AGRICULTURAL DEVELOPMENT IN AURANGABAD DISTRICT

BY

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DISSERTATION

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2002

Affectionately

Dedicated

To

Mahatma Jyotiba Phule

CANDIDATE'S DECLARATION

I, hereby declare that this dissertation or part thereof, has not been previously submitted by me for a degree of any University.

Place : PARBHANI
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CERTIFICATE-I

This is to certify that *Shri.* **PHAD JAIKRISHNA SHRIRANGRAO** has satisfactorily prosecuted his course and research for a period of not less than four semesters and that the dissertation entitled **"AGRICULTURAL DEVELOPMENT IN AURANGABAD DISTRICT"** submitted by him is the result of original research work and is of sufficiently high standard to warrant its presentation for award of degree of **MASTER OF SCIENCE (Agriculture)** in the subject of **AGRICULTURAL ECONOMICS.**

I also certify that the dissertation or part thereof has not been previously submitted by him for a degree of any university.

Place : PARBHANI
Date : / /2002

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CERTIFICATE-II

This is to certify that the dissertation entitled **"AGRICULTURAL DEVELOPMENT IN AURANGABAD DISTRICT"** submitted by *Shri.* **PHAD JAIKRISHNA SHRIRANGRAO** to the Marathwada Agricultural University, Parbhani in partial fulfilment of the requirement for the degree of ***MASTER OF SCIENCE (Agriculture)*** in the subject of ***AGRICULTURAL ECONOMICS*** has been approved by the student's advisory committee after oral examination in collaboration with the external examiner.

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Chapter-I

INTRODUCTION

The progress of a civilization can be very aptly estimated by seeing how efficiently, it utilizes the most important resource i.e. land to meet its necessities and for further trade purpose. Here started the very first occupation of human being i.e. agriculture, which aims at growing crops and raising livestock to meet diverse human needs like food directly and livelihood indirectly.

In Indian context, agriculture constitute backbone of its national economy by giving a source of livelihood to more than 65 per cent of population directly, contributing upto 75 and 26.40 per cent to our exports and gross domestic products, respectively. Thus agriculture enjoyed a prime status during successive plans by planers as well as people not only for food security but also as a part of overall economic growth. Since independence, the foodgrain production in India has increased considerably, starting from 50.82 MT during the year 1950-51 to upto 198.3 MT in 2000-01. With governments intentions to feed growing mouths and to mitigate the food scarcity aroused due to loss of fertile wheat growing part of Western Punjab and jute growing part of East Bengal to Pakistan in partition, it started planned way of development of its economy with special emphasis towards agricultural development through integrated efforts like irrigation development, agricultural research and extension to laggardous Indian farmers in International competition not only of production and productivity but also of survival.

In Post World War two scenario, we witnessed the efforts of various international agricultural research centres and courteous like food foundation of stretching the advances in pure and applied sciences to the third world countries for the support to their unprivileged,malnutritioned and war ravaged population,for feeding themselves with their own resources

through intensive technologies like use of fertilizers, high yielding varieties, plant protection, chemicals and equipments. Our planners realised the necessity of participation of common man in development of the nation.

Still after 50 years of independence and planning our economy is an agrarian economy. Agriculture provides source of livelihood to 67 per cent of Indian population. Agriculture export accounts for about 5 per cent of total agricultural production and about 15.08 per cent to the countries total export, thus helps in avoiding balance of payment crisis becoming worse. The agricultural development provides expanding market for chemical fertilizers and agricultural implements. Efforts must be directed towards maximum utilization of blessings that mother nature had given us in the form of vast genetic resources, varied agroclimatic zones, miles and miles of fertile soils, abundant sunshine and last but not the least plentiful of cheap labour.

Development of agriculture, hitherto was the aim of planners but it turned to be necessity when data from central statistical organization indicated that although Indian economy grown at the rate of 6.4 per cent in 1999-2000, it received a setback having a growth rate of 6 per cent due to loss of pace growth rate by agriculture with industrial sector.

Green revolution in late 60's made India self-sufficient in food grains as well as gave a spirit of self esteem thus proving to be a cause of real independence. At the dawn of twenty first century we are the toppers in food, milk production, sugar production, fruit production and we are among toppers in vegetable, cotton, rubber production. After successful green revolution we wrote the saga of white, blue and yellow revolutions and now we are hoping for triamphantic march towards evergreen revolution. With opening of Indian and world markets for transport and trade of different commodities under WTO, Indian agriculture now turned also to be "Gamble with markets" which was previously "Gamble with monsoon". Here we can hope that futuristic government policies and

acumen within farmers will no doubt accept the challenges of new era and succeed further as well.

As the development of the nation, particularly like India lies in development of villages. Here some attempts have been made to study the differential performance of agriculture in different periods by analysing different aspects of agricultural development at district level and it's comparison with divisional and state level.

In Marathwada region, great efforts have been made after 1960 to bring about agricultural development. Irrigation facilities have been created, new technology in crop production has been introduced, use of chemical fertilizers and plant protection measures are being widely adopted. All these efforts have changed the face of agriculture in the Marathwada region.

Aurangabad district being a part of the Marathwada region, has also made progress in case of agriculture development. Due to increase in irrigation facilities because of Jayakwadi, Galati and Sukhana irrigation projects and increase in adoption of new technology, changes are viable in cropping pattern. Scientific work carried out at Marathwada Agricultural University, Parbhani has also helped the farmers in Aurangabad district to improve the efficiency in agriculture.

Hence, it was felt necessary to study the agriculture development in Aurangabad district with following specific objectives.

1. To study the land utilization pattern of Aurangabad district.
2. To examine the changes in the cropping pattern of the Aurangabad district.
3. To study the performance of important crops in the district with respect to area, production and productivity.
4. To study the agriculture development with respect to different socio-economic indicators over a period of time.

Scope and utility

The study is designed to project the various problems on the basis of past performance. The study focuses light on important parameters of agricultural development in a district which can be further studied under varied situations, in district for knowing their significance.

The results of the study can be made use of for launching different programmes for developing agriculture in the district. The results of the study will help policy makers, administrators and research workers for development of agriculture in different fields to plan their strategies for overall development of the district.

The major factors which affect the agricultural development can be identified. The farmers would be benifitted to arrange their cropping pattern for maximising income with available resources.

Limitations of the study

The present study is based on secondary data obtained from published sources as well as development agencies in Aurangabad district. The analysis is limited to available stock of data. However, an attempt has been made to have indepth analysis of data by adopting suitable analytical techniques to arrive at meaningful conclusion. The study is limited to its objectives only. However, the findings of the study can be projected to wider area having similar agroclimatic conditions.

Chapter II

REVIEW OF LITERATURE

While carrying out any systematic research, it is necessary to have knowledge of the similar previous research work carried out by other researches. It provides guideline in respect of the concepts used. Such a knowledge is helpful in designing the research problem, adopting suitable methodology and interpreting the results properly. The review of past literature therefore, forms an integral part of any systematic research work. Therefore the literature closely related to the present study is reviewed in this hapter.

The literature is grouped into following categories :-

I. Importance of agricultural development.

II. Growth rates of area, production and productivity of crops.

III. Growth rates of other factors like land utilization, irrigation, fertilizer, wage rates, livestock, cropping pattern, population, literacy etc.

IV. Economic growth and regional development.

2.1 Importance of agricultural development:-

Pawar (1978) in his study revealed that proportion of rural population was high (91.60 per cent) in Ratnagiri district as compared to rural population in the Maharashtra state (63.83 per cent) The migration of the males from the district to cities for jobs had affected the growth of agriculture. Man land ratio in Ratanagiri district was also found to be low. The growth rate of

area under coconut was positive but that of total edible oilseeds was negative. Positive and high growth rates of co-operatives credit, consumption of fertilizer and area under high yielding varieties of rice were indicators of agricultural development on right path.

Goswami (1982) studied the pattern and area allocation of crops and input structure in the hill region of Uttar Pradesh and developing agriculture in the semihill districts, central districts and border district of the region Uttar Pradesh. The lack of land for cultivation because of large area, covered with forests and grooves, etc., had retarded development. Rural poverty was the result of security of land which prevented the spread of the Green Revolution and absence of non-farm occupation cropping intensity in the hill farming was high.

Kale *et al.* (1987) studied the progress of agricultural development in Parbhani district over a period of 20 years (1960-61) to (1979-80). It was assessed with a view to measuring the magnitude of growth and fluctuations in pre-green and post-green revolution periods. Data regarding area, production and yield of major cereal crops like rice, wheat, *kharif* and *Rabi* jowar and bajara, gram as well as cash crops like cotton, sugarcane, groundnut were used. The results revealed positive growth rates with higher C.V. in most of the cereal crops in the post-green revolution period over the entire period whereas change for pulses and cash crops were not remarkable.

Chand and Swarup (1988) studied overall agricultural development in Himachal Pradesh. Though it had been a priority for the government but due to natural limitation on production base, growth in production and other services did not succeed in keeping pace with expenditure and the domestic product of the state. They emphasized on the need to set up and upgrade the institutional infrastructure under the plan as well as to develop suitable technology to make the production of other fruits equally profitable.

Thakur and Chole (1992) studied the agricultural development opportunity of the farmers and factors related with it. The development opportunity of the respondents was measured by using a development opportunity scale. The results indicated that majority & respondents had moderate development opportunity.

The independent variables namely, caste, education and land holding, annual income, social participation, socio-economic status, cosmopoliteness, risk preference, level of aspiration and independence were found positively related with development opportunity. The major ten variables explained variation in development opportunity to the extent of 61.90 per cent. The results of path analysis showed that socio-economic status and income were the most important variables affecting directly and positively.

Bhagabati (1993) studied the level of agricultural development attained by the districts of Assam. The agricultural land use distribution was

analysed in the light of some major causal factors. It identifies four levels of agricultural development covering eighteen districts of the state by means of a composite index, the range of which is calculated on the basis of nine selected indicators, which represent the importance of agricultural development. The indicators are divided into four categories, land use, crop productivity, "technification" institutional factors. Indices are synthesized to classify the district into high, medium, low and very low levels of agricultural development.

Singh and Tyagi (1995) studied the impact on agriculture in one of the block of Basti district in Eastern Uttar Pradesh. Analysis indicated that the co-operation by providing adequate and timely credit can create a favourable impact on agricultural development even in a backward region. However, to make such impact significant, it would be necessary to further expand. The services of co-operatives and increase their operational efficiency.

Ahluwalia (1996) examined with some of the key policy issues involved in achieving the objectives of faster agricultural growth of around 4 per cent per year in India and examined how this can be addressed within the framework and constraints of the new economic policy in India. Six areas of importance for accelerating agricultural development are discussed.

1. Public investment versus subsidies in agriculture.
2. Trade liberalization .

3. Extending deregulation to agriculture
4. Agricultural credit.
5. The role of agro-processing in stimulating agricultural development .
6. Technology development and research.

Li San Duk (1998) studied the agricultural development in Korea, Democratic people's Republic for the year 1960 to 1963. He observed decrease in share of agriculture in GNP from 37.6 per cent in 1960 to 8.2 per cent in 1993. The main constraints to development was small average size of farm (not more than 3 ha. of cultivated area), which does not allow the most effective use of technological advances. There was also a declining trend in the number of farms and rural population as a result of outflow of young people to town.

Andersan *et al.* (1999) examined the importance of agricultural development to alleviate poverty in the developing world. It notes that there needs to be investment in agricultural growth and particularly in research and technology. However, this alone will not secure the alleviation of poverty, with policy needing to take an important role.

2.2 Growth Rates Of Area, Production And Productivity Of Crops

Alagh and Sharma (1981) analysed the differences in agriculture growth performance in India during 1960-61 and 1972-73 by taking 1969-70 as the cut off point of comparison. The trends for food grains

such as rice, nagli, wheat and other cereals for India as a whole and wide major states. The variation in the growth trends was large.

Raja Purohit (1985) studied the recent trends in the growth rates of important selected crops specially with reference to rice, jowar and cotton in Karnataka and he 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.

Ram Verma and Singh (1985) studied trends in growth of area, production and productivity of major crops in India and they found that agriculture was backbone of Indian economy prior to independence. Agriculture situation in India was very bad. In year 1966-67 where the introduction of HYV programme in some of the crops like paddy, wheat, potato and sugarcane showed growth in area, production and productivity, while other crops like pulses, oilseed, cotton did not register any growth in area, production and productivity. There was need for further expansion of area under oilseed crops in addition to making further improvement in the productivity.

Walia *et al.* (1986) studied the growth analysis and trends of area, production and yield of potato in major potato growing states of India. For this study, the secondary data for period from 1950-51 to 1979-80 were divided into three decades and each for the major potato growing areas like Assam, Bihar, Madhya Pradesh, Uttar Pradesh, West Bengal, Himachal

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 yield of potato were observed in Assam during 1950-51 to 1959-60. Decline in growth rates were observed in Bihar and Madhya Pradesh during 1970-71 to 1979-80.

Nagraj and Bathaiah (1986) conducted study on the growth rate in area, production and productivity of fifteen crops in Andhra Pradesh from 1970-71 to 1980-81. They indicated that both area and productivity per hectare play an important role in raising production of paddy, jowar, bajara, maize, ragi, green gram and cotton. The area under sugarcane and productivity had shown negative growth rate. Groundnut registered negative area, production and productivity. The production of wheat, bengal gram, horse gram and tobacco had declined due to reduction in the area.

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 rate of area was 1.71 per cent and 10.23 per cent in the period 1960-61 to 1983-84. The compound growth rate of production was 2.66 per cent in Andhra Pradesh and 6.17 per cent in Karnataka for the same period. The compound growth rate of productivity was 0.87 percent in Andhra Pradesh and -3.68 per

cent 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.

Rao and Rao (1986) studied the growth rates in area, production and yield per hectare of tobacco in India as compared with other tobacco growing countries of the world during the period 1967 to 1989 and they concluded that these other countries had relatively lower contribution in the world production of tobacco.

Bhambure (1987) conducted study of districtwise growth rates of agriculture in the Konkan region and concluded that the growth rates of area for all foodgrain crops were negative in Ratnagiri district but positive for horticultural production like coconut, mango, cashewnut, Long term loans advanced by land development banks had positive growth rate in all districts of Konkan region.

Singh and Swarup (1988) analysed 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 district of state. They concluded 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 positive 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 0.04 per cent to 0.60 per cent per annum, respectively.

Singh *et al.* (1989) indicated that the area, production and productivity of sugarcane more or less remained static. After 1980-81 the area and production of sugarcane showed an increasing trend overtime. The area under sugarcane increased from 13.63 lakh hectaresduring 1961-62 to 1959 lakh hectaresduring 1986-87.

Tripathy (1990) analysed the change in the composition of agricultural production and its stability in Orissa State, India. Cropping pattern changes are analysed using three yearly average figures for 1951-52 to 1953-54, 1966-67 to 1968-69 and 1977-1978 to 1979-80 as well as estimation of linear growth rates of area, production and yields of principal crops. Stability analysis is carried out for area, production and yields of selected crops and the aggregate of all crops.

Mitra and Jena (1991) conducted the study on growth rates of groundnut production in Orissa. He worked out the growth rates during the study period i.e. from 1950-51 to 1985-86 and concluded that the compound growth rates of area were 3.70 per cent, 9.83 per cent and 8.17 per cent, compound growth rates of productivity were 5.85 per cent, 9.76 per cent and 10.47 per cent respectively. In respect of productivity compound growth rates were 2.12 per cent, 0.16 per cent and 0.11 per cent .

Naidu and Munikrishnaan (1991) examined the growth and the instability of agricultural output, during post and pre-green revolutions period in Chittor district, Andhra Pradesh. The linear growth rate and compound growth rates of area, production and productivity are calculated for the principal crops during the periods 1954-55 to 1985-86. To measure the instability the coefficient of variation and instability were used. 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.

Singh *et al.* (1993) examined the growth rates of area, production and productivity of chick peas in different areas of Bihar, India and to estimate the various factors affecting the area, production and productivity of chick pea cultivation over the region. The state of Bihar is divided into 6 agro-climatic zones for the purpose of the study and time series data was collected over the period 1960-61 to 1989-90. The data was used to estimate compound growth rates of area, production and productivity and to estimate a Cobb-Douglas production function to investigate the determinants of chick pea output. Results indicate that area production of chick pea is in steady decline as farmers switch to cereals and cash crops.

Lal *et al.* (1994) analysed the growth rates of area, production and productivity of rice, wheat and maize in Bihar state, India over the period 1951-52 to 1987-88, which encompasses the pre and post-green Revolution period. The growth rate of production was significant for all crops due to the significant growth in productivity. The contribution of area to production was not significant for rice.

Shrinivas *et al.* (1994) studied the compound growth rates of area, production and yield of cotton for Cotton growing states in India (Maharashtra, Gujrat, Karnataka, Andhra Pradesh, Punjab and Madhya Pradesh). Growth rates are estimated for three periods, Green Revolution period (1951-52 to 1968-69) Post-Green Revolution (1969-70 to 1986-87) and overall period. A production function analysis was also conducted to estimate elasticities of production and coefficients of multiple determination of input factors (irrigation, crop area, cropping intensity, fertilizer consumption, electricity consumption, rainfall).

Pandey *et al.* (1994) conducted a study which was based on an index no. approach to productivity measurement measured the growth rates of crop production output and input for each of the 12 districts in Haryana state, India. during the green revolution period (1970-71 to 1979-80) and the Post-Green Revolution period (1980-81 to 1989-90). Fourteen crops and 16 inputs comprising various types of Land, Power in factor and values shares and trends in total factor productivity were examined. In the Post-Green Revolution period, the output and input growth rates were 2.288 and

2.228 per annum, respectively for the state as a whole. Traditional input growth was 0.918 per annum while modern input growth was 1.31 per cent per annum. In general, the output growth rates were higher in the Western region than in the Eastern region.

Alexandratos (1995) discusses future developments in world food and agriculture to the year 2010, in varying degrees of detail concerning commodities and country groups. It is projected that the world population will grow to 7.200 million by the year 2010. The growth of aggregate production in agriculture will continue to slow down mirroring the similar slow down in the growth of demand for agricultural produce. The trend towards lower growth rates in the cereals production is expected to continue as focuses shift to other food stuffs.

Maheshwari (1996) studied agricultural growth in semi-arid area in Karnataka state and concluded that there was growth in the period prior to the Green Revolution which continued in period -II (1967-68 to 1979-80). In period -I (1955-56 to 1966-67) the gross irrigated area rose by 3.10 per cent per annum, while in a period-II (1967-68 to 1979-80) the gross irrigated area was increased at the rate of 1.70 per cent per annum. Per hectare fertilizer consumption was 2.22 kg in period-I, 19.08 kg in period-II and 47.38 kg in period-III (1980-81 to 1989-90).

Shinde (1995) studied compound growth rates of area, production and yield of pearl millet, for the period 1961-90 at the district level in Maharashtra state, India. Acreage showed a negative

trend for the state as a whole, while production and yields showed a positive trend. However, the results of adaptive trials in Aurangabad, Jalna and Beed district show 45 per cent to 60 per cent yield gap between actual and potential yields. Constraints contributing to low production are listed, pearl millet is grown on low fertility soils, higher than recommended plant spacing, low fertilizer use, no stable hybrids varieties, lack of timely availability of seeds, plant protection measures not undertaken, low prices and rainfed nature of crop. These areas need to be addressed in order to improve farmers returns.

Singh *et al.* (1997) examined trends in area, production and yield of major food grains (rice, wheat) coarse cereals, pulses, oil seeds, sugarcane and cotton at the state level in India and the factors responsible for determining yield and acreage of important foodgrains crops. Compound growth rates of area, production and yield were estimated by fitting log-linear functions using data for 1960-61 to 1992-93. The determinants of yield levels of important foodgrain crops were examined by fitting multiple regression equations using data for the period 1972-73 to 1992-93.

. The main determinants of agricultural performance were found to be total cropped area, yield per hectare and irrigation water, followed by regulated markets and road networks. Relatively less agriculturally prosperous states showed good potential for improving their agricultural performance.

Rangi *et al.* (1998) studied the growth pattern in Indian Punjab agriculture over the period 1966-67 to 1994-95 is and examined .. shifts in cropping pattern, compound growth rates of area, production and yields of major crops and factors associated with value productivity (fertilizer use, cropping intensity, per cent irrigated area and mechanization). Estimates are made of acreage, production and yield of wheat and rice in the year 2000-01.

Barmah and Pandey (1998) studied growth trends and variabilities in area, production and productivity of rice crops grown in three seasons(Summer, autumn, winter) in Assam, India .. for the period 1968-96. The linear and compound growth rates indicated that the highest growth rates in terms of area and production were for summer rice, whereas the highest growth rates in productivity were for winter rice, winter rice was found to be the most stable crop in terms of area and production and autumn rice in terms of productivity.

Ball *et al.* (1999) reported that disaggregated analysis of farm sector productivity growth was essential for understanding the sources of the sectors growth. Input requirement per unit of farm output as well as the overall level of input use had continued to decline. Productivity was the single dominant source of the sectors economic growth. The consistently high rates of farm sector productivity growth reported as an unbroken stream from subperiod to subperiod is so many sectoral studies conceal significant variation in state and regional trends. Productivity growth within

states and regions deviates considerably from the sector average within subperiods.

2.3 Growth rates of other factors like land utilization, Irrigation, Fertilizer, wage rates, Livestock population, cropping pattern; Literacy, agricultural finance etc.

