*	0.58	8.27*
Gram	17.3*	28.9*	12.05*	19.6*	10.5*	19.9*	4.85*	15.2*	3.05*	10.04*	2.74*	11.4*

\*\* , \* denote significance at 5 and 1 per cent, respectively.

A , P, and Y denote Area, Production and Productivity.



production by 9.82 per cent, tur shows non significant result. At current prices all crops shows positively significant growth rate except kharif jowar indicated increasing production in cotton, tur, soybean and gram by 13.5, 9.50, 22.8 and 19.6 per cent respectively while kharif jowar shows negative but significant growth rate indicated decreasing production by 3.66 per cent.

From table it is observed that the growth at constant prices during period-I indicated that production growth of all the crops contributed significantly except kharif jowar towards economic growth. Decline in area under kharif jowar could not contribute significantly in economic growth of production. The overall picture of crop production indicated that cotton, tur, soybean and gram contributed significantly in economic growth in district.

In case of productivity from table 5.15 It is revealed that the growth rate of productivity at overall period, at constant prices cotton and gram shows positively significant growth rate indicated increasing productivity by 5.6 and 2.74 per cent whereas tur and kharif jowar shows non significant result and soybean shows negative growth rate indicated decreasing productivity by 1.45 per cent. At current prices similar result was observed as in Akola, Amravati and Buldhana district that the growth rate of all crops was positively significant indicated increasing productivity in cotton, tur, soybean, kharif jowar and gram by 14.00, 9.25, 5.48, 8.27 and 11.4 per cent respectively.

It is observed that the growth rate of productivity at period-I, at constant prices the growth rate of cotton, kharif jowar and gram was positively significant indicated increasing productivity by 2.98, 2.83 and 4.85 per cent respectively whereas tur and soybean shows non significant result. At current prices all crops shows positive growth rate as in overall period indicated increasing productivity in cotton, tur, soybean, kharif jowar and gram by 12.8, 12.4, 7.79, 10.5 and 15.2 per cent respectively.

From table it is also observed that the growth rate of productivity at period-II, at constant prices the growth rate of cotton and gram was positively significant indicated increasing productivity by 8.23 and 3.05 per cent while soybean and kharif jowar shows negative growth rate indicated decreasing productivity by 1.09 and 1.53 per cent and Tur shows

non significant result. At current prices similar trend was observed as in overall period that all crops shows significant growth rate indicated increasing productivity in cotton, tur, soybean, kharif jowar and gram by 13.8, 8.56, 3.71, 5.1 and 10.04 per cent respectively.

From table it is observed that the growth at constant prices during period-I indicated that productivity growth of cotton, kharif jowar and gram contributed significantly towards economic growth. The overall picture of crop productivity indicated that cotton and gram contributed significantly in economic growth in district.

#### **4) Growth rate of production and productivity at constant and current prices of major crops in Yavatmal district**

Growth rate of production and productivity at constant and current prices for major crops were worked out and presented in table 5.16

In case of production from table 5.16 it is revealed that the growth rate of production at overall period, at constant prices the growth rate of cotton, tur, soybean and gram was positively significant indicated increasing production by 4.40, 2.85, 26.3 and 12.1 per cent respectively while kharif jowar shows negative growth rate indicated decreasing production by 5.85 per cent. At current prices similar trend was observed, all crops shows positively significant indicated increasing production in cotton, tur, soybean and gram by 12.6, 11.8, 35.2 and 21.6 per cent respectively whereas kharif jowar shows non significant result.

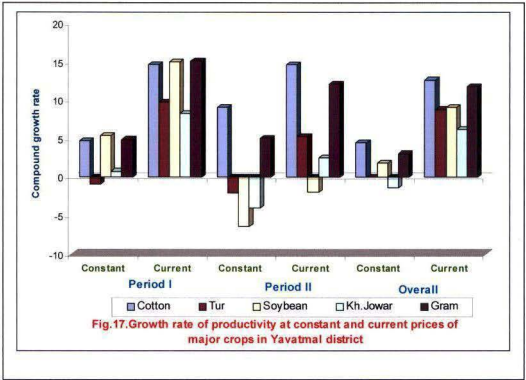
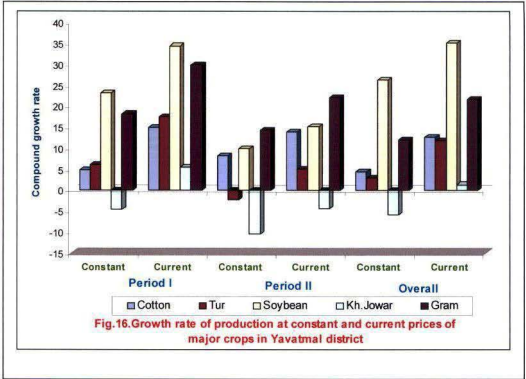
It is observed from table that growth rate of production of major crops at period-I, at constant prices the growth rate of cotton, tur, soybean and gram shows positive growth rate indicated increasing production by 4.82, 6.04, 23.1 and 18.2 per cent and kharif jowar shows negative growth rate indicated decreasing production by 6.64 per cent. at current prices all crops shows positively significant growth rate indicated increasing production in cotton, tur, soybean, kharif jowar and gram by 14.9, 17.4, 34.4, 5.50 and 29.9 per cent respectively.

**Table 5.16. Growth rate of production and Productivity at constant and current prices of major crops in Yavatmal district**

Crops	Production						Productivity					
	Period-I		Period-II		Overall		Period-I		Period-II		Overall	
	Constant	current	constant	current	constant	Current	Constant	current	constant	current	constant	Current
Cotton	4.82**	14.9*	8.14*	13.8*	4.40*	12.6*	4.67**	14.7*	9.05*	14.7*	4.52*	12.7*
Tur	6.04*	17.4*	-2.27	5.04*	2.85*	11.8*	-0.92	9.73*	-2.02	5.31*	0.029	8.80*
Soybean	23.1*	34.4*	9.94*	15.2*	26.3*	35.2*	5.41*	15.1*	-6.4**	-1.92	1.89**	9.07*
Kh.jowar	-4.64	5.50*	-10.5*	-4.46*	-5.85*	1.33	0.753	8.28*	-4.002**	2.55*	-1.35**	6.17*
Gram	18.2*	29.9*	14.3*	22.06*	12.1*	21.6*	4.88*	15.2*	5.08*	12.2*	3.05*	11.8*

\*\* , \* denote significance at 5 and 1 per cent, respectively.

A , P, and Y denote Area, Production and Productivity.



From table it is also revealed that growth rate of production of major crops at period-II, at constant prices the growth rate of cotton, soybean and gram shows significant growth rate indicated increasing production by 8.14, 9.94 and 14.3 per cent respectively whereas tur and kharif jowar shows negative growth rate indicated decreasing production by 2.27 and 10.5 per cent. At current prices all crop shows positive growth rate except kharif jowar, the growth rate of cotton, tur, soybean and gram shows significant growth rate indicated increasing by 13.8, 5.04, 15.2 and 22.06 per cent respectively while kharif jowar shows negative growth rate indicated decreasing production by 4.46 per cent.

From table it is observed that the growth at constant prices during period-I indicated that production growth of all the crops except kharif jowar contributed significantly towards economic growth. Decline in area kharif jowar could not contribute significantly in economic growth of production. The overall picture of crop production indicated that cotton, tur, soybean and gram contributed significantly in economic growth in district.

In case of productivity from table 5.16 It is revealed that the growth rate of productivity at overall period, at constant prices the growth rate of productivity of cotton, soybean and gram was positively significant indicated increasing productivity by 4.52, 1.89 and 3.05 per cent respectively whereas tur shows non significant result and kharif jowar have negative but significant growth rate indicated decreasing productivity by 1.35 per cent. At current prices growth rate of all crops was positively significant indicated increasing productivity in cotton, tur, soybean, kharif jowar and gram by 12.7, 8.80, 9.07, 6.17 and 11.8 per cent respectively.

It is observed from table that the growth rate of productivity at period-I, at constant prices the growth rate of cotton, soybean and gram was significant indicated increasing productivity by 4.67, 5.41 and 4.88 per cent respectively. but tur and kharif jowar shows non significant result. At current prices similar trend was found as in overall period that all crops have positively significant growth rate indicated increasing productivity in cotton, tur, soybean, kharif jowar and gram by 14.7, 9.73, 15.1, 8.28 and 15.2 per cent respectively.