Bhattacharya and Mahalnobis (1976) analysed the growth and population of India and Pakistan during 1901-1961 and found that the population of undivided India and Pakistan together increased per annum. The period (1871-1921) was slow growth of the population with a total increase of 20 per cent in fifty years due to fluctuating birth and death. The share of urban population of undivided India increased from 9.3 per cent in 1881 to 12.8 per cent in 1941. For the Indian union, the urban share was 17.35 per cent in 1951 and 17.99 per cent in 1961. The share of Pakistan was 10.4 and 31.3 per cent in 1951 and 1961 respectively.

Fertilizer association of India (1982) reported that fertilizer consumption in India increased at a compound annual growth rate of 9.3 per cent during the year 1971 to 1981 and revealed that violent fluctuation in fertilizer consumption from year to year as well as amongst regions and states. Panjab, Haryana and Uttar Pradesh recorded a higher growth rate in fertilizer consumption. Bihar and Gujrat indicated lower rates of growth.

Ashturkar (1986) studied progress and prospects of irrigation water management in Maharashtra. He pointed out that jowar, bajra, paddy and cotton based cropping system were equally profitable as compared to

sugarcane. Jowar, bajra, paddy and cotton require protective irrigation in the *kharif* season, while wheat, gram, safflower and sunflower made the best use of available irrigation water in *Rabi* season. Groundnut used a good deal of available water in summer season. The water requirement of these crops was two to three times less than that of sugarcane. If the area under sugarcane was restricted, large area could be brought under irrigation which ultimately would increase and stabilize the production and productivity of major cereals, pulses and oilseeds in the state.

Narappanavar (1989) conducted a comparative study of wage rates of agricultural labourers in the Karnataka state over the period from 1956-57 to 1971-72. He concluded that the real wage rate showed declining trend during 1961-62 to 1984-85 and increased marginally in year 1976-78. The rural population, which depended on wage as the main source of the income had grown steadily over time.

Ramesh Chand (1995) studied the growth, composition and analysed the factors associated with these aspects. Regional variation in livestock intensity and composition were studied in relation to agro-climatic and socio-economic variables operation in each district. The study was based on state and district level, data derived from livestock census, 1972, 1982 and 1992 and showed that the composition of livestock did not under go any change during the last two decades. The composition of breeding stock of buffalo and cows had shown improvement through increased share of milk animals and population of buffaloes was increasing.

Jha (1997) studied the agricultural growth in North-East arrival plains of Bihar and reported that compound growth rate of area, production and productivity of paddy, wheat, maize, jute and oilseeds were found to be positive. Study of growth performance of major factors of production namely, gross cropped area under major crops, area under high yielding varieties, fertilizer consumption and rainfall pattern showed an increasing trend. Irrigated area however, showed a declining trend after 1974-75 in the zone possibly because of the problem of silting and water logging in Kasi command area, a major source of irrigation in this zone.

Mittal and Praduman Kumar (2000) reported a positive relation of literacy with crop productivity and a strong link between literacy and farm modernization. It emerged as an important source of growth in the adoption of technology, use of modern inputs like Machine, fertilizer and yield. In the liberalized economic environment, efficiency and growth orientation attracted maximum attention. Literacy played a far more important role than it did in the past. Contribution of literacy through TFP would be substantial on yield, growth and domestic supply. High returns to investment on substantial yield growth and domestic supply. High returns to investment on education were expected.

Narayanmoorthy (2000) studied role of farmers education in the productivity of crops and reported that the bivariate analysis indicated that the use of yield increasing input was significantly higher among the higher educated (above 5 years of schooling) group of farmers when

compared to the less educated group of farmer (up to 5 years of schooling). The estimates of production function relating to the Samba paddy indicated that the coefficient of education was positive but not significant in influencing the productivity of paddy. In the Thaladi season, the coefficient of education was negative in four, out of five alternatives specification, but none of them was significant. The use of fertilizers had significantly influenced the productivity of paddy consistently in both the seasons. The results of the study suggested that the role of farmers education was significant with the productivity of crop.

Thammi Raju and Sastry (2000) reported that India claims to posses large number of goats i.e.122 millions with a share of 17.4 per cent of the total world population. There was a growth 21.16 per cent in total world population of goats during 1979-81 to 1988 and about 12 per cent in Asia during the same period and it was only 2 per cent in Asia and the Pacific during 1980-90. In India, the growth rate varied from 0.94 to 5.13 per cent with an overall average of 3.32 per cent during 1951 to 1988 which was highest among other livestock species.

2.4 Economic growth and regional development

Datta and Sundharam (1973) observed economic development as a process whereby in economy real national income over a long period of time. And if the rate of development was greater than the rate of population growth then per capita real income will increase.

Joshi (1986) studied agricultural and economic development in Gujrat state and analysed the structural features and silent changes experienced by Gujrat state economy. The study revealed that improvement in growth rates in all sectors in the state. Growth in agricultural production was largely explained by improvement in growth of agricultural productivity. The growth in agricultural sector was facilitated by government initiated programmes of agricultural and rural development to a considerable extent and also by the transfer of intermediate products from the non-agricultural sector such as fertilizer, insecticides,etc.

The agricultural sector was characterized by relatively greater improvement in irrigation intensity and commercialisation among large farm.

Sharma *et al.* (1997) conducted study on regional disparities in agricultural development and also stated that the new technology had not been uniform among different states /regions, it had spread thoroughly in a few favourably endowed states like Punjab, Haryana,etc. while other mountainous states like Himachal Pradesh, Jammu and Kashmir, Nagaland, Assam,etc. had lagged behind. In Himachal Pradesh the gross cultivated area and irrigated area increased by almost same proportion. In Meghalaya, the percentage of irrigated area to cultivated area increased from 1970-71 till 1980-81 but it decreased to 19.34 per cent on an all India level, increase in the irrigated area as proportion of cultivated area from 23 per cent in 1970-71 to 34 per cent in 1990-91. The highest rice productivity

was observed in Jammu and Kashmir, whereas in maize and wheat, it was the highest in Himachal Pradesh.

Deo (1998) indicated that agricultural growth during the 1980's was higher than during the earlier decades and there had been a reduction in regional disparities because of wide spread growth in 1980's. The growth of 1980's was lagged response to earlier public investment or an increase in the efficiency of investment. The declining investment of the 1980's was manifesting in terms of lower growth in foodgrain production in 1990's and discussed that agricultural growth experienced across districts for some states such as Andhra Pradesh, Assam, Himachal pradesh, Maharashtra and Tamil Nadu. It was noted that there were significant regional variations within states with widening inter district disparities.

Shiyani *et al.* (2000) observed the adoption of improved chick pea varieties was quite impressive. The area was gradually increasing in the study region by replacing the prominent local variety namely, Dahol Yellow. The important factors, which influenced the adoption of improved varieties including duration of crop, farm size, yield risk and experience of growing chick Pea crop. There was substantial increase in yield level income and labour productivity of these varieties in comparison to the local varieties other benefits of improved varieties in comparison to local variety including higher marketable surplus, price premium on grain and lower unit cost of production.

Chapter III

SOCIO-ECONOMIC BACKGROUND OF AURANGABAD DISTRICT

Socio-economic and agrophysical conditions prevailing in the area have enormous influence on crop production and livestock raising. Therefore it is very essential. The various factors like topography, locations climate, rainfall, soils, irrigation, marketing and communication facilities etc. which decide the suitability of a particular enterprise in the area. Therefore, a brief account of geographical and socio-economical condition prevailing in the selected area is given so as to have better understanding of the region and of the interpretation of the findings of the study.

1. Location

Aurangabad district lies at the heart of Marathwada region and Maharashtra state as well. The district lies between 19° 20 ' North latitude and 74° 75 ' East longitude.

2. Boundaries

The district has Jalna, Jalgoan and Beed districts to it's East North and South respectively, while Nasik and Ahmednagar shares western boundaries of the district.

3. Topography and soils

In general, the district slopes down towards South and South East. In general, elevation about the sea level varies from 2000 to 2200 feet on the North and 1700 to 1999 feet towards the South.

Most of the soil in the district is resulted from volcanic granite stone comprising mostly soils like black, medium black, calcarious with varying depths and textures. Talukas of Soygaon, Kannad, Khultabad and Sillod have light soils in their northern parts, while areas in basin of river Godavari have soils with plentiful fertility.

4. R ivers

Most part of Aurangabad District comes under river basins of Godavari and Tapi. Except Waghur, all the tributaries of Tapi are very small rivers. Godavari enters the district through Vaijapur Tahsil and flows at outsides of Vaijapur, Gangapur and Paithan talukas. Tributaries of Godavari like Purna, Shivna, Dudhna and Girija emerge from hills of Kanad Nasik Tahsil, most of which them are seasonal rivers.

5. Climate and rainfall

The climate of Aurangabad district is pleasant during greater part of the year. The climate year may be divided into three short seasons (i) a moderately warm wel-season from June to September, (ii) a cool dry season from October to February and (iii) hot dry season from March to May. Temperature here varies from 9.3°C to 40.7°C.

Most part of the district comes under drought prone area. Average rainfall of district is 735 mm while Khultabad and Vaijapur tahsil. shows highest and lowest average rainfall of 544 and 981 mm respectively.

7. Area and population

The total geographical area of the district is 10,100 sq.km. The population of the district as per the 2001 census was 29.20 lakh. The density of population per sq.km was 289. The sex ratio (male to female) was 919.

8. Land utilization

The total geographical area of the district is 1007700 ha of which area under forest is 7.08 per cent. Uncultivable land constitute 2.17 per cent of total geographical area. Proportion of culturable waste land is 1.51 per cent. Net sown area is 69.1 per cent and gross cropped area accounts for 145.01 per cent of net sown area.

9. Cropping pattern

Cropping pattern of the district is dominated by cereals. The percentage of area under total cereals to total cropped area was 55.75 per cent, while the area under pulses was only 15.01 per cent.

Thus total area under foodgrain (cereals and pulses) was 70.85 per cent. Among the cereals, jowar occupied largest area (24.52 per cent) of the total area under crop, while sugar-cane and cotton occupied only 1.94 per cent and 18.79 per cent respectively.

10. Livestock

Livestock is an integral part of agriculture and consists of cattle, buffaloes, sheep, goats, pigs and poultry. Together, they contribute to a considerable extent to the agricultural economy.

Cattle, buffaloes, sheep and goat species form 49.06 per cent, 8.21 per cent, 7.48 per cent and 32.89 per cent respectively.

11. Co-operative society

Cooperative sectors cover various aspects of agricultural needs such as extension of agricultural credit and provision of agricultural inputs through cooperative societies. In all, in the Aurangabad district, there were 698 primary agricultural societies, eight taluka Kharedi Vikri Sangh, eight Sugar Factories, 46 other agro-processing industries, 541 milk societies, 66 fisheries societies and 48 lift irrigation societies.

Transport and Communication

The total road length and length of railways route in the year 1999 was 7883 km and 180 km respectively. Road density in the district was 72 km/100 km of area. Railways and road ways provide connectivity with all major cities in the state as well as country.

Chapter IV

METHODOLOGY

The success of any scientific research depends upon the research methods used. It is necessary to adopt an appropriate method and procedure to arrive at useful conclusions. The reliability and validity of the results depend upon method and procedure of data collection and analytical tools used in the study. The methodology followed for the present study is outlined in this chapter.

SAMPLE AND DATA

I. Selection of District

Aurangabad district was selected for the present study. The main object of the present study is to evaluate the agricultural development that has been achieved so far during the last 19 years in Aurangabad district. It is believed that agricultural development in a specific region causes significant change in cropping pattern due to rational aptitude of farmers to allocate, their resources for high rewarding enterprise. The adoption of new techniques of production results in improving the productivity of crops. The new techniques of production has involved the use of crucial inputs having significant effect on the agricultural production.

II. Selected parameters for agricultural development

1. Demographic particulars

   i. Rural population as per cent to total population.
   ii. Density of population.
   iii. Working population as per cent to total population.
   iv. Agricultural workers as per cent to total population.
   v. Literacy percentage to total population.
   vi. Male female ratio.
   vii. Land man ratio.
   viii. Number of cattle per 100 ha. of total area.

ix. Irrigated area as per cent to total cropped area.

x. Application of fertilizer per hectare of gross cropped area.

2. Growth rate of Land utilization.

3. Growth rate of area, production and productivity of crops.

4. Growth rate of quantity of fertilizer used.

III The data

Since the main objective of the study is to examine the development of agriculture in Aurangabad district, for the period of 19 years (1981-1999). A time series data was necessary to study the growth rate of selected parameters. Such data can be had only through secondary sources. The required data obtained from the different published records of the state government and co-operative institution viz.,

1. Epitome of Agriculture, Department of Agriculture, Government of Maharashtra, Pune.
2. Socio-economic review and district statistical abstract of Aurangabad district, Directorate of Economics and Statistics, Government of Maharashtra, Mumbai.
3. Statistical abstract of Maharashtra state, Directorate of Economic and

Statistics, Government of Maharashtra, Mumbai.

IV. Method of analysis

Simple arithmetic averages and percentages of the selected parameters of the development were used for the comparison of situation in Aurangabad district with that of average situation in the Marathwada region and Maharashtra state.

To know the average situation and variability in selected parameters of development, arithmetic mean (X), standard derivation (S.D.); and coefficient of variation (C.V.) were estimated for each parameter.

Linear or simple growth rates

For studying the growth in selected parameters linear growth rate was estimated by using following linear function.

$Y = a + bx + e$

Where,

Y = dependent variable for which growth rate is estimated.

a = intercept or constant

b = regression/trend coefficient

x = period in years.

e = error term with zero mean and constant variance.

Compound growth rate.-

Compound growth rate of selected parameters were worked out to know the percentage increase/decrease in the selected parameters. The exponential growth function of the following formula was used for this purpose.

$Y = a\ b^x$

Where,

Y = dependent variable for which growth rate is estimated

a = intercept

b = regression/ trend coefficient

x = period in years.

e = error term with zero mean and constant variance.

$b = (1+r)$

Where,

'r' is compound growth rate

C.G.R. (%) = (b-1) x 100

Chapter-V

RESULTS AND DISCUSSION

The various aspects of agricultural development in Aurangabad district over a period of 19 years are studied and results are presented in this chapter. The various parameters selected are population, land utilization, cropping pattern, area, production and productivity of important crops, irrigation facilities, livestock, fertilizer, consumption, etc. The statistical analysis of selected parameter is done for Aurangabad district. The results are compared with Marathwada region and Maharashtra State.

5.1 Area and population

The comparative statistical information regarding geographical area and population of Aurangabad district, Marathwada region and Maharashtra State is given in Table 5.1

Table 5.1. Area and population of Aurangabad district, Marathwada region and Maharashtra state (2001)

Sr. No	Particulars	Aurangabad District	Marathwada Region	Maharashtra State
1.	Area (Sq.km)	10100	63918	307710
2.	Density of population (No. of person/ km^2)	289	198	314
3.	Rural Population (lakh)	17.0057 (61.30)	101.23 (64.89)	628.12 (64.97)
4.	Urban Population (lakh)	11.2997 (38.70)	54.77 (35.11)	338.90 (35.03)
5.	Total Population (lakh)	29.2054	156.22	967.52
6.	Literacy (Percentage)	73.63	68.52	77.27
-	Male Literacy	85.07	81.67	86.27
-	Female Literacy	61.28	55.47	67.51

(Figures in parenthesis are percentage to total population)

The total population of the district as per the 2001 census was 29.20 lakh; the proportion of rural population was low (61.30 per cent) as compared to Marathwada region (64.89 per cent) and Maharashtra State (64.97 per cent). The proportion of urban population was comparatively higher (38.7 per cent) than Marathwada region (35.11 per cent) and Maharashtra State (35.03 per cent). The density of population in Aurangabad district (289) was found more than Marathwada region (198) and less than Maharashtra State (314).

The literacy percentage of Aurangabad district was found to be more (73.63 per cent) than Marathwada region (68.52 per cent) but less than Maharashtra State (77.27 per cent). The literacy percentage of male and female in the district was 85.07 per cent and 61.28 per cent, respectively.

5.2 Manpower

The information of manpower is given in Table 5.2.

Table 5.2. Total manpower and manpower available for agriculture in Aurangabad district, Marathwada region and Maharashtra state (2001)

Sr. No	Particulars	Aurang-abad District	Marath-wada Region	Mahara-shtra State
1.	Total population (lakh)	29.20	156.22	967.53
2.	Total working population (lakh)	12.14	57.90	407.38
3.	Percentage of working population to total population	41.59	37.06	42.10
4.	Agriculture workers (lakh)	7.23	41.73	217.42
5.	Percentage of agriculture workers to total working population	59.58	72.04	53.37
6.	Sex ratio (female/1000 males)	919	845	922
7.	Land-man ratio	0.28	0.42	0.32

It is seen from the Table 5.2 that the total number of workers in the district were 12.14 lakh which forms 41.59 per cent of the total population, whereas, the working population in the Marathwada region was 57.90 lakh. The proportion of working population in Maharashtra State was 42.10 per cent which was more than Aurangabad district and Marathwada region.

Out of total working population in the district, 59.58 per cent were engaged in agriculture, while this proportion was observed to be 72.04 per cent and 53.37 per cent in Marathwada region and Maharashtra State respectively. It shows that agriculture was the main occupation of majority of population.

Sex ratio was higher in the Aurangabad district (919) compared to Marathwada division (845) and lower than the Maharashtra State (922). The land man ratio indicated the pressure of population on land and consequently backwardness or forwardness of the region. It was noticed from the table that land man ratio in Aurangabad district was the lowest i.e. 0.28, Marathwada region (0.42) and Maharashtra state (0.32).

5.3 Land utilization

Land utilization pattern of the district, Marathwada region and Maharashtra State for the year 1998-99 was studied and presented in Table 5.3.

The total area of Maharashtra State was 307.58 lakh ha and Marathwada region was 64.43 lakh ha which was 20.94 per cent of the state area whereas total area of Aurangabad district was 10.00 lakh ha which constitutes 3.25 per cent of the State area. The highest proportion of land under forest was reported in Maharashtra State (17.44 per cent) than in Aurangabad district (7.3 per cent) and Marathwada region (13.5 per cent). The

distribution of total area under different categories of land utilization shows that barren and uncultivable land area was higher in Maharashtra State (5.53 per cent) than in Aurangabad district (2.18 per cent) and Marathwada region (1.78 per cent). The proportion of land under non-agricultural use was higher in Aurangabad district (6.18 per cent) as compared to Marathwada region (3.66 per cent) and Maharashtra State (4.02 per cent).

Table 5.3. Land utilization (1998-99)

(area in '00' ha.)

Sr. No	Category of land	Auranga-bad District	Marathwada Region	Maharashtra State
1.	Total area	10008 (100)	64434 (100)	307583 (100)
2.	Forest	714 (7.3)	8703 (13.5)	53655 (17.44)
3.	Barren and uncultivable land	219 (2.18)	1147 (1.78)	17015 (5.53)
4.	Land under non-agriculture use	619 (6.18)	2360 (3.66)	12387 (4.02)
5.	Culturable waste land	152 (1.51)	2078 (3.22)	8882 (2.88)
6.	Permanent pastures and other grazing lands	376 (3.75)	2313 (3.58)	13405 (4.35)
7.	Land under miscellaneous trees, crops and grooves	54 (0.53)	431 (0.66)	2219 (0.72)
8.	Current fallow	382 (3.81)	4595 (7.13)	11319 (3.67)
9.	Other fallow	536 (5.35)	1644 (2.55)	11385 (3.70)
10.	Net area sown	7025 (69.92)	46621 (72.35)	177116 (57.58)
11.	Area sown more than once	3161 (31.36)	16001 (24.83)	44231 (14.38)
12.	Gross cropped area	10187 (101.6)	62622 (97.18)	221547 (72.02)
13.	Cropping intensity (%)	145.01	134.32	125.08

(Figures in parentheses are percentages to reported area)

Culturable waste-land in Aurangabad district, Marathwada region and Maharashtra State was 1.51, 3.22 and 2.88 per cent, respectively. Permanent pastures and grazing lands were more in Aurangabad district (3.75 per cent) than Marathwada region (3.58 per cent) but lower than Maharashtra State (4.35 per cent) land under miscellaneous trees, crops and grooves not included in net sown area was less than (0.53 per cent) as compared to Marathwada region (0.66 per cent), Maharashtra State (0.72 per cent). The proportion of current fallow was lower in the district (3.81 per cent) than in Marathwada region (7.13 per cent), but was higher than that in Maharashtra State (3.67 per cent). The proportion of other fallow was higher in the district (5.35 per cent) as compared to Marathwada region (2.55 per cent) and Maharashtra State (3.70 per cent).

The proportion of net sown area was more in Aurangabad district (69.92 per cent) than in Maharashtra State (57.58 per cent), but it was less as compared to that in marathwada division (72.35 per cent). The proportion of area sown more than once was high in the district (31.36 per cent) as compared to Marathwada region (24.8 per cent) and Maharashtra State (14.38 per cent). The cropping intensity was 145.01, 134.32 and 125.08 per cent in Aurangabad district, Marathwada region and Maharashtra State, respectively.

5.4 Livestock

Livestock is an important component of agriculture. The livestock statistics of Aurangabad district, Marathwada region and Maharashtra State is given in Table 5.4.

From the Table 5.4, it was seen that in Aurangabad district, the population of cattle was 7.16 lakh, whereas in the Marathwada region and Maharashtra State, it was 38.5 lakh and

179.49 lakh, respectively. The percentage of cattle to total livestock in the district was 57.28 per cent, whereas, in Marathwada region and Maharashtra State constituted 45.51 per cent and 43.40 per cent, respectively.

Table 5.4. Livestock statistics (1997)

Sr. No	Particulars	Aurangabad district			Marathwada region		Maharashtra state	
		Number	Percentage to total Livestock	Percentage Share of Abd dist. With total M.S.	Number	Percentage of total livestock	Number	Percentageof livestock
1)	Total cattle	716137	57.28	3.98	3857743	45.51	17949000	43.40
2)	Total buffalo	102719	8.21	1.58	1280645	15.10	6484000	15.68
3)	Total bovine	613418	49.06	2.51	5138388	60.62	24433000	59.08
4)	Total goats	411209	32.89	3.49	2330434	27.50	11772800	28.49
5)	Total sheep's	93585	7.48	3.17	512182	6.04	2943200	7.11
6)	Total horses and ponies	2737	0.21	10.24	6515	0.07	26713	0.06
7)	Other livestock	26543	2.12	1.22	488924	5.77	2175415	5.26
8)	Total livestock	1250211	100	3.02	8476443	100.00	41351128	100.00
9)	Total poultry	521266	--	1.49	3539823	-	34984000	-
10)	No.of cattle/100 ha of area	69.35	--	--	59.87	-	58.35	-

The percentage of buffaloes to total population in Aurangabad district was 8.21, which was low as compared to Marathwada region (15.10 per cent) and Maharashtra State (15.68 per cent), respectively. The share of Aurangabad district in total population of buffalo in Maharashtra State was just 1.58 per cent.

The population of goats in total livestock population in the district was 4.11 lakh (32.89 per cent), whereas, it was 51.38 lakh (60.62 per cent) in Marathwada region and 117.72 lakh (28.49 per cent) in Maharashtra State. The share of Aurangabad district to total population of goats in Maharashtra State was 3.44 per cent. The population of sheeps was 0.93 lakh (7.48 per cent) in the district, while it was 5.12 lakh (6.04 per cent) and 29.43 lakh (7.11 per cent) in Marathwada region and Maharashtra State, respectively. The number of poultry birds in the district was 5.21 lakh against 35.39 lakhs in Marathwada region and 349.84 lakh in Maharashtra state. The share of Aurangabad district in total population of poultry birds in the state was 1.49 per cent.

The total livestock of Aurangabad district in comparison of Maharashtra state was not booming as a majority of district does not receive enough rains to make availability of perennial pastures, also constraints in irrigation development are responsible to some extent.

5.5 Cropping pattern

The type of different major crops grown and the proportion of area under foodgrains, cash crops influence the agricultural economy of any region. The information about cropping pattern is given in Table 5.5.

From Table 5.5, it can be concluded that *Rabi* jowar was the most important cereal crop of this district occupying 21.06 per cent area of the total cropped area and 6.06 per cent of the total area under *Rabi* jowar in Maharashtra State. The percentages of area under *Rabi* jowar in Marathwada region and Maharashtra State were 14.78 and 12.72 per cent, respectively. The percentage of bajra in total cropped area was 16.13 per cent,

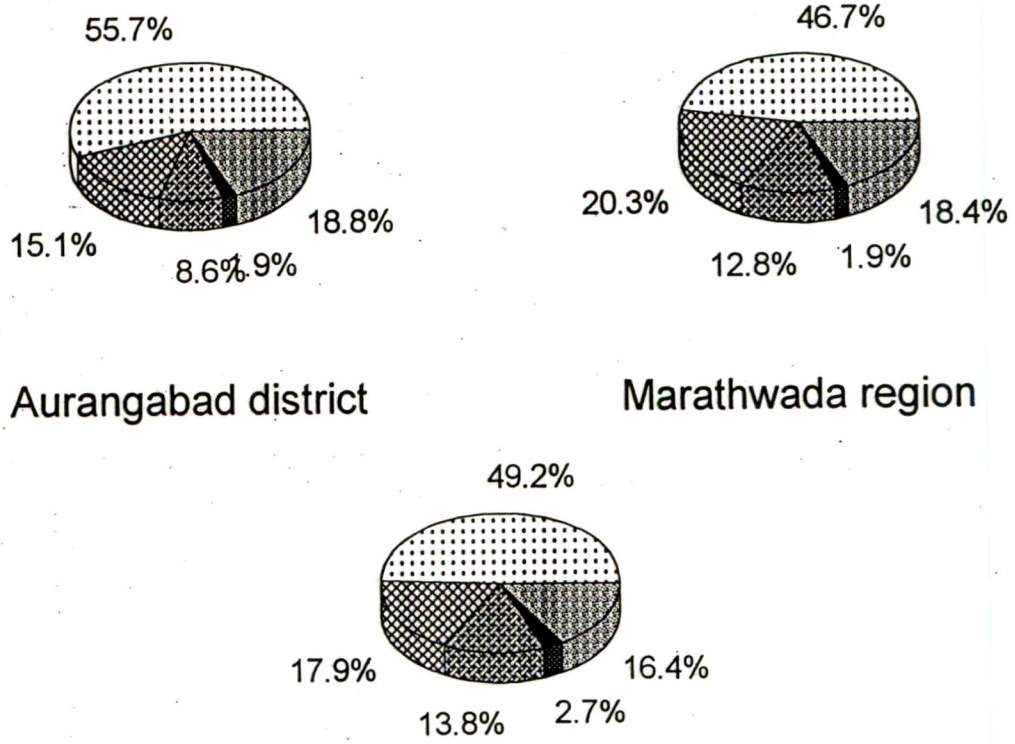


Fig. Percentage share of various crops in cropping pattern

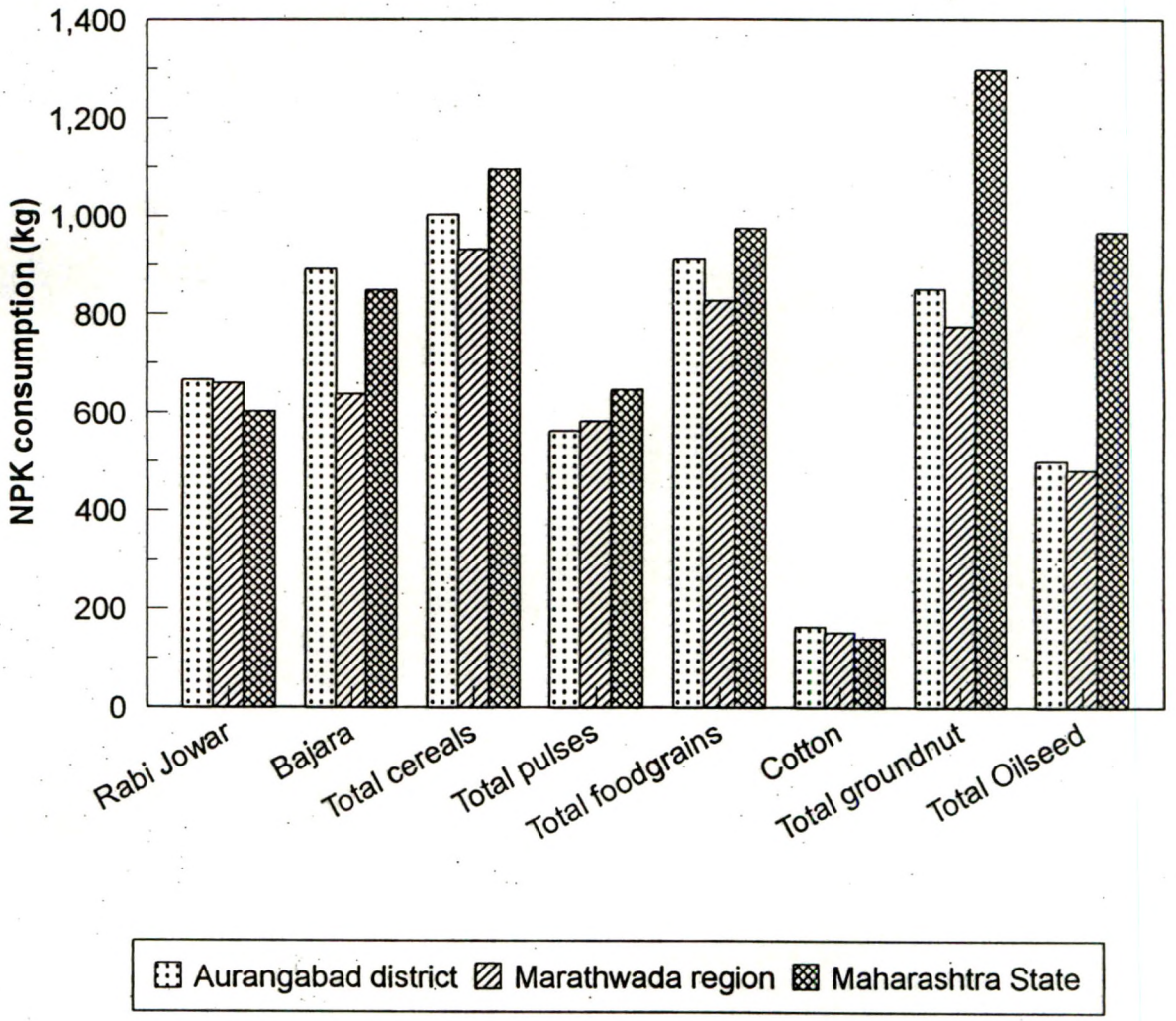


Fig. Productivity of principal crops(kg/ha)

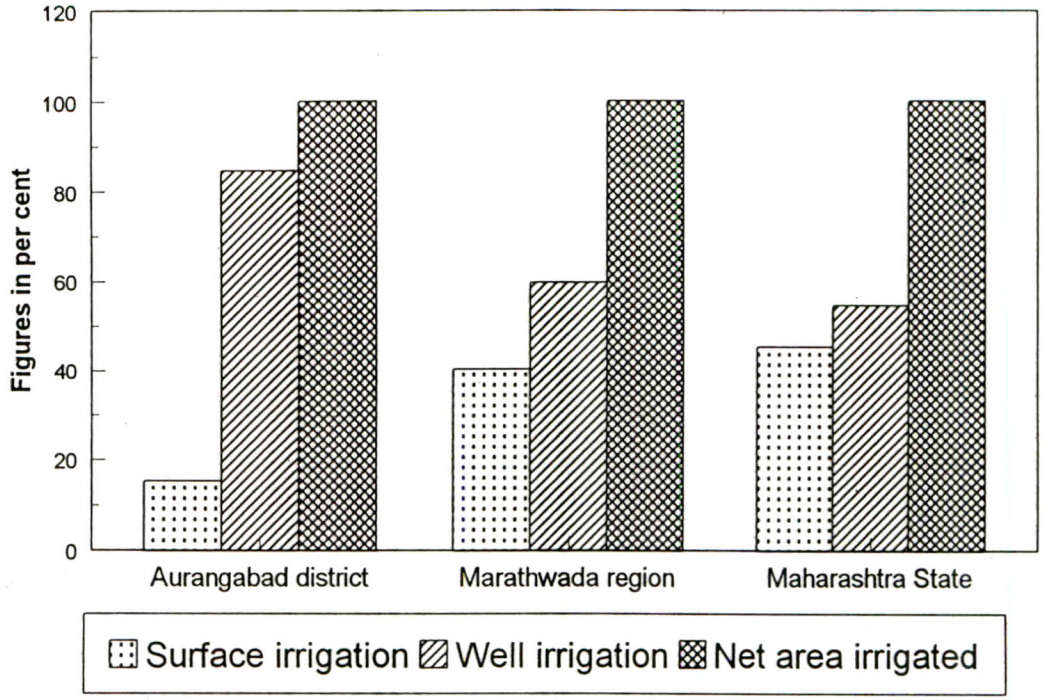


Fig. Sources of irrigation

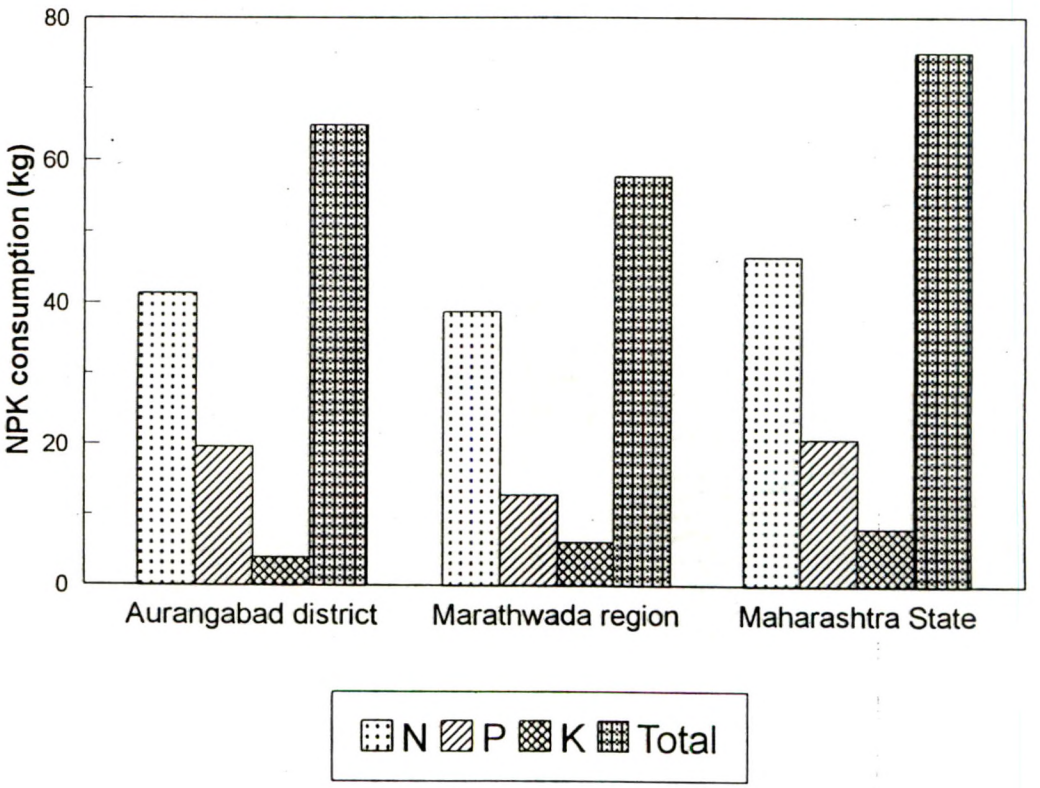


Fig. Per hectare fertilizer consumption

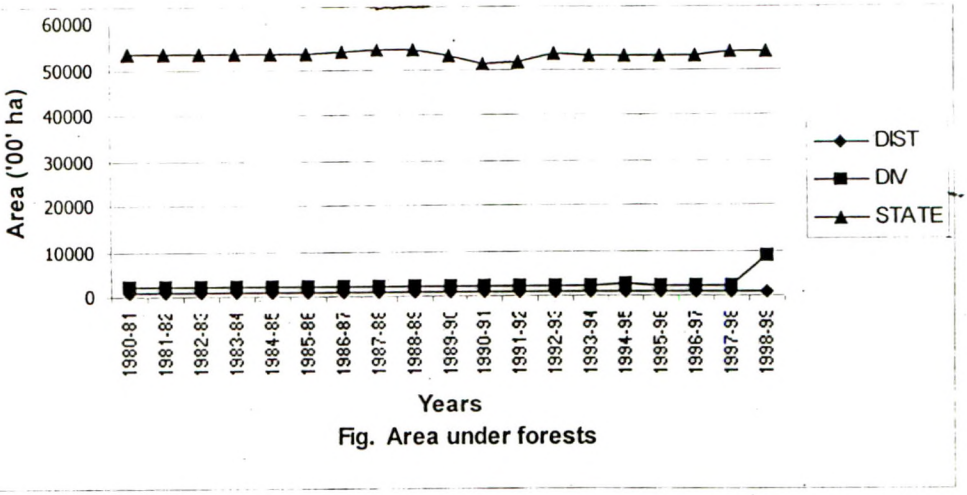


Fig. Area under forests

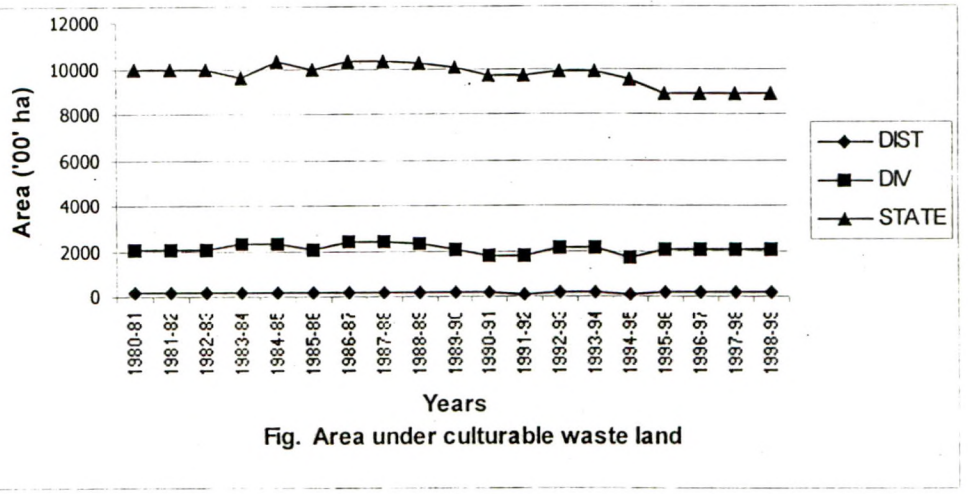


Fig. Area under culturable waste land

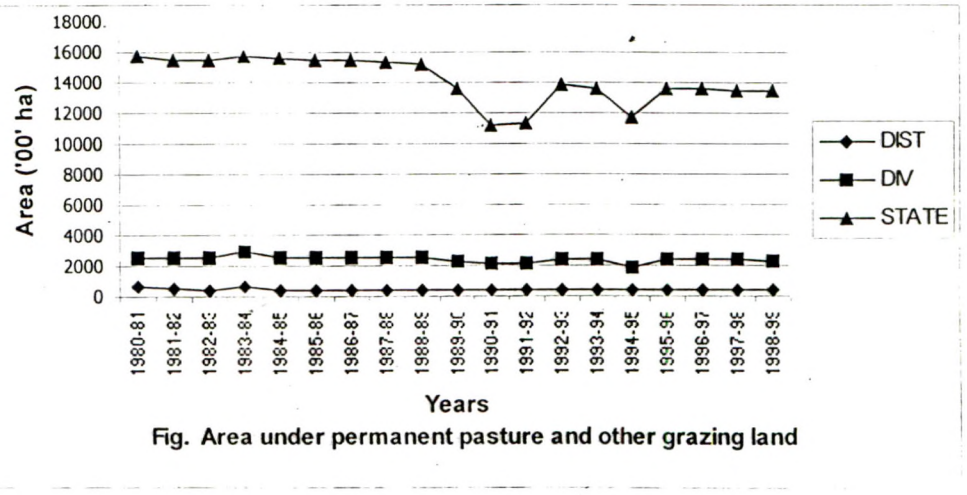


Fig. Area under permanent pasture and other grazing land

which was still higher than that in Marathwada region (6.7 per cent) and Maharashtra State (7.84 per cent)

Table 5.5. Cropping pattern (1998-99)

Sr. No	Particulars	Aurangabad district			Marathwada region		Maharashtra state	
		Area in '00' ha	Per cent to total cropped area	Per cent to share with M.S.	Area in '00' ha	Per cent to total cropped area	Area in '00' ha	Per cent to total cropped area
1)	R. Jowar	1710	21.06	6.06	9258	14.78	28202	12.72
2)	Bajra	1310	16.13	7.44	4246	6.78	17597	7.94
3)	Total cereals	4527	55.75	16.21	27192	43.42	96041	43,35
4)	Total pulses	1226	15.10	3.49	11796	18.83	35064	15.82
5)	Total foodgrains	5738	70.67	4.37	38427	61.36	131108	59.17
6)	Total groundnut	123	1.51	2.26	887	1.41	5425	2.44
7)	Total oilseeds	697	8.58	2.58	7431	11.86	26976	12.17
8)	Sugarcane	158	1.94	2.98	1110	1.77	5298	2.39
9)	Cotton	1526	18.79	4.77	10692	17.07	31991	14.43
10)	Total cropped area	8119	100.00	3.66	62622	100.00	221547	100.00

The proportion of area under total cereals in the Aurangabad district was more (55.75 per cent) as compared to Marathwada region (43.42 per cent) and Maharashtra State (43.35 per cent). The percentage of area under total pulses to total cropped area in the district (15.10 per cent) was somewhat similar to that in Maharashtra State (15.82 per cent) while it was higher in Marathwada region (18.83 per cent). The proportion of area under foodgrains was more in Aurangabad district (70.76 per cent) as compared to Marathwada region (61.36 per cent) and Maharashtra State (59.17 per cent). The share of area under total oilseeds in the cropping pattern of the district was lower than that

in Marathwada region (11.86 per cent) and Maharashtra State (12.17 per cent). Sugarcane contributed less to the cropping pattern of the district (1.94 per cent) and of the division (1.97 per cent) contrasting to the Maharashtra state (2.39 per cent), while the Maharashtra State (2.39 per cent), while the contribution of cotton was more in the division and the district i.e. 18.79 and 17.07 per cent, respectively than that in the State (14.43 per cent).