From table it is also observed that the growth rate of productivity at period-II, at constant prices cotton and gram shows positive growth rate among all crops whereas tur, soybean and kharif jowar shows negative growth rate. In cotton and gram productivity increased by 9.05 and 5.08 per cent. In tur, soybean and kharif jowar productivity decreased by 2.02, 6.4, 4.00 per cent respectively. At current prices all crop shows positively significant growth rate except soybean, the growth rate of cotton, tur, kharif jowar and gram was increasing by 14.7, 5.31, 2.55 and 12.2 per cent respectively while growth rate of soybean was negative indicated decreasing productivity by 1.92 per cent.

From table it is observed that the growth rate at constant prices during overall period and period-I indicated that productivity growth of cotton, soybean and gram contributed significantly towards economic growth. The overall picture of crop productivity indicated that tur shows non significant and kharif jowar shows negative contribution in economic growth in district.

It is concluded from above table 5.13 to 5.16 that the significant positive growth in gross value of output for each crop at constant and current prices indicated that there is significant impact of production on gross value of output though area under kharif jowar is declining. Significant growth in gross value of output indicates increase in productivity. Numerically the growth rate at current prices is higher than at constant prices indicates the effect of money inflation.

## CHAPTER VI

### SUMMARY AND CONCLUSIONS

Agriculture being one of the major sector associated with the country's populace, has attracted much attention since independence for its development. Recent breakthrough in agriculture productivity made possible by far reaching technological and institutional changes which have opened new dimension of growth. . Agriculture contributes a high share of domestic product by sectors in India. Farmers are growing various crops in the field rather than single crop. The physical factors determine the outline of the area of crops, while the socio economic relationships determine their extent and government policy can impact on crop growing like new various crops can be introduced in the place of traditional crops. A dynamic change was recorded in food grains production. These changes in area, production and productivity of major crops in agriculture plays important role in rise in GDP ultimately in economic growth of the region. Growth may well imply not only more output and also more inputs and more efficiency, i.e., an increase in output per unit of input. . So in this context, an effort has been made to examine the economic growth in Amravati division. The specific objectives of this study were as under.

- 1) To study the growth performance of major crops
- 2) To study the contribution of selected crops in economic growth
- 3) To study the economic growth performance over the study period

The present study was based on secondary data collected from various offices of Amravati division and Government sites. The time series data on area, production and productivity of major crops for five district of Amravati division viz., Akola including Washim, Amravati, Buldhana and Yavatmal, minimum support prices of major crops were collected for the period 1980-81 to 2010-11.

The crops selected for the study were cotton, tur, soybean, *kharif* Jowar, and gram. Various statistical techniques were used to achieve the objectives of study. In order to study the growth performance of major crop in various district of Amravati division the compound growth rates of area, production and yield of selected crops have been calculated by fitting

the exponential function and coefficient of variation also calculated. compound growth rates were estimated for sub periods as period-I (1980-1995), period-II (1996-2010) and overall period (1980-2010). the contribution of major crops in value of gross output was worked out with the help of multiple linear regression equation. In order to study the economic growth performance of major crops the growth rate were examined at constant as well as at current prices. The results of the study are summarized as below

### **6.1 To study growth performance of major crops**

The growth analysis revealed that the growth rate of area of cotton and kharif jowar was negative in all district of Amravati division during all period of study showed declining trends in area. The compound growth rate of area of soybean was positively significant in Akola, Amravati, Buldhana and Yavatmal district showed increasing in area over period of study followed by area of gram was also observed significant. Growth rate of area tur increased at period-I but decreased at overall period in all district of Amravati division.

The compound rate of production was positively significant in soybean followed by gram in Akola, Amravati, Buldhana and Yavatmal district at period-I, period-II and overall period. Cotton has significant results for all district of Amravati division over periods of study. Kharif jowar showed negative growth rate of production indicated declining production of kharif jowar in all district of Amravati division over the period of study. Growth of tur showed inconsistency performance it was increased at period-I but decreased at period-II and at overall period in Amravati division.