5.6 Production and productivity of principal crops

The information about production and productivity is depicted in Table 5.6.

Table 5.6.Production and productivity of principal crops(1998-99)

Particulars	Aurangabad district		Marathwada region		Maharashtra state	
	Production '00' (M.T.)	*Productivity (kg/ha)*	*Production '00' (M.T.)*	*Productivity (kg/ha)*	*Production '00' (M.T.)*	*Productivity (kg/ha)*
R. Jowar	1137 (6.69)	665	5994 (35.29)	659	16983	602
Bajra	1166 (16.88)	890	3159 (45.74)	639	6906	848
Total cereals	4521 (4.30)	1002	24807 (23.59)	931	105129	1095
Total pulses	688 (3.04)	561	7009 (31.5)	581	22573	844
Total Food grain	5209 (4.07)	908	31816 (24.91)	826	127702	974
Total groundnut	81 (1.21)	849	622 (9.32)	774	6673	1297
Total oilseeds	348 (1.33)	499	3549 (13.60)	481	26077	966
Sugarcane	13830 (2.93)	87532	86263 (18.29)	78778	471513	88998
Cotton	1483 (5.66)	162	9321 (35.59)	151	26189	139

(Figures in parentheses are percentage share with total Maharashtra state)

As most of the part of district comes under drought prone area, bajra emerged as major crop in *kharif* season. The district solely contribute to 16.88 per cent to the total production of bajra in the state. Productivity of bajra in the district (890 kg/ha) was more than Marathwada (639 kg/ha) and Maharashtra state (602 kg/ha). Same was the case with *Rabi* jowar i.e. productivity in district, division and state was 665 kg/ha, 659 kg/ha and 602 kg/ha respectively. Out of total cereal production, Aurangabad district and Marathwada region contributes 4.3 and 23.59 per cent. Productivity of total cereals was higher (1095 kg/ha) in state than in Aurangabad district (1002 kg/ha) and Marathwada region (931 kg/ha). Aurangabad district and Marathwada region contributes only 3.04 per cent and 31.5 per cent respectively to production of total pulses with lesser productivity of 561 kg/ha and 581 kg/ha respectively than Maharashtra State i.e. 844 kg/ha. In general, productivity of foodgrains was lower in the district (908 kg/ha) than in state. Contribution to total foodgrain production by the district to the state pool was only 4.07 per cent. In oilseeds also, Aurangabad district and Marathwada region contributed merely by 1.3 and 13.60 per cent, respectively, as the productivity in both of above was very less i.e. 499 kg/ha and 481 kg/ha, respectively, as compared to the Maharashtra State (966 kg/ha). Although productivity of sugarcane was somewhat at par in the district (87532 kg/ha) with the Maharashtra State (88998), the contribution of the district to total sugarcane production was only 2.93 per cent to the total sugarcane production in the Maharashtra State. Aurangabad district and Marathwada region contribute substantially by 5.60 per cent and 35.59 per cent, respectively to the total production of cotton in the state due to higher

productivity of 162 kg/ha and 151 kg/ha respectively than 139 kg/ha in the state.

5.7 Area irrigated by different sources

The different sources of irrigation available in the district were also studied and the details are presented in Table 5.7.

Table 5.7. Area irrigated by different sources (1998-99)

(Area in hectare)

Particulars	Aurangabad District	Marathwada region	Maharashtra State
Surface irrigation	24888 (15.36)	363163 (40.33)	1165500 (45.39)
Well irrigation	137096 (84.62)	537478 (59.67)	1402400 (54.61)
Net area irrigated	162000 (100)	900641 (100.00)	2567900 (100.00)
Percentage of net area irrigated to net sown area	23.04	19.31	14.48
Area irrigated more than once	170000	609000	794400
Gross irrigated area	185000	1651970	3362300
Percentage of gross irrigated area to gross cropped area	26.80	26.38	15.18

(Figures in the parenthesis are the percentages to net irrigated area)

The net area irrigated by surface irrigation in the district was about 24888 ha constituting 15.36 per cent of net area irrigated. It was lower than Marathwada region and Maharashtra State. The well irrigation in Aurangabad district was 84.62 per cent which was higher than Marathwada region (59.67 per cent) and Maharashtra state (54.61 per cent). The net area irrigated in

Aurangabad district was 162000 ha whereas in Marathwada region, it was 900641 ha and in Maharashtra State 2567900 ha.

The percentage of net area irrigated to net sown area in Aurangabad district was 23.04 per cent which was higher than Marathwada region (19.31 per cent) and Maharashtra State (14.48 per cent). Gross irrigated area in Aurangabad district was 185000 ha, while 609000 ha in Marathwada region and 3362300 ha in Maharashtra State. The percentage of gross irrigated area to gross cropped area was 26.80 per cent in Aurangabad district which was higher as compared to Marathwada region (26.38 per cent) and Maharashtra State (15.18 per cent).

5.8 Fertilizer consumption

Fertilizer consumption statistics of Aurangabad district, Marathwada region and Maharashtra State is depicted in Table 5.8.

Table 5.8. Fertilizer Consumption (1998-99)

Fertilizer	Fertilizer Consumption in M.T.		
	Aurangabad District	Marathwada region	Maharashtra State
N	45152 (41.3)	241783 (38.60)	1025493 (46.28)
P	19905 (19.5)	81083 (12.74)	457747 (20.66)
K	4013 (3.9)	38225 (6.1)	179107 (8.08)
Total	66070	361091	1662347
Fertilizer consumption (kg/ha)	64.8	57.66	75.03

(Figures in the parenthesis are per hectare consumption of fertilizers in kg).

The Table 5.8 indicates that 45.152 MT of N, 19905 MT of P and 4013 MT of K were consumed in the district. Per hectare consumption of the district, N, P, K constitute 41.3 kg, 19.5 kg and 3.9 kg, respectively. Total fertilizer consumption of Marathwada region was 361091 MT, out of which 38.6 kg of N, 12.74 kg of P and 6.1 kg of K was consumed per hectare. Total fertilizer consumption of Maharashtra State was 1662347 MT, out of which, 46.23 kg of N, 20.66 kg of P and 8.1 kg of K was consumed per hectare. The per hectare consumption of fertilizers in Aurangabad district, Marathwada region and Maharashtra State was 64.8 kg, 57.60 kg and 75.03 kg, respectively.

5.9 Development of selected parameters

The development of various selected parameters are discussed here.

5.9.1 Trends in land utilization

Land forms the most important natural wealth and its proper utilization is a matter of almost concern to the people as its improper use leads to wastage and progressive deterioration or loss of productivity. To know the development in the land utilization in Aurangabad district, Marathwada region and Maharashtra State, mean, S.D. and C.V. of land utilization are worked out and are given in Table 5.9.

5.9.1 Area under forest

It was observed from the Table that during period of 1981, the area under forest in Aurangabad district was 820 hundred ha, which decreased to 714 hundred ha at the end of the year 1999. During this period (1981-1999), the average area under forest was 766.42 hundred ha. The variability in the area under forest was 4.64 per cent.

The average area under forest in Marathwada region was 2657.4 hundred ha and the variability in the area was 55.13

per cent. While the average area under forest in Maharashtra was 66516 hundred ha and the variability was 87.77 per cent. As compared to Marathwada and Maharashtra State, more stability in area under forest was observed in Aurangabad district.

5.9.2 Area under barren and uncultivable land

The area under barren and uncultivable land in Aurangabad district in the beginning year (1981) was 269 hundred ha which decreased to 219 hundred ha at the end of 1999. The average area under barren and uncultivable land was 194.4 hundred ha and the variability in the area was 21.01 per cent.

The average area under barren and uncultivable land in Marathwada region and Maharashtra State was 1147 hundred ha and 17015 hundred ha respectively and variability was 8.26 per cent and 2.89 per cent respectively. More stability in the area under barren and uncultivable land was observed in Maharashtra State as compared to Aurangabad district and Marathwada region. Decreasing trend in the area under barren and uncultivable land was observed in Aurangabad district, and Maharashtra State, while increasing trend was noticed in Marathwada region.

5.9.3 Land under non-agricultural use

The land under non agricultural use during the year 1981 was 741 hundred ha in Aurangabad district which came down to 619 hundred ha in 1999. The average land under non-agricultural use was 633.9 hundred ha with a variability of 17.23 per cent in Aurangabad district.

The average land under non-agricultural use was 2267.3 hundred ha and variability was 14.95 per cent in the Marathwada region and it was 11325 hundred ha and 7.91 per cent respectively, in Maharashtra State. More stability in the land under non-agricultural use was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.9.4 Area under cultivable waste

The area under cultivable waste in the beginning of the year was 200 hundred ha in the district which decreased to 152 hundred ha in the year 1999. The average area under cultivable waste was 145.68 hundred ha with a variability of 16.19 per cent.

The average area under cultivable waste was 2089.4 hundred ha and 97.07 hundred ha in Marathwada region and Maharashtra State, respectively with a variability of 9.30 per cent and 5.09 per cent.

5.9.5 Area under permanent pasture and grazing land

In Aurangabad district, area under permanent pasture and other grazing land at the beginning of the year was 703 hundred ha, which decreased to 376 hundred ha. The average area under permanent pasture and grazing land was 471.7 hundred ha and variability was 17.83 per cent.

The average area under permanent pasture and other grazing land was 2401.9 hundred ha and the variability was 9.59 per cent and 14148 hundred ha and 10.66 per cent in Marathwada region and Maharashtra State, respectively. More stability in the area under pastures was observed in Marathwada region as compared to Aurangabad district and Maharashtra state. It is seen from the table that the area under permanent pasture and other grazing land was decreasing in Aurangabad district, Marathwada region and Maharashtra State.

5.9.6 Land under miscellaneous trees and grooves

In Aurangabad district, the land under miscellaneous trees and grooves not included in net sown area decreased from 144 hundred ha to 54 hundred ha during the period 1981 to 1999.

and

Table 5.9. Mean S.D. & C.V. for land utilization in Aurangabad district, Marathwada division and Maharashtra State (1980-1999)

(Area in '00' ha)

Sr. No.	Particulars	Aurangabad district					Marathwada region					Maharashtra State				
		Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)
1.	Forest	820	714	766.42	35.56	4.64	2238	8703	2657.42	1465.21	55.1	53291	53655	66516.36	58381.77	87.77
2.	Barren & uncultivated land	269	219	1944	40.85	21.01	946	1147	1033.10	85.35	6.26	17373	17015	17012.15	492.62	2.89
3.	Land under non-agril use	741	619	633.9	109.25	17.23	2242	2360	2267.36	338.99	14.95	10479	12387	11325.73	896.15	7.91
4.	Cultivable Waste	200	152	145.68	23.59	16.19	2047	2078	2089.47	194.43	9.30	9923	8882	9707.36	495.01	5.09
5.	Permanent pasture and other grazing land	703	376	471.7	84.13	17.83	2564	2313	2401.94	230.75	9.5	15656	13405	14148.36	1512.05	10.68
6.	Land under misc. trees, & grooves not included in area not sown	144	54	58.79	32.51	55.30	346	431	353.84	59.58	16.83	2120	2219	2187.10	366.66	16.77
7.	Current fallow	594	382	326.52	169.14	51.80	3403	4595	3424.94	768.15	22.42	8580	11319	3168.31	11856.87	20.25
8.	Other fallow	508	536	366.73	156.84	42.74	1944	1644	2244.15	749.85	33.41	9981	11385	10781.84	1878.46	17.42
9.	Net sown area	12293	7025	8370	2326	27.79	48572	46621	48173.04	1123.08	2.33	180080	177116	232615.84	230793.01	99.21
10.	Area sown more than once	1324	3162	1549.7	883.75	57.02	4685	16601	13229.31	17558.04	132.72	16344	44231	27368.36	8436.18	30.92
11.	Total cropped area	13617	10187	10471	2368.5	22.62	53257	62622	57557.05	3671.49	6.37	196424	221547	207063.73	8204.18	3.96

The average land under miscellaneous trees and grooves not included in net sown area was 58.79 hundred ha and the variability was 55.30 per cent.

The average area under this category was 353.8 hundred ha in Marathwada region and 2187 hundred ha in Maharashtra State. The variability for Marathwada region and Maharashtra State was 16.83 per cent and 16.77 per cent, respectively. It is seen from the table that area under miscellaneous trees and grooves not included in net sown area was decreased in Aurangabad district and increased in Marathwada region and Maharashtra State.

5.9.7 Area under current fallow

The area under current fallow in Aurangabad district decreased from 594 hundred ha to 382 hundred ha during the period 1981 to 1999. The average area under current fallow was 326.52 hundred ha and variability was 51.80 per cent. In Marathwada region, the average area under current fallow was 3424.9 hundred ha and variability was 22.42 per cent. In Maharashtra State, the average area under current fallow was 9168 hundred ha and variability was 20.25 per cent. It was observed that the area under current fallow was decreased in Aurangabad district while it was increased in Marathwada region and Maharashtra State.

5.9.8 Area under other fallow

The area under other fallow in the district was 508 hundred ha and 536 hundred ha during 1981 and 1999 with an average of 366.73 hundred ha and variability of 42.74 per cent.

The average area under other fallow was 2244 hundred ha and 10781 hundred ha, with variability of 33.41 per cent and 17.42 per cent in Marathwada region and Maharashtra

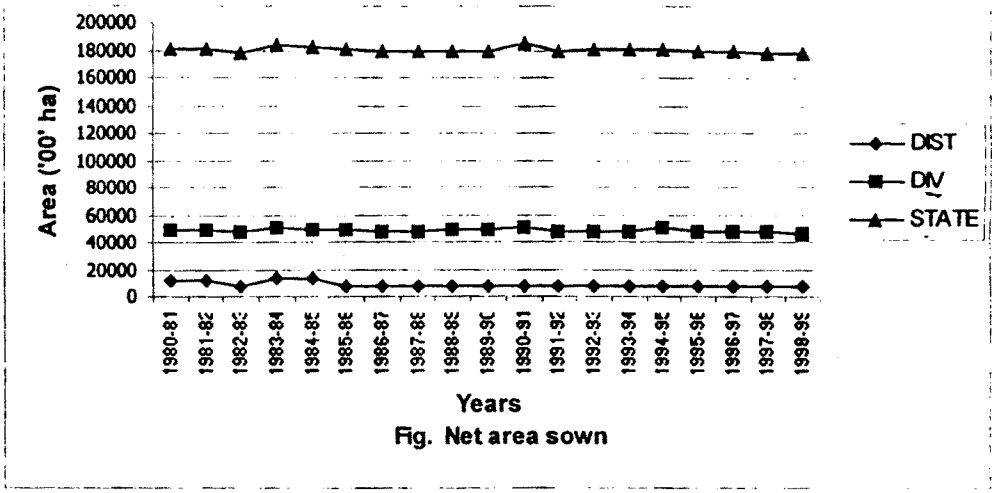


Fig. Net area sown

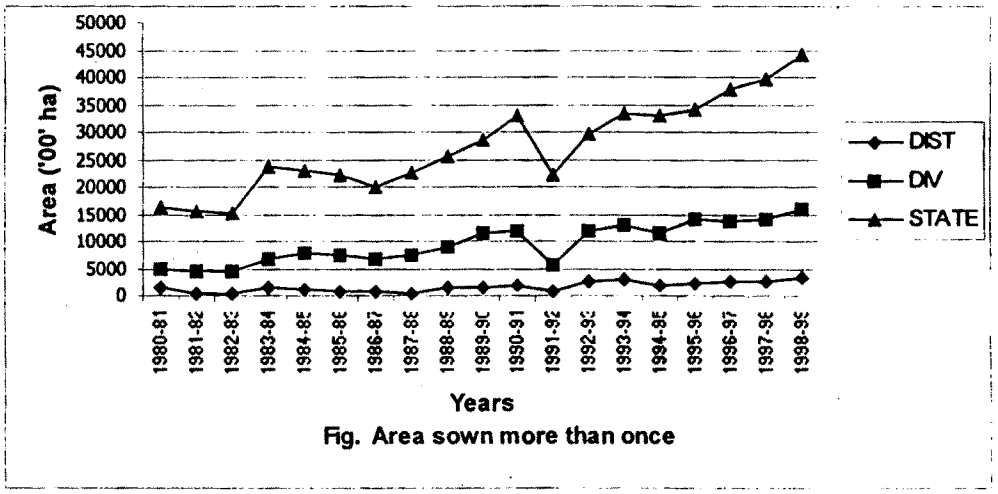


Fig. Area sown more than once

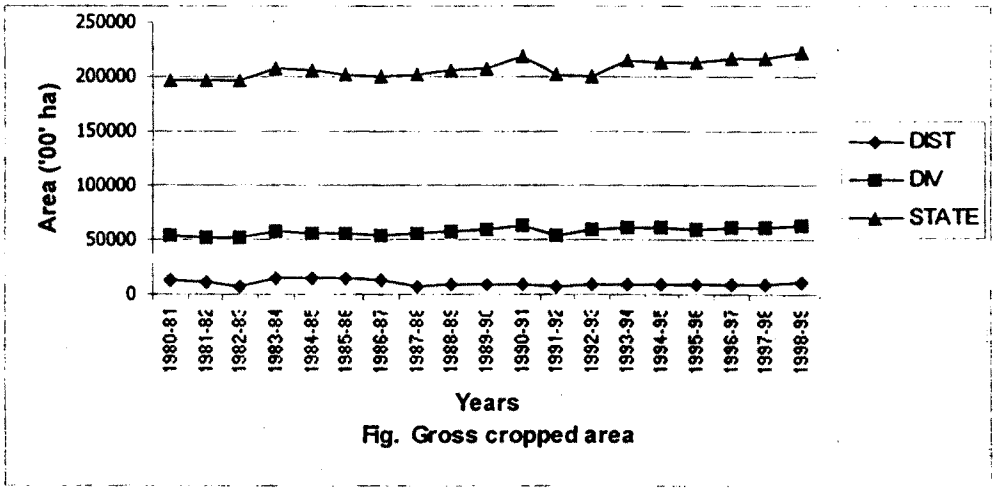


Fig. Gross cropped area

State, respectively. It is seen from the Table that area under other fallow was increased in Aurangabad district and Maharashtra State and decreased in Marathwada region.

5.9.9 Net sown area

The net sown area in Aurangabad district in the beginning year was 12293 hundred ha which decreased to 7025 hundred ha in the year 1999. The average net sown area was 8370 hundred ha and variability was 27.79 per cent.

In Marathwada region, net sown area increased from 48572 hundred ha to 76622 hundred ha during the period 1981 to 1999 with a variability of 2.33 per cent. While in Maharashtra State, net sown area decreased from 180080 hundred ha to 177116 hundred ha during said period with a variability of 99.21 per cent. More stability was observed in Marathwada region as compared to Maharashtra State and Aurangabad district. It was noticed that net sown area was decreased in Aurangabad district and Maharashtra State and increased in case of Marathwada region.

5.9.10 Area sown more than once

Area sown more than once was increased in Aurangabad district from 1324 hundred ha to 3162 hundred has with an average of 1549.7 hundred ha and variability of 57.02 per cent during 1981 to 1999.

Area sown more than once was increased in Marathwada region and Maharashtra State during 1981 to 1999 with an average of 13229 hundred ha and 27368 hundred ha respectively and variability was 132.72 per cent and 30.82 per cent, respectively. A noticeable increase in area sown more than once is probably due to the increase in irrigation facilities.

5.9.11 Gross cropped area

Gross cropped area in Aurangabad district was 13617 hundred ha which reduced to 10187 hundred ha from the year 1981 to 1999. The average gross cropped area in the district was 10471 hundred ha and variability was 22.62 per cent.

The average gross cropped area was 57557 hundred ha and 207063 hundred ha in Marathwada region and Maharashtra State with variability of 6.37 per cent and 3.96 per cent, respectively. It is seen from the Table that gross cropped area was decreasing in Aurangabad district while it was increasing in Marathwada region and Maharashtra State.

5.10 Area under different crops

To know the development of area under different crops in Aurangabad district, Marathwada region and Maharashtra State. the mean, S.D. and C.V. of area under different crops were worked out and presented in Table 5.10.

5.10.1 Area under wheat

In Aurangabad district, area under wheat in the beginning of year 1981 was 872 hundred ha which decreased to 510 hundred ha in the year 1999. The average area under wheat was 355.2 hundred ha and variability in the area was 44.00 per cent.

The average area under wheat in Marathwada region and Maharashtra State was 2265 hundred ha and 85684 hundred ha, respectively and variability was 22.5 per cent and 17.43 per cent, respectively. Area under wheat in Maharashtra State shows more stability as compared to Aurangabad district and Marathwada region.

5.10.2 Area under *kharif* jowar

Area under *kharif* jowar in the Aurangabad district was 1121 hundred ha and 281 hundred ha during the year 1981 and 1999 respectively. The average area under *kharif* jowar was 535.6 hundred ha with a variability of 33.58 per cent.

In Marathwada region and Maharashtra State, average area under *kharif* jowar was 9558.6 hundred ha and 26601 hundred ha, respectively and variability was 9.97 per cent and 14.29 per cent, respectively. More variability in terms of *kharif* jowar was observed in Aurangabad district as compared to Marathwada region and Maharashtra State. Area under *kharif* jowar was decreasing in Aurangabad district, Marathwada region and Maharashtra State.

5.10.3 Area under *Rabi* jowar

In Aurangabad district, area under *Rabi* jowar in the beginning of year 1981 was 3258 hundred ha which reduced to 1710 hundred ha in the year 1999. The average area under *Rabi* jowar was 2363.3 per cent and variability was 24.33 per cent.

In Marathwada region and Maharashtra State, the average area under *Rabi* jowar was 10531.4 hundred ha and 34297.5 hundred ha with variability of 12.72 per cent and 7.9 per cent respectively. In terms of area under *Rabi* jowar, Maharashtra State shows more stability than Aurangabad district and Marathwada region.

5.10.4 Area under bajra

The area under bajra in Aurangabad district during year 1981 and 1999 was 1842 hundred ha and 1310 hundred ha, respectively. The average area under bajra in Aurangabad district was 1682 hundred ha with a variability of 12.61 per cent.

The average area under bajra in Marathwada region and Maharashtra State was 4220 hundred ha and 17732 hundred ha with a variability of 13.15 and 7.7 per cent, respectively. It is seen from the table that Maharashtra State shows more stability in area under bajra than Aurangabad district and Marathwada region.

5.10.5 Area under other cereals

Aurangabad district, shows comparative increase in area under other cereals from 94 hundred ha in 1981 to 689 hundred ha in 1999 with an average of 265.1 hundred ha and variability of 96.75 per cent.

In Marathwada region and Maharashtra State the average area under other cereals was 708.9 hundred ha and 4813.6 hundred ha, respectively with a variability of 56.58 per cent and 9.59 per cent, respectively. Highest variability in area under other cereals was noticed in Aurangabad district as compared to Marathwada region and Maharashtra State. This might be due to vagaries of monsoon which many a times forced to take rainfed coarse cereals rather than jowar.

5.10.6 Area under total cereals

Aurangabad district shows comparative decrease in area under total cereals from 7244 hundred ha in 1981 to 4527 hundred ha in 1999 with an average of 5195 hundred ha and variability of 13.10 per cent.

In Marathwada region and Maharashtra State, the average area under total cereals was 27530 hundred ha and 107112 hundred ha, respectively with a variability of 11.66 per cent and 5.11 per cent. Highest variability in area under total cereals was noticed in Aurangabad district.

Table 5.10. Mean S.D. and C.V. of area under different crops in Aurangabad district, Marathwada region and Maharashtra State (1980-1999).

(Area in '00' ha)

Sr. No.	Particulars	Aurangabad district					Marathwada region					Maharashtra State				
		Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)
1.	Wheat	872	510	355.2	156.32	44.0	3072	2956	2265	509.7	22.5	10628	10155	8568.4	1494.1	17.43
2.	Kharif Jowar	1121	281	535.6	179.8	33.58	10027	7961	9558.4	953.9	9.97	29707	19549	26601	3802.4	14.29
3.	Rabi Jowar	3258	1710	2363.3	574.9	24.33	10286	9258	1053.4	1339.6	12.72	34981	28202	34297.5	2711.4	7.9
4.	Bajara	1842	1310	1682	212.2	12.61	3436	4246	4220	555.3	13.15	15340	17597	17732	1365.6	7.7
5.	Other cereals	94	669	265.1	256.5	96.75	443	1316	708.9	401.17	56.58	4516	5710	4813.6	461.7	9.59
6.	Total cereals	7244	4527	5195	680	13.10	28279	27192	27530	3210	11.66	109758	96041	107112	5533.3	5.16
7.	Tur	561	408	396	105.1	26.57	2839	3953	3552.7	558.5	15.85	6437	10067	8801.7	1562	17.75
8.	Gram	384	483	359.7	85.65	23.81	1459	2671	1898.8	328.46	17.29	4095	9042	5891.4	1466.6	24.89
9.	Other pulses	1984	335	763	387.9	50.83	5725	5172	5365	428.7	7.99	16621	15955	16331.5	927.2	5.67
10.	Total pulses	2929	1226	1519	413.2	27.20	10323	11796	10802.7	850.13	7.86	27153	35064	31024	3255.9	10.49
11.	Total foodgrains	10173	5738	6728	1028.7	15.29	38602	38427	39098	1645.8	4.20	136711	131108	138111	4555	3.28
12.	Sugarcane	184	158	182.2	73.69	40.43	490	1110	774.6	336.3	43.42	2584	5298	3844.26	1024	26.63
13.	Cotton	1451	1526	763.3	342.6	44.88	6444	10692	7790.9	1352.6	17.36	25497	31991	27435	2182.3	7.95
14.	Kharif groundnut	287	114	152	49	32.24	1162	556	872.5	189.4	21.7	6653	4077	5635.8	909.8	16.14
15.	Summer groundnut	7	9	10.15	7.16	70.55	87	329	373.3	303.1	81.12	998	1348	1130.4	679	60.06
16.	Safflower	979	238	600.3	26566	44.25	2480	197	2583.8	964.85	37.34	4803	3213	5261	1003	19.06
17.	Total Oilseed	1853	697	1137.3	311.5	27.4	6101	7431	8130	1700	20.91	17077	26976	23782	4077.9	17.14

5.10.7 Area under tur

In the beginning of year 1981, area under tur in Aurangabad district was 561 hundred ha which reduced to 408 hundred ha. The average area under tur was 396 hundred ha and variability was 26.57 per cent.

In the same period, the average area under tur in Marathwada region and Maharashtra State was 3522.7 hundred ha and 8801.7 hundred ha and variability was 15.85 per cent and 17.75 per cent, respectively. More stability in the area under tur was observed in Marathwada region as compared to Aurangabad district and Maharashtra State.

5.10.8 Area under gram

The area under gram, in Aurangabad district in the beginning of year (1981) was 384 hundred ha which increased to 483 hundred ha in the year (1999) with an average of 359.7 hundred ha and variability of 23.81 per cent.

The average area under gram was 1898.8 hundred ha and 5891.4 hundred ha and variability was 17.29 per cent and 24.91 per cent during the year 1981 to 1999, in Marathwada region and Maharashtra State, respectively. In terms of area under gram, more stability was observed in Marathwada region as compared to Aurangabad district and Maharashtra state.

5.10.9 Area under other pulses

The Aurangabad district shows decrease in area under other pulses from 1984 hundred ha in the year 1981 to 335 hundred ha in the year 1999. An average area under other pulses was 763 hundred ha with a variability of 50.83 per cent.

The Marathwada region and Maharashtra State, shows an average area under other pulses 5365 hundred ha and 16331.5 hundred ha, respectively. The variability in the same period was

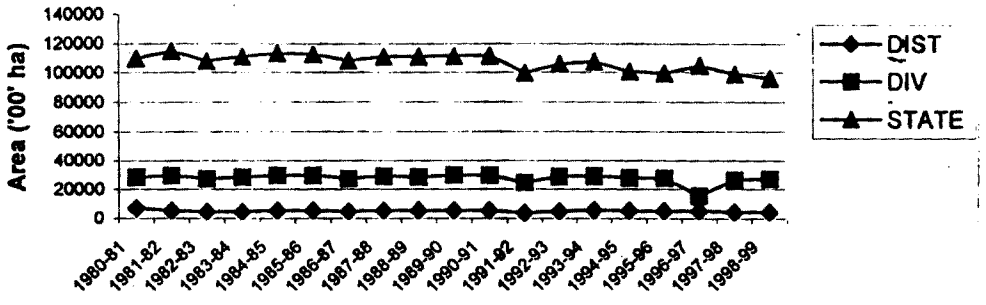


Fig. Area under total cereals

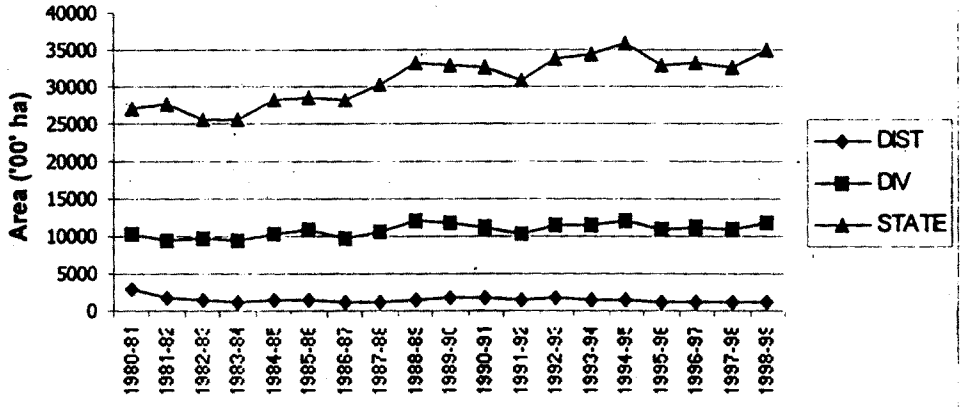


Fig. Area under total pulses

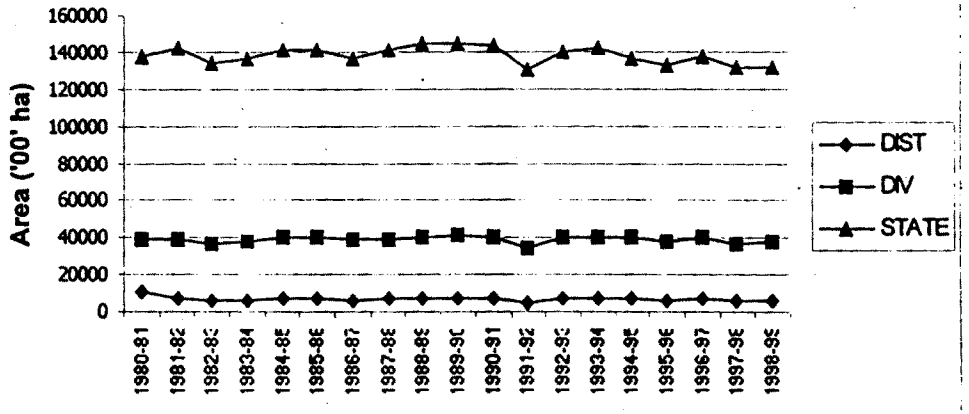


Fig. Area under total foodgrains

7.99 per cent and 5.67 per cent, respectively. Highest variability was seen in Aurangabad district compared to Maharashtra State and Marathwada region.

5.10.10 Area under total pluses

The area under total pulses, in Aurangabad at the beginning of year 1981 was 2929 hundred ha, which reduced to 1226 hundred ha at the year 1999. The average area under total pulses was 1519 hundred ha and variability of 27.20 per cent.

The average area under total pulses in Marathwada region and Maharashtra State was 10802.7 hundred ha and 31024 hundred ha and variability was 7.86 per cent and 10.49 per cent, respectively. More stability was seen in area under total pulses in Marathwada region as compared to Aurangabad district and Maharashtra State.

5.10.11 Area under total foodgrains

Area under total foodgrains in the Aurangabad district at the beginning of the year 1981 was 10173 hundred ha which later dropped to 5738 hundred ha in the year 1999. The average area under total foodgrains and variability was 6728 hundred ha and 15.29 per cent respectively during the said period in the Aurangabad district.

The average area under total foodgrains in Marathwada region and Maharashtra State was 39098 hundred ha and 138111 hundred ha, respectively and variability observed was 15.29 per cent and 3.28 per cent. Maximum stability in terms of area under total foodgrains was noticed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.10.12 Area under sugarcane

In Aurangabad district, the area under sugarcane was 184 hundred ha during the year 1981, which reduced to 158

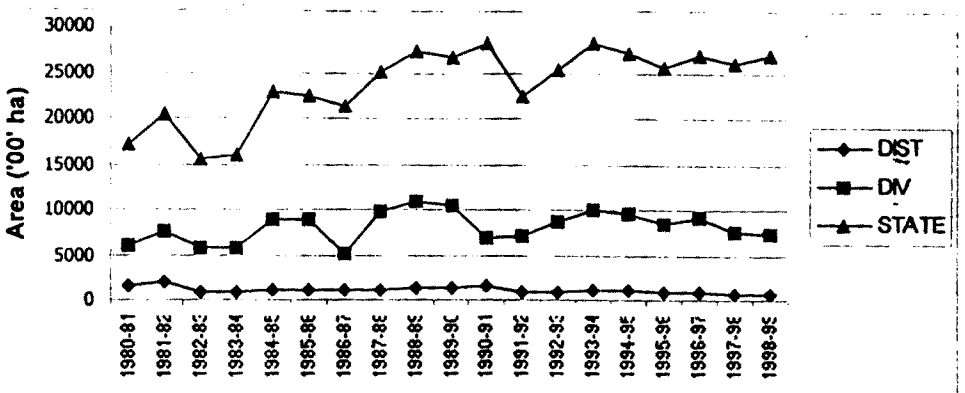


Fig. Area under total oilseeds

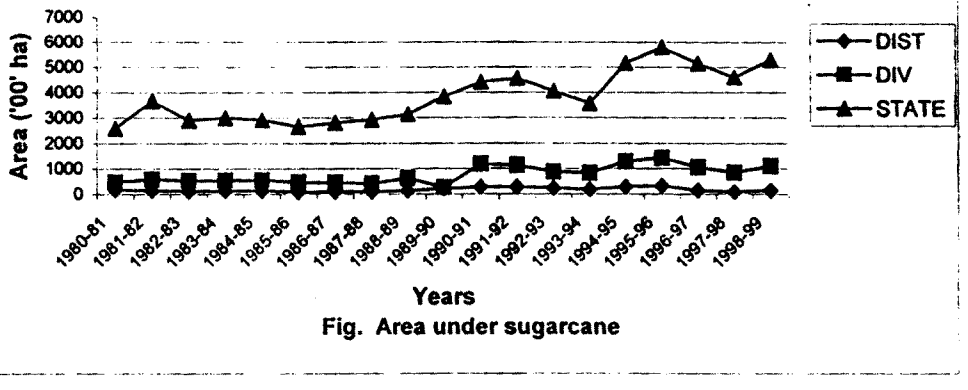


Fig. Area under sugarcane

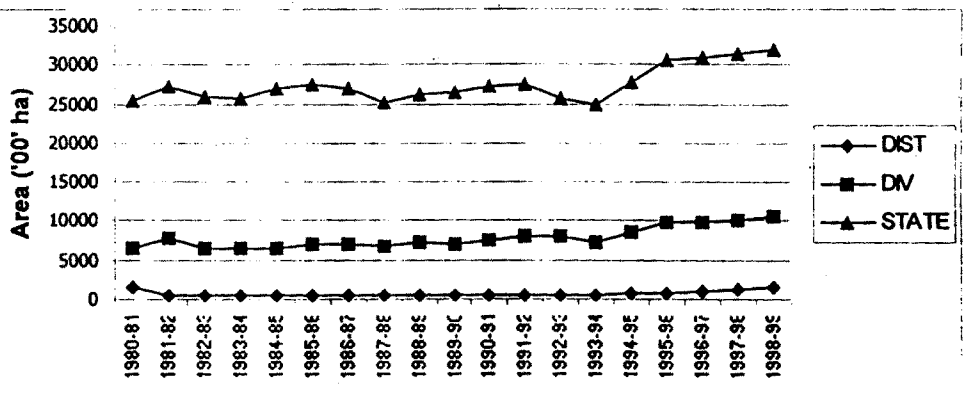


Fig. Area under cotton

hundred ha during the year 1999. The average area under sugarcane was found to be 182.2 hundred ha and variability was 40.43 per cent.

In Marathwada region and Maharashtra State, the average area under sugarcane during the years 1981 to 1999 was 744 hundred ha and 3844.26 hundred ha, respectively. The variability in terms of area under sugarcane was 43.42 per cent and 26.63 per cent, respectively. Maharashtra State has shown more stability as compared to Aurangabad district and Marathwada region, this might be due to variation in perennial irrigation sources and other lucrative crops like cotton

5.10.13 Area under cotton

Cotton crop shown a increase in terms of area under Aurangabad district from the beginning of the year 1981 when it was 1451 hundred ha to the end of year 1999 when it was 1526 hundred ha. The average area under cotton in the district was 763.3 hundred ha and variability was 44.88 per cent.

The average area under cotton in Marathwada region and Maharashtra State was 7790.9 hundred ha and 27435 hundred ha with a variability of 17.36 per cent and 7.95 per cent, respectively. It was observed that area under cotton showed an increasing trend in Aurangabad district as well as Marathwada region and Maharashtra State.

5.10.14 Area under *kharif* groundnut

In Aurangabad district, area under *kharif* groundnut was 287 hundred ha during the year 1981 which reduced to 114 hundred ha in the year 1999. The average area under *kharif* groundnut in Aurangabad district was 152 hundred ha and variability was 32.24 per cent.

In Marathwada region and Maharashtra State, the average area under *kharif* groundnut was 872.5 hundred ha and 5635.8 hundred ha and variability was 21.7 per cent and 16.14 per cent respectively. It is seen from the Table that Maharashtra State shows more stability in area under groundnut as compared to the Aurangabad district and Marathwada region.

5.10.15 Area under summer groundnut

Area under summer groundnut in the Aurangabad district was 700 ha during the year 1981 which increased to 900 ha with an average of 1015 ha and variability of 70.55 per cent. The average area under summer groundnut in Marathwada region and Maharashtra State was 373.3 hundred ha and 1130.4 hundred ha, respectively. The variability in terms of area under summer groundnut in Marathwada region and Maharashtra State was 81.12 per cent and 60.06 per cent, respectively. More stability is observed in area under summer groundnut in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.10.16 Area under safflower

In Aurangabad district, during the beginning of 1981, the area under safflower was 979 hundred ha which decreased to 238 hundred ha in the year 1999. The average area under safflower in the Aurangabad district was 600.3 hundred ha with a variability of 44.54 per cent.

In Marathwada region and Maharashtra State, the average area under safflower was 2583.8 hundred ha and 5261 hundred ha and variability was 37.34 per cent and 19.06 per cent, respectively. More stability in terms of area under safflower was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.10.17 Area under total oilseeds

Area under total oilseeds in Aurangabad district in the beginning of year 1981 was reported 1553 hundred ha which decreased to 697 hundred ha at the end of year 1999.~ The average area under total oilseeds during said period in Aurangabad district was 1137.3 hundred ha and variability was 27.4 per cent.

The average area under total oilseeds in Marathwada region and Maharashtra State was 8130 hundred ha and 23782 hundred ha and variability was 21.91 per cent and 17.14 per cent, respectively. More stability was observed, in terms of area under total oilseeds in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11 Production of principal crops

The information regarding mean, S.D. and C.V. of production of principal crops is given in Table 5.11.

5.11.1 Production of wheat

It could be seen from the table that production of wheat in Aurangabad district was 911 hundred MT during the year 1981 which decreased to 717 hundred MT during the year 1999. The average production of wheat in Aurangabad district was 380.05 hundred MT and coefficient of variation was 52.67 per cent.

The average production of wheat in Marathwada region and Maharashtra State during the year 1981 to 1999 was 2125.6 hundred MT and 8826.1 hundred MT and variability was 33.56 per cent and 23.41 per cent, respectively. It was noticed from the table that production of wheat increased over the period in Marathwada region and Maharashtra State while it declined in Aurangabad district.

5.11.2 Production of *kharif* jowar

In Aurangabad district, at the beginning of the year 1981, the production of *kharif* jowar was 1189 hundred MT which reduced to 400 hundred MT at the end of the year 1999. The average production of *kharif* jowar during the period was 569.39 hundred MT and variability was 39.10 per cent.

In Marathwada region and Maharashtra State, the average production of *kharif* jowar was 9974 hundred MT and 32313 hundred MT and variability was 34.58 per cent and 23.70 per cent, respectively. It can be seen from the table that production of *kharif* jowar was decreasing in Aurangabad district and Maharashtra State while it was increasing in Marathwada region, although more stability was observed in Maharashtra State.

5.11.3 Production of *Rabi* jowar

Production of *Rabi* jowar was 1505 hundred MT during the beginning of the year 1981 which decreased to 1137 hundred MT in Aurangabad district in the year 1999. The average production of *Rabi* jowar was 1164 hundred ha and variability was 40.36 per cent. The average production of *kharif* jowar in Marathwada region and Maharashtra State was 5863 hundred MT and 17019 hundred MT and variability was 29.25 per cent and 23.86 per cent, respectively. More stability was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11.4 Production of bajra

In Aurangabad district, production of bajra during the year 1981 was 878 hundred MT which increased to 1166 hundred MT in the year 1999 with an average of 1024 hundred MT and variation was 42.07 per cent. In Marathwada region and

Maharashtra State, average production of bajra was 2503 hundred MT and 9626 hundred MT and variability was 48.46 per cent and 37.97 per cent, respectively. Average production in Aurangabad district, Marathwada region and Maharashtra State was more than beginning year, this shows increasing performance.

5.11.5 Production of other cereals

Production of other cereals, in the beginning of the year 1981 in Aurangabad district was 80 hundred MT, which increased upto 1095 hundred MT with an average of 369.4 hundred MT and variation of 120.64 per cent.