The compound growth rate of productivity of cotton and gram showed positively significant result indicated increasing productivity in all district at all period of study. The growth rate of productivity of soybean was observed positively significant in Amravati and Yavatmal district but in other district it was non significant. The compound growth rate of productivity of kharif jowar and tur shows non significant in all district over the period of study.

## **6.2 To study the contribution of selected crops in economic growth**

The analysis of contribution of selected crops in economic growth revealed that cotton, tur, soybean, kharif jowar and gram have large contribution in economic growth of Amravati division. Cotton, soybean and gram are major contributors of gross value of output in Amravati division shows contribution as in Akola (15.13%, 30.57% and 49.27%), in Amravati (14.11%, 42.67% and 26.10%), in Buldhana (27.08%, 36.18% and 31.77%) and in Yavatmal (55.37%, 21.59% and 6.39%). Tur and kharif jowar shows lowest contribution in Akola, Amravati and Buldhana but in Yavatmal district kharif jowar (15.89%) shows significant contribution in value of gross output.

## **6.3 To study the economic growth performance over the study period**

The economic growth performance of major crops were analysed by studying growth rate of production and productivity of major crops at constant as well as current prices. the study revealed that the growth rate of production of cotton, tur soybean, kharif jowar and gram was positively significant at current prices at period-I, period-II and overall period in all district. In Akola district the growth rate of production of cotton, soybean, tur and gram was positively significant but in kharif jowar it was negative at overall period of study at constant prices, same trend was found in Amravati, Buldhana and Yavatmal district. In Amravati division the crop production indicated that cotton, soybean and gram contributed significantly in economic growth. Decline in area under cotton, tur and kharif jowar could not contribute significantly in economic growth of production.

The compound growth rate of productivity was found similar as production at current prices cotton, tur, soybean, kharif jowar and gram was positively significant at all period of study. In Akola district cotton, kharif jowar and gram showed positively significant growth rate of productivity but tur and soybean showed non significant growth rate at constant prices at all period of study. In Amravati tur and kharif jowar showed non significant result and other crops have significant growth rate at constant prices. in Buldhana district all crops showed positively

significant growth rate except kharif jowar showed negative but significant result at constant prices. in Yavatmal district same result was found as in Akola district at constant prices. in Amravati division the growth at constant prices during study period indicated that productivity growth of cotton and gram contributed significantly towards economic growth.

### **Conclusion**

From the present study following conclusions are drawn.

1. Area and production of soybean and gram was found significantly increasing in Amravati division at all periods of study.
2. There was reduction in area under cotton in Amravati division over all periods of study.
3. Area under cotton, tur, kharif jowar was diverted to soybean in Amravati division.
4. Production of soybean was observed more among all crops in Amravati division.
5. Area and production of kharif jowar was significantly declined over period of study.
6. Productivity of cotton and gram was found significantly increasing in Amravati division.
7. Inconsistency in area, production and productivity of tur exhibited during the study period.
8. Cotton, soybean and gram are the major contributors of gross value of output in Amravati division.
9. Tur is the lowest contributor of gross value of output in Amravati and Yavatmal district.
10. Kharif jowar has lowest contribution in gross value of output in Akola and Buldhana district.
11. In overall crop production pulses contributed significantly in economic growth, cotton, kharif jowar and gram productivity contributed significantly in economic growth in Akola district.
12. Overall crop production at constant prices of cotton, tur, soybean and gram contributed significantly in economic growth in Amravati, Buldhana and Yavatmal district.

13. Productivity of cotton and gram at constant prices contributed significantly in economic growth in Amravati, Buldhana and Yavatmal district.
14. Growth rate at current prices is higher than at constant prices indicated the effect of monetary inflation.
15. Significant positive growth in gross value of output for each crop at constant and current prices indicated that there is significant impact of production on gross value of output though the area under kharif jowar is declining.

### **Implication**

The following policy implications are brought out from important findings of present study

1. Cotton, soybean and gram are major contributors of gross value of output in Agriculture, the market prices of these crops should be in tune with increase in cost of cultivation to benefit and encourage the farmer.
2. Soybean, tur and gram (pulses) are major contributors of economic growth. Farm economy can be enhanced by concentration of strategies on pulses and jowar production.

## CHAPTER VII

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