The average production of other cereals in Marathwada region and Maharashtra State was 832.7 hundred MT and 4858 hundred MT and variability was 89.16 per cent and 27.46 per cent, respectively. More stability in production of other cereals was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11.6 Production of total cereals

In Aurangabad district, the production of total cereals at the beginning of the year 1981 was 4690 hundred MT which decreased to 4521 hundred MT at the end of the year 1999. The average production of total cereals in the district was 3536.7 hundred MT and variability was 37.32 per cent.

In Marathwada region and Maharashtra State, the average production of total cereals was 22053 hundred MT and 95755 hundred MT and variability was 30.23 per cent and 17.56 per cent, respectively. More stability in production of total cereals was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

Table 5.11. Mean S.D. and C.V. of production of principal crops in Aurangabad district, Marathwada region and Maharashtra State (1980-1999).

('00' MT)

Sr. No.	Particulars	Aurangabad district					Marathwada region					Maharashtra State				
		Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)
1.	Wheat	911	717	380.05	200	52.67	25.39	3752	2125.6	713.4	33.56	8862	13085	8826.4	2067	23.41
2.	Kharif Jowar	1189	400	569.39	222.62	39.10	7940	9294	9974	3447.3	34.58	28409	27853	32313	7661	23.70
3.	Rabi Jowar	1505	1137	1164	469.8	40.36	4480	8994	5863	1712	29.25	15676	16983	17019	4062	23.86
4.	Bajara	878	1166	1024.1	4308	42.07	1505	3159	2503	1213.1	48.46	6906	14925	9626	3655	37.97
5.	Other cereals	80	1095	369.4	445.7	120.64	273	2189	832.7	742	89.16	3405	7607	4898	1334	27.46
6.	Total cereals	4690	4521	3536.7	1320.2	37.32	17924	24807	22053	6668.0	30.23	86465	105129	95755	16823	17.56
7.	Tur	181	244	121.57	53.41	42.87	1122	3010	1509	623	41.33	3184	8089	5166.9	14764	28.37
8.	Gram	138	282	163.8	87.0	53	555	1372	624.31	328.19	39.81	1372	5619	2950	1380.8	46.79
9.	Other pulses	369	162	264	105	39.74	1011	2627	1829	646.8	35.36	3696	8865	6239.4	1907.8	30.57
10.	Total pulses	688	688	522.5	177.9	32.21	2688	7009	4164.8	1421	33.90	8252	22573	14357	4489	31.27
11.	Total foodgrains	5378	5209	4089.3	1448.4	35.41	20612	31816	26219	7742	29.52	94717	127702	109584	20522	18.72
12.	Sugarcane	13763	13830	13640	5601.2	41.0	36078	862.63	57312	25044	43.69	237063	471513	312398	105046	33.62
13.	Cotton	941	1483	607.6	325.5	53.5	3274	8321	5121.1	2069.4	40.40	12242	26189	16337	6505.9	35.47
14.	Kharif groundnut	104	71	75.52	36.27	48.03	478	267	443.3	146.1	32.95	4056	4746	4866.1	813	16.7
15.	Summer groundnut	11	10	14.31	12.21	85.33	131	355	506.7	439.4	36.70	451	1927	1817.5	1139.7	62.70
16.	Safflower	538	126	256.6	127.95	49.47	844	882	1467	544.9	37.13	1743	1763	2558.8	851.2	33.26
17.	Total Oilseed	719	348	516.73	208.4	40.33	2015	3549	5736.7	6774.3	118.08	7275	26077	15510	5622.6	36.25

5.11.7 Production of tur

Production of tur in Aurangabad district in the beginning of the year 1981 was 181 hundred MT which increased 244 hundred MT in the year 1999. The average production of tur in the district was 121.57 hundred MT and variability was 42.87 per cent.

Average production of tur in Marathwada region and Maharashtra State was 1509 hundred MT and 5166.9 hundred MT with variability of 41.33 per cent and 28.37 per cent, respectively. More stability in the production of tur was observed in Maharashtra State as compared to Marathwada region and Aurangabad district.

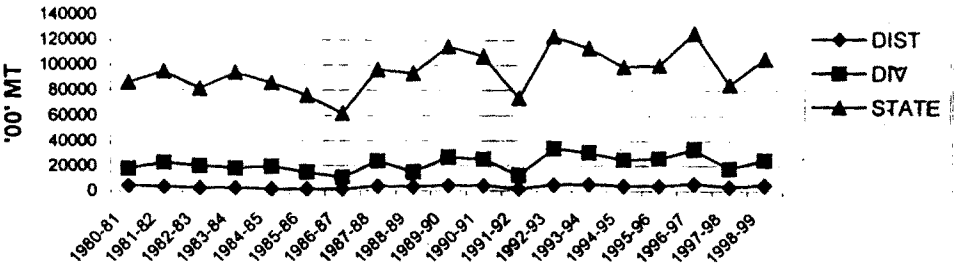
5.11.8 Production of gram

In Aurangabad district, the production of gram in the beginning year 1981 was 138 hundred MT which increased upto 282 hundred MT at the end of year 1999 with an average of 163.8 hundred MT and variability of 53 per cent.

In Marathwada region and Maharashtra State, the average production of gram was 824.31 hundred MT and 2950 hundred MT and variability was 39.81 per cent and 46.79 per cent, respectively. Maximum variability in the production of gram was observed in Aurangabad district as compared to Marathwada region and Maharashtra State.

5.11.9 Production of other pulses

In the beginning of year 1981, the production of other pulses in Aurangabad district was 369 hundred MT which decreased to 162 hundred MT in the year 1999. The average production of other pulses during the period was 264 hundred MT and variability was 39.74 per cent.



Years

Fig. Production of total cereals

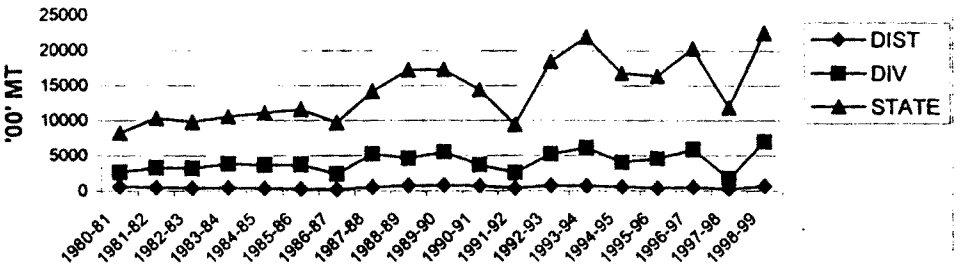


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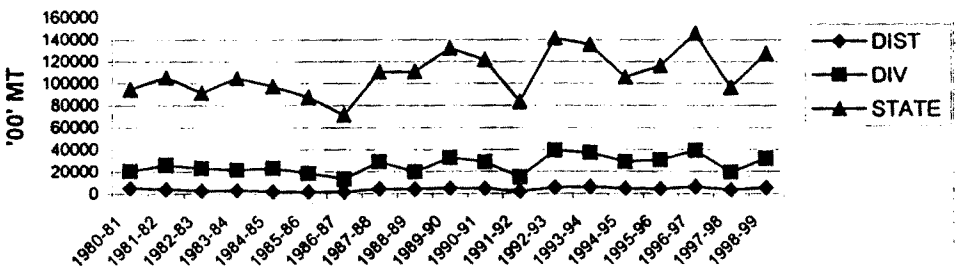
Fig. Production of total pulses



Years

Fig. Production of total foodgrains

The average production of other pulses in Marathwada region and Maharashtra State was 1829 hundred MT and 6239.4 hundred MT and variability was 35.36 per cent and 30.57 per cent, respectively. In production of other pulses more stability was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11.10 Production of total pulses

In Aurangabad district, production of total pulses was 680 hundred MT during the year 1981 and 1999 with an average of 522.5 hundred MT and variability of 32.21 per cent. In Marathwada region and Maharashtra State, average production of total pulses was 4164.8 hundred MT and 14357 hundred MT and variability was 33.90 per cent and 31.21 per cent, respectively. More stability in production of total pulses was seen in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11.11 Production of total foodgrains

Aurangabad district shows comparative decrease in production of total foodgrains from 5378 hundred MT in 1981 to 5209 hundred MT in 1999 with an average of 4089.3 hundred MT and variability of 35.41 per cent.

In Maharathwada region and Maharashtra State, the average production of total foodgrains was 26219 hundred MT and 312398 hundred MT respectively with a variability of 29.52 per cent and 18.72 per cent. More stability in the production of total foodgrains was observed in Maharashtra State than in Aurnagabad district and Marathwada region.

5.11.12 Production of sugarcane

Production of sugarcane in Aurangabad district at the beginning of year 1981 was 13763 hundred MT which increased

to 13830 hundred MT in the year 1999 with an average of 13640 hundred MT and variability was 41 per cent.

Average production of sugarcane in Marathwada region and Maharashtra State was 57312 hundred MT and 312398 hundred MT, respectively. The variability in sugarcane production in Marathwada region and Maharashtra State was found to be 43.69 per cent and 33.62 per cent, respectively. More stability in sugarcane production was found in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11.13 Production of cotton

In Aurangabad district, at the beginning of year 1981, production of cotton was 941 hundred MT while it was 1483 hundred MT at the end of year 1999. The average production of cotton in the district was 607.6 hundred MT and variability was 53.5 per cent.

In Marathwada region and Maharashtra State, average production of cotton was 5121.1 hundred MT and 18337 hundred MT, respectively. The variability observed in cotton production in Marathwada region and Maharashtra State was 40.40 per cent and 35.47 per cent, respectively. Maximum stability in the production of cotton was found in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11.14 Production of *kharif* groundnut

Production of *kharif* groundnut in Aurangabad district in the year 1981 was 104 hundred MT which decreased to 71 hundred MT at the end of year 1999. The average production of *kharif* groundnut was 75.52 hundred MT and variability was 48.03 per cent. The average production of *kharif* groundnut in

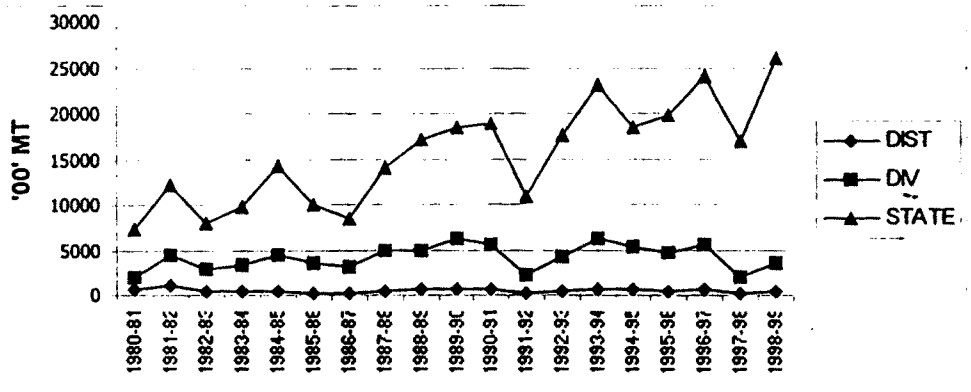


Fig. Production of total oilseeds

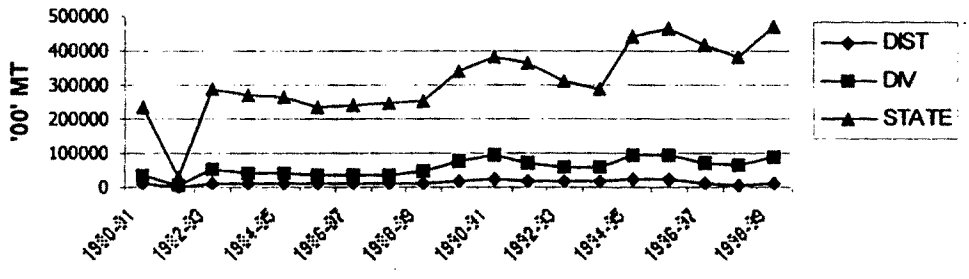


Fig. Production of sugarcane

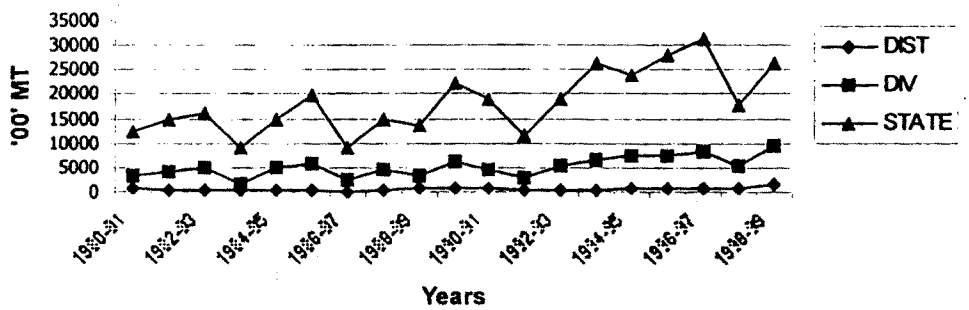


Fig. Production of cotton

Marathwada region and Maharashtra State was 443.3 hundred MT and 4866.1 hundred MT and variability was 32.95 per cent and 16.7 per cent respectively. It is seen from the table that more stability in *kharif* groundnut production was seen in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.11.15 Production of summer groundnut

At the beginning of year 1981, the production of summer groundnut in the district was 11 hundred MT which decreased to 10 hundred MT in the year 1999. The average production was 14.31 hundred MT and variability was 85.33 per cent.

In Marathwada region and Maharashtra State, the average production was 506.7 hundred MT and 1817.5 hundred MT and variability was 87.70 per cent and 62.70 per cent, respectively.

5.11.16 Production of safflower

In Aurangabad district, production of safflower in the year 1981 was 538 hundred MT which decreased to 126 hundred MT in the year 1999. The average production and variability of safflower production in the district were found 258.6 hundred MT and 49.47 per cent, respectively.

In Marathwada region and Maharashtra State, average production and variability in safflower production were found to be 1467 hundred MT and 2558.8 hundred MT and 37.13 per cent and 33.26 per cent, respectively.

5.11.17 Production of total oilseeds

In Aurangabad district, in the beginning of year 1981 production of total oilseeds was 719 hundred MT and in the year 1999 it came down to 348 hundred MT. The average production

and variability was 516.73 hundred MT and 40.33 per cent, respectively.

In Marathwada region and Maharashtra State average production of total oilseeds was found to be 5736.7 hundred MT and 15510 hundred MT, respectively and variability was 118.0 per cent and 36.25 per cent, respectively. More stability in production of total oilseeds was found in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12 Productivity of important crops

The mean, S.D. and C.V. for the productivity of important crops is worked out and presented in the Table 5.12.

5.12.1 Productivity of wheat

In Aurangabad district, productivity of wheat was 1045 kg/ha which increased to 1406 kg/ha from 1981 to 1999. The average yield was 997.5 kg/ha and variability was 31.10 per cent. The average productivity of wheat in Marathwada region and Maharashtra State was 934.4 kg/ha and 1043.7 kg/ha and variability was 25.32 per cent and 23.06 per cent, respectively. Highest average productivity and more stability is reported in Maharashtra State than Aurangabad district and Marathwada region.

5.12.2 Productivity of *kharif* jowar

Productivity of *kharif* jowar was 1061 kg/ha and 1424 kg/ha during the years 1981 and 1999, respectively. The average yield per ha was 1111.57 kg/ha and variability was 30.37 per cent.

In Marathwada region and Maharashtra State, the average productivity was 1040 kg/ha and 1232 kg/ha and variability was 31.29 per cent and 24.82 per cent, respectively. More stability is seen in Maharashtra State in the productivity of

kharif jowar as compared to Aurangabad district and Marathwada region.

5.12.3 Productivity of *Rabi* jowar

The productivity of *Rabi* jowar was 980 kg/ha at the beginning of year 1981 which decreased to 665 kg/ha in the year 1999. The average productivity of *Rabi* jowar was 508.4 kg/ha and variability was 36.85 per cent.

The average production of *Rabi* jowar in Marathwada region and Maharashtra State was reported to be 567.4 kg/ha and 495.8 kg/ha and variability was 25.50 per cent and 22.07 per cent, respectively. More stability was observed in the productivity of *Rabi* jowar in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.4 Productivity of bajra

In Aurangabad district, productivity of bajra was 477 kg/ha during the year 1981 which increased to 890 kg/ha with an average of 611.2 kg/ha and variability of 40.02 per cent. In Marathwada region and Maharashtra State, the average productivity of bajra was 869.3 kg/ha and 560.8 kg/ha and variability was 189.24 per cent and 36.95 per cent, respectively. More stability was observed in Maharashtra State as compared to Aurangabad district and Marathwada region in terms of productivity of bajra.

5.12.5 productivity of other cereals

The productivity of other cereals in Aurangabad district increased from 851 kg/ha to 1589 kg/ha in the year 1981 to 1999. The average productivity of other cereals was 1088 kg/ha and variability was 49.77 per cent.

The average productivity in other cereals in Marathwada region and Maharashtra State was 693.5 kg/ha and

989.7 kg/ha and variability was 40.50 per cent and 19.78 per cent. More stability was observed in Maharashtra State in comparison with Aurangabad district and Marathwada region.

5.12.6 Productivity of total cereals

In Aurangabad district, the productivity of total cereals was 647 kg/ha and 1002 kg/ha in the year 1981 and 1999, respectively. The average productivity and variability reported was 678.8 kg/ha and 34.88 per cent, respectively.

The average productivity reported in Marathwada region and Maharashtra State was 777.9 kg/ha and 896.78 kg/ha and variability was 28.02 per cent and 18.74 per cent, respectively. More stability in the productivity of total cereals was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.7 Productivity of tur

The productivity of tur in Aurangabad district was 323 kg/ha during 1981 which increased to 599 kg/ha in the year 1999. The average productivity was 321.57 kg/ha and variability was 42.09 per cent.

In Marathwada region and Maharashtra State average productivity of tur was 420 kg/ha and 578.5 kg/ha, respectively. The variability in the productivity was 36.20 per cent and 21.17 per cent in Marathwada region and Maharashtra State, respectively. It is seen from the table that more stability in tur productivity, was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.8 Productivity of gram

The productivity of gram in Aurangabad district increased from 359 kg/ha to 585 kg/ha in the years 1981 and 1999, respectively. The average productivity was 447.26 kg/ha

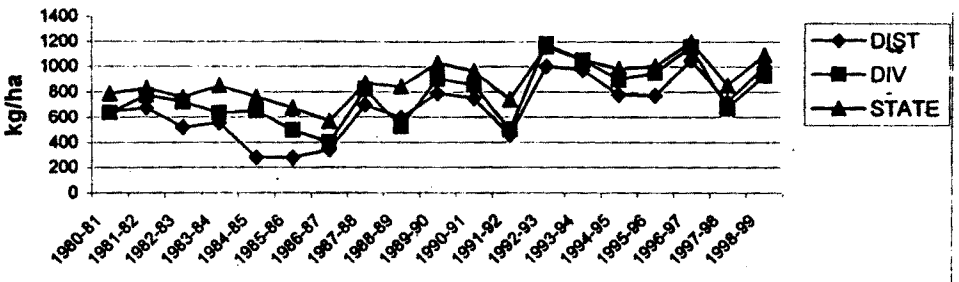


Fig. Productivity of total cereals

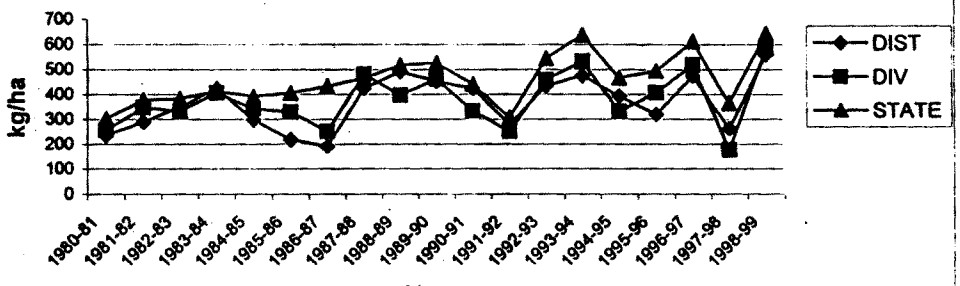


Fig. Productivity of total pulses

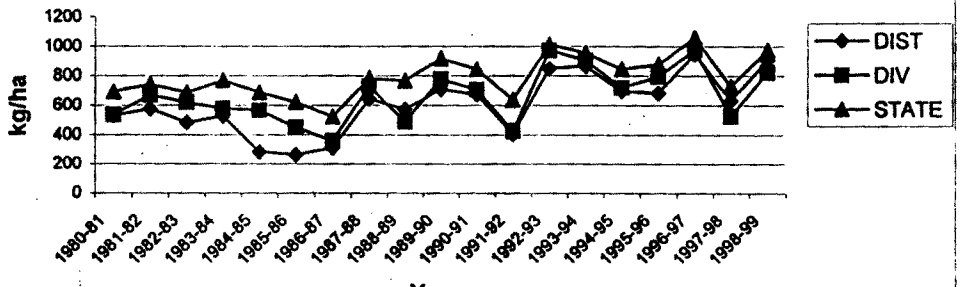


Fig. Productivity of total foodgrains

and variability was 44.19 per cent. The average productivity of gram in Marathwada region and Maharashtra State was 420.68 kg/ha and 479 kg/ha and variability was 28.51 per cent and 26.57 per cent, respectively. In gram, more stability in productivity was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.9 Productivity of other pulses

In Aurangabad district, productivity of other pulses increased from 186 kg/ha to 384 kg/ha from the year 1981 to 1999. The average productivity in other pulses was 378.8 kg/ha and variability was 29.90 per cent.

In Marathwada region and Maharashtra State, the average productivity was 320.3 kg/ha and 380 kg/ha and variability was 39.33 per cent and 28.20 per cent, respectively. More stability in productivity of other pulses was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.10 Productivity of total pulses

The productivity of total pulses in Aurangabad district was 235 kg/ha and 561 kg/ha during the year 1981 and 1999, respectively. The average productivity in total pulses was 368.5 kg/ha and variability was 82.75 per cent.

The average productivity of total pulses in Marathwada region and Maharashtra State was 379.5 kg/ha and 460.1 kg/ha and variability was 28.54 per cent and 22.02 per cent, respectively. More stability in the productivity of total pulses was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.11 Productivity of total foodgrains

In Aurangabad district, productivity of total foodgrains was 529 kg/ha and 908 kg/ha during the year 1981

and 1999, respectively. The average productivity was 608.8 kg/ha and variability was 33.44 per cent.

In Marathwada region and Maharashtra State, average productivity of total foodgrains was 665 kg/ha and 796.4 kg/ha and variability was 27.41 per cent and 18.03 per cent, respectively. More stability in the productivity of total foodgrains was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.12 Productivity of sugarcane

The productivity of sugarcane, in Aurangabad district in the beginning of year 1981 was 74798 kg/ha which increased in 1999 upto 87532 kg/ha. The average productivity in sugarcane was 76981 and variability was 26.39 per cent.

The average productivity of sugarcane in Marathwada region and Maharashtra State was 68993 kg/ha and 8182 kg/ha and variability was 23.26 per cent and 21.99 per cent, respectively. More stability in productivity of sugarcane was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.13 Productivity of cotton

In Aurangabad district, productivity of cotton during the year 1981 was 110 kg/ha which increased to 162 kg/ha in the year 1999. the average productivity of cotton was 132.7 kg/ha and variability was 31.84 per cent.

In Marathwada region and Maharashtra State, the average productivity reported in cotton was 114.47 kg/ha and 112.47 kg/ha and variability was 28.65 per cent and 32.62 per cent, respectively. More stability in the productivity of cotton was observed in Marathwada region as compared to Aurangabad district and Maharashtra State.

Table 5.12. Mean S.D. and C.V. of productivity of principal crops in Aurangabad district, Marathwada region and Maharashtra State (1980-1999).

(kg/ha)

Sr. No.	Particulars	Aurangabad district					Marathwada region					Maharashtra State				
		Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)
1.	Wheat	1045	1406	997.8	310.32	31.10	848	1277	934.4	236.6	25.32	834	1289	1043.7	240.7	23.06
2.	Kharif Jowar	1061	1424	111.87	337.6	30.37	847	1118	1040	325.4	31.29	956	1428	1232	305.8	24.82
3.	Rabi Jowar	480	665	508.4	187.4	36.85	433	659	567.4	144.7	25.50	448	602	495.8	109.4	22.07
4.	Bajara	477	890	611.2	244.6	40.02	400	637	896.3	1696.2	189.2	454	848	550.8	203.5	36.95
5.	Other cereals	851	1589	1088	542	49.77	665	1390	693.5	361.8	40.50	754	1332	989.7	195.8	19.78
6.	Total cereals	647	1002	678.8	236.8	34.88	637	931	777.9	224.9	28.02	788	1095	896.78	168.0	18.74
7.	Tur	323	599	321.57	137.2	42.09	373	720	420	152.07	36.20	495	804	578.5	122.5	21.17
8.	Gram	359	885	447.26	197.68	44.19	318	823	420.68	119.9	28.51	336	621	479	127.28	26.57
9.	Other pulses	186	384	378.8	113.28	29.90	177	804	320.3	120	39.33	222	556	380	107.2	28.20
10.	Total pulses	235	561	368.5	105.9	28.75	256	881	379.15	108.22	28.54	309	644	460.1	101.36	22.02
11.	Total foodgrains	529	908	608.8	203.6	33.44	537	826	665	182.29	27.41	692	974	796.4	143.6	18.03
12.	Sugarcane	74798	87532	769.81	20319	26.39	73628	78778	68993	16047.9	23.26	91742	88998	81812	17997	21.99
13.	Cotton	110	162	132.7	42.27	31.84	93	151	114.47	32.80	28.65	82	139	112.47	36.69	32.62
14.	Kharif groundnut	362	619	521.94	242.2	46.42	406	486	507.6	6157.9	31.11	610	1164	885	199.2	22.50
15.	Summer groundnut	1538	1079	1179.2	320.6	27.19	1471	1062	1241.5	255.3	20.56	1529	1430	1468.89	156.82	10.68
16.	Safflower	527	529	447.4	132.2	29.56	322	503	528.84	153.98	29.11	363	549	480.3	140.97	29.34
17.	Total Oilseed	463	499	423.5	147.1	34.72	336	481	361.42	215.02	59.49	426	966	636.4	152.9	24.03

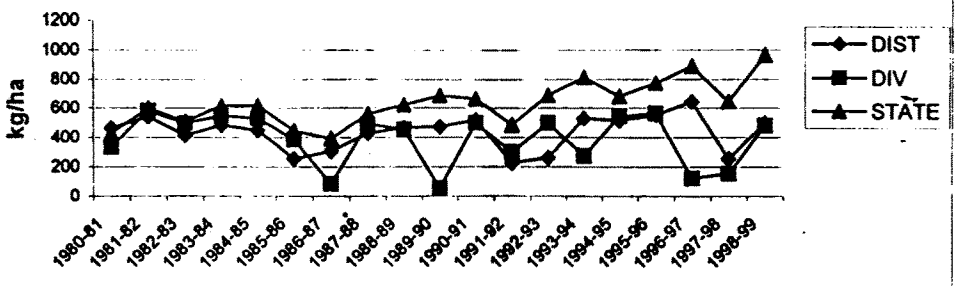


Fig. Productivity of total oilseeds

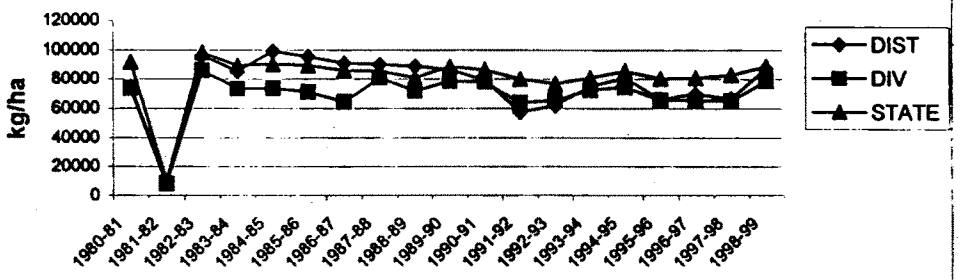


Fig. Productivity of sugarcane

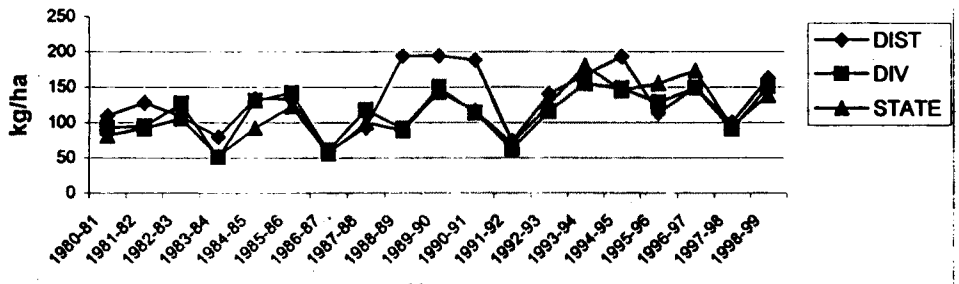


Fig. Productivity of cotton

5.12.14 Productivity of *kharif* groundnut

The productivity of *kharif* groundnut was 362 kg/ha in Aurangabad district in the year 1981 which increased to 619 kg/ha in the year 1999. The average productivity was 521.94 kg/ha and variability was 46.42 per cent.

The average productivity of *kharif* groundnut in Marathwada region and Maharashtra State was 507.6 kg/ha and 885 kg/ha and variability was 31.11 per cent and 22.50 per cent, respectively. More stability in the productivity of *kharif* groundnut was observed in Aurangabad district as compared to Marathwada region and Maharashtra State.

5.12.15 Productivity of summer groundnut

In Aurangabad district, the productivity of summer groundnut was 1538 kg/ha during the year 1981 which increased upto 1079 kg/ha in the year 1999. The average productivity of summer groundnut in Aurangabad district was 1179.2 kg/ha and variability was 27.19 per cent.

In Marathwada region and Maharashtra State, average productivity of summer groundnut was 1241.5 kg/ha and 1468.89 kg/ha, respectively with the variability of 20.56 per cent and 10.68 per cent, respectively. More stability in summer groundnut productivity was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.12.16 Productivity of safflower

The productivity of safflower in Aurangabad district during the year 1981 was 527 kg/ha which increased to 529 kg/ha in the year 1999. The average productivity of safflower in the district was 447.4 kg/ha and variability was 29.56 per cent.

The average productivity of safflower in Marathwada region and Maharashtra State was 528.84 kg/ha and 480.3 kg/ha

and variability was 29.11 per cent and 29.34 per cent, respectively. Aurangabad district State shows instability in productivity of safflower as compared to Marathwada region and Maharashtra State.

5.12.17 Productivity of total oilseeds

In Aurangabad district, in the beginning of the year 1981 the productivity of total oilseeds was 463 kg/ha which increased upto 499 kg/ha at the end of the year 1999. The average productivity of total oilseeds was 423.5 kg/ha and variability was 34.72 per cent.

In Marathwada region and Maharashtra State, the average productivity of total oilseeds was 361.42 kg/ha and 480.30 kg/ha and variability was 59.49 per cent and 24.03 per cent, respectively. In productivity of total oilseeds more stability was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.13 Fertilizer consumption

Fertilizer is the most important input contributing towards productivity and ultimately towards more production. The mean, C.V. and S.D. of fertilizer consumption are given in Table 4.13.

5.13.1 Nitrogenous fertilizer consumption

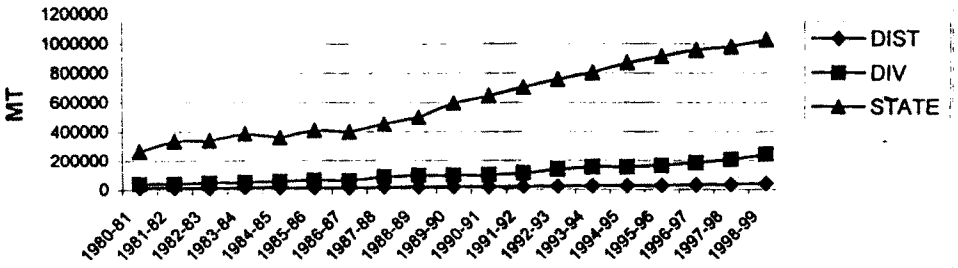
In Aurangabad district, the consumption of nitrogenous fertilizers was 14618 MT in the year 1981 which increased to 42156 MT in the year 1999. The average fertilizer consumption was 21460 MT and variability was 40.12 per cent.

In Marathwada region and Maharashtra State, average consumption of nitrogenous fertilizer was 111586 MT and 616181 MT and variability was 53.74 per cent and 41.25 per cent, respectively. More stability in the consumption of fertilizers was

Table 5.13. Mean S.D. and C.V. of NPK fertilizer consumption in Aurangabad district, Marathwada region and Maharashtra State (1980-1999)

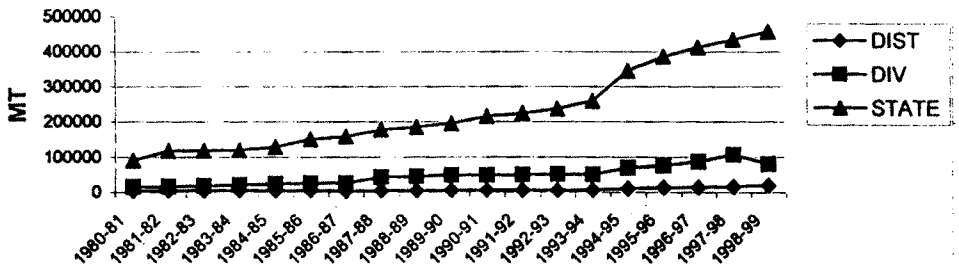
(M.T.)

Sr. No.	Particulars	Aurangabad district					Marathwada region					Maharashtra State				
		Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)	Begin of year (1980)	End of year (1999)	Mean	S.D.	C.V. (%)
1	N	14618	42156	21460	8611.20	40.12	42224	241783	111586.4	59976.89	53.74	266543	1035493	616181.3	254187.8	41.25
2	P	5010	19905	8198	4650.3	56.72	15350	81083	47621.42	26503.12	55.65	90595	457747	232706.3	117627.12	50.54
3	K	3348	4013	3316.3	1256.3	37.88	10544	38225	20964.42	9184.86	43.81	65349	179107	12198541	40168.94	32.92



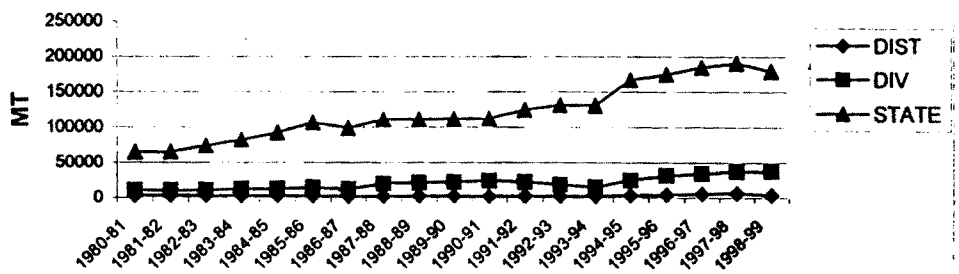
Years

Fig. Nitrogenous fertilizer consumption



Years

Fig. Phosphatic fertilizer consumption



Years

Fig. Potassic fertilizer consumption

observed in Aurangabad district as compared to Marathwada region and Maharashtra State. It is observed that the consumption of nitrogenous fertilizer was increas . . in the Aurangabad district as well as Marathwada region and Maharashtra State.

5.13.2 Phosphatic fertilizer consumption

Phosphatic fertilizer consumption in Aurangabad district during the year 1981 was 5010 MT which increased to 19905 MT in the year 1999. The average consumption of phsophatic fertilizer was 8198 MT in the district and variability was 56.72 per cent.

The average phosphatic fertilizer consumption in Marathwada region and Maharashtra State was 47621.4 MT and 232706 MT and variability was 55.65 per cent and 50.54 per cent, respectively. More stability in the consumption of phosphatic fertilizers was observed in Maharashtra State as compared to Aurangabad district and Marathwada region.

5.13.3 Potassic fertilizer consumption

During the year 1981, in Aurangabad district the potassic fertilizer consumption was 3348 MT which increased to 4013 MT in the year 1999. The average potassic fertilizer consumption was 3316.3 MT and variability was 37.88 MT.

The average consumption of potassic fertilizer in Marathwada region and Maharashtra State was 20964 MT and 121985 MT and variability was 33.81 per cent and 32.92 per cent, respectively. Maharashtra State shows more stability in consumption of potassic fertilizers as compared to Aurangabad district and Marathwada region.

5.14 Growth rates of land utilization

The linear and compound growth rates of selected parameters are given in the Table 5.14.

Area under other follow has shown a non-significant increase in Aurangabad district, Marathwada region and Maharashtra State during the period 1981-1999. On the other hand area under culturable waste and permanent pasture and other grazing land has shown a decline during the period.

Area under forest has shown a decline in growth rate in Aurangabad district while a non-significant increase in growth rate of area under forest was reported in Marathwada region and Maharashtra State.

Area under barren and cultivable land has shown decline in Aurangabad district and Maharashtra State while significant increase of 1.169 per cent in compound growth rate is reported in Marathwada region.

Aurangabad district has shown an increase in land under non-agricultural use while a decline is reported in Marathwada region, during the study period. A significant increase in land under non-agricultural use by 1.265 per cent was reported in Maharashtra State during 1981 to 1999.

Land under miscellaneous trees, grooves and not included in net sown area has shown a decline in Aurangabad district while it increased in Marathwada region and Maharashtra State during the period 1981-1999. Area under current fallow has shown an increase in Aurangabad district and Marathwada region while this growth was significant in Maharashtra State by 2.618 per cent.

Aurangabad district and Marathwada division has shown a decline in net sown area during the years 1981 to 1999

Table 5.14. Growth rates of land utilization of in Aurangabad district, Marathwada Region and Maharashtra State (1981-1999).

Particulars	Region	'a'	'b'	LGR (%)	'r'	'a'	'b'	CGR (%)	'r'
Forest	Dist.	808.930	-4.251	-0.555	-0.673	810.138	0.994	-0.563	-0.678
	Divi.	1637.070	103.035	3.840	0.392	2006.618	1.022	2.163	0.396
	State	4446.330	2207.004	3.318	0.213	50182.900	1.015	1.504	0.206
Barrent and cultivable	Dist.	201.491	-0.707	-0.364	-0.097	198.990	0.995	-0.480	-0.112
	Divi.	910.947	12.216	1.182**	0.805	916.892	1.012	1.169**	0.811
	State	17363.840	-35.168	-0.207	-0.402	17366.250	0.998	-0.210	-0.395
Land under non-agricultural use	Dist.	597.772	3.618	0.571	0.186	593.872	1.005	0.533	0.193
	Divi.	2297.088	-2.972	-0.131	-0.049	2324.728	0.996	-0.372	-0.124
	State	9887.457	143.828	1.270**	0.903	9958.637	1.013	1.265**	0.912
Culturable waste	Dist.	159.439	-1.375	-0.944	-0.328	157.460	0.991	-0.903	-0.303
	Divi.	2201.070	-11.160	-0.534	-0.323	2196.109	0.995	-0.539	-0.319
	State	10350.650	-64.328	-0.663	-0.731	10376.020	0.993	-0.676	-0.735
Permanent pasture	Dist.	567.930	-9.619	-2.039	-0.643	559.935	0.982	-1.822	-0.667
	Divi.	2649.526	-24.758	-1.031	-0.604	2648.104	0.990	-1.014	-0.595
	State	16016.650	-186.828	-1.320	-0.695	16047.400	0.987	-1.308	-0.664
Land under misc. trees	Dist.	91.965	-3.318	-5.643	-0.574	85.591	0.948	-5.173	-0.474
	Divi.	314.667	3.918	1.107	0.37	03418.130	1.009	0.920	0.284
	State	1986.175	20.093	0.919	0.308	1975.626	1.009	0.897	0.316
Current fallow	Dist.	302.386	2.414	0.379	0.080	258.170	1.010	1.039	0.107
	Divi.	2789.877	63.507	1.854	0.465	2812.501	1.017	1.725	0.400
	State	6917.840	225.048	2.455**	0.682	6942.934	1.026	2.618**	0.708
Other fallow	Dist.	309.544	5.719	1.560	0.205	302.792	1.005	0.466	0.041
	Divi.	2324.491	-8.033	-0.358	-0.060	2110.683	1.002	0.173	0.033
	State	10203.530	57.832	0.536	0.173	9900.999	1.007	0.723	0.247
Net sown area	Dist.	11208.630	-283.847	-3.391	-0.687	10964.280	0.970	-2.957	-0.703
	Divi.	48906.720	-73.367	-0.152	-0.368	48905.990	0.998	-0.153	-0.371
	State	216231.500	1638.435	0.704	0.040	193311.800	1.003	0.261	0.034
Area sown more than once	Dist.	299.965	124.982	8.064**	0.796	801.870	1.097	9.719	0.740
	Divi.	-252.807	1348.212	10.191	0.432	4055.429	1.091	9.058**	0.731
	State	13347.180	1402.119	5.123**	0.935	16420.030	1.054	5.411**	0.931
Total cropped area	Dist.	12622.880	-215.182	-2.055	-0.811	12277.490	0.982	-1.805	-0.471
	Divi.	52261.320	529.674	0.920**	0.812	52369.330	1.009	0.929**	0.808
	State	195241.900	1182.190	0.571**	0.811	195470.000	1.006	0.570**	0.818

** Significant at 1 per cent level

* Significant at 5 per cent level.

while it has shown an increasing trend in Maharashtra State. Area sown more than once increased significantly with linear growth rate of 8.064 per cent in Aurangabad district and by a compound growth rate of 9.058 per cent in Marathwada region and with a L.G.R. of 5.123 per cent in Maharashtra State.

Area under total crop decreased in Aurangabad district while it increased significantly by 0.920 per cent in L.G.R. in Marathwada region. Total cropped area increased significantly by 0.570 per cent in C.G.R. in maharashtra State.

5.15 Growth rates of area under different crops

Growth rates of area under different crops are shown in the Table 5.15.

Linear and compound growth rates of area under wheat, kharif jowar, total cereals, kharif groundnut and safflower has shown a non-significant decline in Aurangabad district, Marathwada region and Maharashtra State during the period 1981 to 1999.

Area under rabi jowar and total foodgrains decreased in Aurngabad district and Maharashtra State while it was increased in Marathwada region. Area under bajra has shown decline in Aurangabad district while increase in Maharashtra State, this increase was significant in Marathwada region by linear growth rate of 1.914 per cent.

Area under other cereals increased significantly by 15.193 per cent in Aurangabad district, by 7.332 per cent in Marathwada region and by 0.847 per cent in Maharashtra State.

Similarly area under tur increased significantly in the district with a compound growth rate of 2.680 per cent, while significant increase was also reported in Marathwada region by 2.549 per cent and by 2.924 per cent in Maharashtra State.

Table 5.15. Growth rates of area under principal crops in Aurangabad district, Marathwada Region and Maharashtra State (1981-1999).

Crops	Region	'a'	'b'	LGR (%)	'r'	'a'	'b'	CGR (%)	'r'
Wheat	Dist.	385.9	-3.070	-0.864	-0.111	297.853	1.009	0.876	0.108
	Divi.	2670.263	-40.468	-1.786	-0.447	2614.848	0.983	-1.667	-0.411
	State	10093.39	-152.496	-1.780	-0.574	10012.27	0.983	-1.68	-0.556
Kharif jowar	Dist.	797.47	-26.179	-4.88	-0.819	835.10	0.952	-4.796	-0.880
	Divi.	10916.880	-135.840	-1.421	-0.801	11033.08	0.985	-1.473	-0.806
	State	32682.610	-608.088	-2.286	-0.900	33532.84	0.976	-2.393	-0.888
Rabi jowar	Dist.	2899.069	-53.575	-2.267	-0.524	2864.061	0.978	-2.216	-0.462
	Divi.	10420.050	11.137	0.106	0.047	10416.83	1.000	0.027	0.011
	State	36319.670	-202.214	-0.590	-0.420	36393.06	0.994	-0.623	-0.419
Bajra	Dist.	1699.018	-1.660	-0.099	-0.044	1692.335	0.999	-0.139	-0.059
	Divi.	3448.193	77.233	1.830**	0.783	3462.208	1.019	1.914**	0.794
	State	16712.920	101.960	0.575	0.420	16652.98	1.006	0.601	0.430
Other cereals	Dist.	-107.544	37.270	14.056**	0.818	42.558	1.152	15.193**	0.868
	Divi.	158.754	55.019	7.761**	0.772	297.681	1.073	7.332**	0.662
	State	4397.176	41.651	0.865*	0.508	4404.976	1.008	0.847*	0.493
Total cereals	Dist.	5659.859	-46.423	-0.893	-0.384	5601.510	0.992	-0.827	-0.365
	Divi.	29936.740	-240.647	-0.874	-0.422	30281.53	0.990	-1.034	-0.402
	State	114976.500	-786.386	-0.734	-0.800	115259.8	0.993	-0.743	-0.800
Tur	Dist.	308.544	8.830	2.225	0.471	293.910	1.027	2.680*	0.533
	Divi.	2673.246	84.954	2.412**	0.856	2704.970	1.025	2.549**	0.864
	State	6227.910	257.388	2.924**	0.927	6379.750	1.031	3.106**	0.922
Gram	Dist.	265.456	9.428	2.621*	0.619	263.451	1.029	2.860*	0.620
	Divi.	1551.333	34.756	1.830*	0.595	1568.591	1.018	1.777*	0.547
	State	3622.614	226.886	3.851**	0.871	3870.360	1.040	3.977**	0.861
Other pulses	Dist.	1294.298	-53.119	-6.961	-0.771	1384.699	0.932	-6.759	-0.847
	Divi.	5531.141	-16.582	-0.309	-0.218	5521.999	0.997	-0.317	-0.226
	State	16099.020	23.256	0.142	0.141	16090.30	1.001	0.134	0.135
Total pulses	Dist.	1866.544	-34.739	-2.287	-0.473	1793.413	0.981	-1.918	-0.475
	Divi.	9818.875	98.391	0.911**	0.651	9813.794	1.009	0.935**	0.659
	State	25949.540	507.530	1.636**	0.877	26110.14	1.017	1.685**	0.876
Total food-grains	Dist.	7542.193	-81.398	-1.210	-0.445	7426.019	0.989	-1.081	-0.438
	Divi.	39038.180	6.061	0.016	0.021	39010.44	1.000	0.014	0.018
	State	140925.900	-281.439	-0.204	-0.348	140927.900	0.998	-0.207	-0.352

Sugar-cane	Dist.	133.754	4.851	2.661	0.370	133.5	1.024	2.391	0.338
	Divi.	340.070	43.456	5.610**	0.727	405.073	1.057	5.699**	0.685
	State	2305.667	153.860	4.002**	0.845	2500.616	1.041	4.050**	0.850
Cotton	Dist.	495.193	26.818	3.513	0.440	507.962	1.034	3.369*	0.494
	Divi.	5719.737	207.121	2.658**	0.862	5962.696	1.026	2.575**	0.872
	State	24756.350	267.923	0.977**	0.691	24918.34	1.009	0.938**	0.682
Kh. Ground-nut	Dist.	202.561	-5.051	-3.322	-0.580	194.569	0.972	-2.814	-0.592
	Divi.	1115.772	-24.319	-2.787	-0.722	1160.460	0.970	-2.975	-0.706
	State	6933.491	-129.760	-2.302	-0.803	7114.083	0.976	-2.433	-0.807
Summer ground-nut	Dist.	7.667	0.249	2.453	0.196	6.620	1.016	1.644	0.118
	Divi.	212.526	16.116	4.313	0.299	119.147	1.083	8.334	0.489
	State	565.912	56.451	4.994	0.468	424.636	1.081	8.131**	0.645
Safflower	Dist.	989.544	-38.923	-6.484	-0.824	1086.812	0.934	-6.648	-0.852
	Divi.	3265.105	-68.116	-2.636	-0.397	3898.662	0.942	-5.752	-0.407
	State	5798.755	-53.718	-1.021	-0.301	5801.072	0.988	-1.162	-0.316
Total oilseeds	Dist.	1467.667	-33.030	-2.940	-0.597	1471.798	0.971	-2.871	-0.621
	Divi.	7038.719	109.186	1.343	0.361	6820.319	1.015	1.548	0.393
	State	18118.250	566.465	2.382**	0.782	18057.30	1.026	2.629*	0.771

** Significant at 1 per cent level
* Significant at 5 per cent level.

Area under gram increased significantly by 2.860 per cent in Aurangabad district by, 1.830 per cent in Marathwada region and 3.851 per cent in Maharashtra State. Area under other pulses declined in Aurangabad district, and Marathwada region while it was increased in Maharashtra State.

Area under total pulses decreased in Aurangabad district while it increased significantly by 0.935 per cent in Marathwada region and by 1.636 per cent in Maharashtra State.

Area under sugarcane increased non-significantly in Aurangabad district while it increased significantly by 5.610 per cent in Marathwada region and by 4.050 per cent in Maharashtra State.

Area under cotton increased significantly with compound growth rate of 3.369 per cent in Aurangabad district, while it increased by 2.575 per cent in Marathwada region and by 0.977 per cent in Maharashtra State.

Area under summer groundnut increased non-significantly in Aurangabad district and Marathwada region while a significant compound growth rate of 8.131 per cent was reported in Maharashtra State.

Area under total oilseeds has shown a decline in Aurangabad district while a non-significant growth was reported in Marahtwada region. A significant growth in area under total oilseeds was reported in Maharashtra State by 2.382 per cent in linear growth rate.

5.16 Growth rates of production of different crops

Growth rates of production of different crops are shown in Table 5.16.

Linear growth rates and compound growth rates of production of wheat, rabi jowar, total cereals has shown positive

growth while safflower reported decline in growth rate of production in Aurangabad district, Marathwada region and Maharashtra State. Production of kharif jowar and summer groundnut has shown decline in Aurangabad district and an increase in growth rate of production was reported in Marathwada region and Maharashtra State.

Growth rates of production of tur, total pulses, total foodgrains and total oilseeds has shown non-significant increase in Aurangabad district and Marathwada region. While Maharashtra State reported significant growth rates of 2.959 per cent in tur, 3.685 per cent and 3.821 per cent in other pulses, 4.092 per cent and 4.190 per cent in total pulses, 1.720 per cent and 1.698 per cent in total foodgrains and 5.366 per cent and 5.853 per cent in linear growth rate and compound growth rate respectively in total oilseeds.

Growth rates of other pulses has shown decrease in Aurangabad district and an increase was reported in Marathwada region. This increase was significant in Maharashtra State by 3.685 per cent and 3.821 per cent in L.G.R. and C.G.R., respectively.

Production of bajra increased significantly by 4.283 per cent in Aurangabad district, by 6.209 per cent in Marathwada region and by 5.220 per cent in Maharashtra State.

Other cereals reported significant growth rates of production in Aurangabad district by 22.219 per cent, in Marathwada region 14.489 per cent, in Maharashtra State by 3.911 per cent in compound growth rate.

Production of gram increased significantly by 8.005 per cent in Aurangabad district by 4.253 per cent in Marathwada region and by 7.543 per cent in Maharashtra State.

Table 5.16. Growth rates of production of principal crops in Aurangabad district, Marathwada Region and Maharashtra State (1981-1999).

Crops	Region	'a'	'b'	LGR (%)	'r'	'a'	'b'	CGR (%)	'r'
Wheat	Dist.	339.316	4.074	1.072	0.115	264.527	1.023	2.274	0.225
	Divi.	1852.754	27.288	1.284	0.215	1807.062	1.010	1.007	0.148
	State	7486.035	134.039	1.619	0.365	7517.661	1.013	1.346	0.313
Kharif jowar	Dist.	714.333	-14.496	-2.546	-0.366	646.830	0.980	-1.972	-0.285
	Divi.	8260.281	171.388	1.718	0.280	7903.305	1.017	1.726	0.258
	State	31389.560	92.3986	0.286	0.068	30926.550	1.002	0.183	0.045
Rabi jowar	Dist.	978.772	18.528	1.592	0.222	845.008	1.022	2.171	0.235
	Divi.	4708.439	115.546	1.970	0.380	4623.921	1.019	1.948	0.344
	State	14724.750	229.509	1.348	0.318	14502.700	1.013	1.319	0.292
Bajra	Dist.	610.421	41.368	4.039*	0.540	617.789	1.043	4.283*	0.542
	Divi.	1003.930	149.923	5.989**	0.695	1235.589	1.062	6.209**	0.732
	State	4600.863	502.535	5.220**	0.774	5198.968	1.056	5.576**	0.753
Other cereals	Dist.	-257.281	62.675	16.963**	0.791	22.157	1.222	22.219**	0.843
	Divi.	-247.579	108.037	12.973**	0.819	146.981	1.145	14.489**	0.851
	State	2963.667	189.454	3.900**	0.799	3197.507	1.039	3.911**	0.801
Total cereals	Dist.	2441.123	109.567	3.098	0.467	2322.705	1.035	3.461	0.441
	Divi.	16624.790	542.900	2.462	0.458	16626.880	1.024	2.387	0.413
	State	81880.230	1387.477	1.449	0.464	81748.950	1.014	1.439	0.443
Tur	Dist.	106.544	1.804	1.448	0.190	101.493	1.009	0.910	0.095
	Divi.	1247.632	26.163	1.734	0.236	1347.351	1.002	0.200	0.023
	State	3637.860	152.909	2.959*	0.583	3757.529	1.028	2.848*	0.562
Gram	Dist.	61.807	10.209	6.229**	0.660	64.171	1.080	8.005**	0.684
	Divi.	473.772	35.054	4.253*	0.601	508.022	1.041	4.113*	0.533
	State	932.614	201.812	6.839**	0.822	1278.573	1.075	7.543**	0.840
Other pulses	Dist.	356.211	-9.216	-3.490	-0.494	370.803	0.959	-4.141	-0.550
	Divi.	1325.333	50.382	2.754	0.438	1339.935	1.025	2.550	0.397
	State	3940.439	229.898	3.685**	0.678	4103.702	1.038	3.821**	0.692
Total pulses	Dist.	524.561	2.796	0.506	0.088	499.359	1.004	0.438	0.067
	Divi.	3050.246	111.460	2.676	0.444	3182.375	1.021	2.125	0.327
	State	8511.299	584.591	4.072**	0.733	9093.979	1.042	4.190**	0.739
Total food-grains	Dist.	2965.684	112.363	2.748	0.437	2812.073	1.031	3.073	0.416
	Divi.	19675.910	654.325	2.496	0.476	19830.170	1.024	2.381	0.425
	State	90739.080	1884.582	1.720*	0.517	91042.880	1.017	1.698*	0.497

Sugar-cane	Dist.	10009.930	363.028	2.661	0.365	7983.912	1.042	4.169	0.368
	Divi.	23007.840	3430.421	5.986**	0.771	21507.180	1.086	8.632**	0.667
	State	159841.800	15285.66	4.883**	0.817	146322.700	1.068	6.787*	0.635
Cotton	Dist.	268.754	33.893	5.577*	0.586	308.089	1.056	5.885*	0.561
	Divi.	2545.630	257.553	5.029**	0.700	2810.180	1.052	5.247*	0.632
	State	10103.420	823.363	4.490**	0.712	11041.390	1.046	4.558**	0.683
Kh. Ground-nut	Dist.	61.649	1.388	1.837	0.215	52.528	1.023	2.337	0.230
	Divi.	524.088	-9.077	-1.822	-0.311	518.017	0.979	-2.115	-0.309
	State	4566.949	29.916	0.615	0.207	4494.550	1.007	0.666	0.225
Summer ground-nut	Dist.	17.404	-0.309	-2.157	-0.142	12.999	0.971	-2.894	-0.172
	Divi.	403.175	10.361	2.045	0.133	213.130	1.049	4.922	0.275
	State	1305.193	51.239	2.819	0.253	875.230	1.054	5.373	0.424
Safflower	Dist.	405.526	-14.689	-5.680	-0.646	461.302	0.928	-7.192	-0.613
	Divi.	1871.053	-40.337	-2.748	-0.417	1994.281	0.959	-4.122	-0.405
	State	2975.526	-41.663	-1.628	-0.275	3084.864	0.974	-2.589	-0.329
Total oilseeds	Dist.	641.298	-12.456	-2.411	-0.336	604.539	0.976	-2.358	-0.313
	Divi.	8267.650	-253.091	-4.412	-0.210	4932.462	0.989	-1.063	-0.099
	State	7186.615	832.344	5.366**	0.833	8205.891	1.059	5.853**	0.824

** Significant at 1 per cent level
* Significant at 5 per cent level.

Production of sugarcane was shown a non-significant increase in Aurangabad district, while it increased significantly by 5.986 per cent in Marathwada region, by 4.883 per cent in linear growth rate in Maharashtra State.

Cotton reported significant growth rates of production in Aurangabad district by 5.577 per cent, in Marathwada region by 5.029 per cent and by 4.490 per cent in linear growth rate in Maharashtra State.

production of kharif groundnut increased non-significantly in Aurangabad district and Maharashtra State while it has shown a decline in Marathwada region.

5.17 Growth rates of productivity of different crops

Growth rates of productivity of different crops are shown in the Table 5.17.

Productivity of wheat increased significantly by 3.043 per cent in Aurangabad district by 2.753 per cent in Marathwada region and by 3.024 per cent in linear growth rates in Maharashtra State.

Significant increase in the productivity of kharif jowar reporte din Aurangabad district by 2.704 per cent, in Marathwada region by 2.774 per cent, in Maharashtra State by 2.636 per cent in linear growth rates.

Aurangabad district, Marathwada region and Maharashtra State has shown a significant increase in productivity of rabi jowar by 3.448 per cent, 2.226 per cent and 1.937 per cent, respectively in linear growth rates

Bajra reported a non-significant increase in productivity in Marathwada region while it increased significantly by 4.296 per cent in Aurangabad district, and by 4.903 per cent in linear growth rates in Maharashtra State.

Table 5.17. Growth rates of productivity of principal crops in Aurangabad district, Marathwada Region and Maharashtra State (1981-1999).

Crops	Region	'a'	'b'	LGR (%)	'r'	'a'	'b'	CGR (%)	'r'
Wheat	Dist.	694.246	30.360	3.043*	0.551	6876.759	1.034	3.379*	0.512
	Divi.	677.246	25.723	2.753*	0.612	695.727	1.027	2.669*	0.567
	State	728.105	31.563	3.024**	0.738	755.095	1.030	3.035**	0.738
Kharif jowar	Dist.	811.018	30.056	2.704*	0.501	795.228	1.029	2.859	0.447
	Divi.	751.596	28.856	2.774*	0.499	757.757	1.027	2.699	0.447
	State	907.526	32.479	2.636*	0.598	922.014	1.026	2.640*	0.584
Rabi jowar	Dist.	333.158	17.532	3.448*	0.526	307.242	1.042	4.244*	0.499
	Divi.	441.088	12.633	2.226*	0.491	441.829	1.022	2.193	0.452
	State	399.860	9.604	1.937*	0.494	398.358	1.020	1.956	0.460
Bajra	Dist.	348.632	26.258	4.296*	0.604	365.013	1.044	4.428*	0.568
	Divi.	333.790	56.253	6.276	0.187	343.818	1.049	4.890	0.366
	State	280.807	27.009	4.903**	0.747	312.169	1.051	5.126**	0.726
Other cereals	Dist.	540.544	54.830	5.036*	0.569	517.826	1.061	6.141*	0.565
	Divi.	427.281	46.625	5.218**	0.725	471.482	1.057	5.701**	0.714
	State	704.860	28.488	2.878**	0.819	728.022	1.029	2.925**	0.809
Total cereals	Dist.	405.754	27.309	4.023**	0.649	414.191	1.043	4.335*	0.589
	Divi.	562.281	21.567	2.772*	0.539	569.397	1.027	2.738*	0.501
	State	699.772	19.702	2.197**	0.660	709.117	1.022	2.200**	0.636
Tur	Dist.	360.509	-3.893	-1.211	-0.160	345.372	0.983	-1.722	-0.199
	Divi.	454.930	-3.493	-0.832	-0.129	476.280	0.980	-2.047	-0.256
	State	586.088	-0.751	-0.130	-0.034	589.603	0.996	-0.422	-0.104
Gram	Dist.	267.561	17.970	4.018*	0.512	252.870	1.049	4.905*	0.608
	Divi.	304.684	11.600	2.757*	0.544	308.710	1.027	2.719*	0.499
	State	321.316	15.744	3.293**	0.697	330.447	1.034	3.427**	0.696
Other pulses	Dist.	300.333	7.851	2.072	0.390	276.034	1.026	2.637	0.437
	Divi.	188.333	13.204	4.121*	0.590	196.225	1.042	4.191*	0.542
	State	243.070	13.714	3.607**	0.720	254.802	1.037	3.689**	0.716
Total pulses	Dist.	283.228	8.530	2.315	0.453	278.417	1.024	2.402	0.432
	Divi.	313.702	6.546	1.726	0.340	320.603	1.013	1.266	0.231
	State	349.842	11.032	2.397*	0.612	356.787	1.023	2.342*	0.591
Total food-grains	Dist.	366.649	24.225	3.978**	0.669	379.397	1.042	4.197*	0.610
	Divi.	501.351	16.365	2.461*	0.505	506.798	1.024	2.372	0.463
	State	636.772	15965	2.005*	0.625	643.877	1.020	1.988*	0.603

Sugar-cane	Dist.	78078.710	-109.712	-0.143	-0.030	60943.850	1.016	1.591	0.174
	Divi.	63798.950	519.442	0.753	0.182	49817.220	1.026	2.578	0.281
	State	76739.350	507.270	0.620	0.159	60927.900	1.023	2.329	0.268
Cotton	Dist.	108.965	2.377	1.791	0.316	104.506	1.019	1.879	0.304
	Divi.	91.316	2.316	2.023	0.397	87.664	1.022	2.218	0.370
	State	72.421	4.005	3.561*	0.614	74.187	1.037	3.683*	0.585
Kh. Ground-nut	Dist.	292.404	22.954	4.398*	0.533	294.296	1.047	4.658	0.485
	Divi.	445.456	6.223	1.226	0.222	426.682	1.012	1.187	0.182
	State	611.649	27.372	3.092**	0.773	631.804	1.032	3.176**	0.761
Summer ground-nut	Dist.	1435.807	-25.654	-2.175	-0.450	1447.267	0.976	-2.418	-0.456
	Divi.	1468.123	-22.654	-1.825	-0.499	1477.677	0.981	-1.941	-0.497
	State	1522.176	-5.328	-0.363	-0.191	1516.604	0.996	-0.373	-0.197
Safflower	Dist.	478.000	-3.058	-0.683	-0.130	493.954	0.983	-1.657	-0.215
	Divi.	611.877	-9.304	-1.570	-0.303	642.222	0.973	-2.662	-0.313
	State	526.667	-4.630	-0.964	-0.185	548.312	0.981	-1.893	-0.273
Total oilseeds	Dist.	438.982	-1.,640	-0.364	-0.059	511.931	0.968	-3.241	-0.254
	Divi.	488.351	-12.693	-3.512	-0.332	857.811	0.857	-14.331	-0.473
	State	436.053	20.042	3.149**	0.737	454.554	1.031	3.138**	0.716

** Significant at 1 per cent level
* Significant at 5 per cent level.

Productivity of other cereals reported significant increase in Aurangabad district by 5.036 per cent, in Marathwada region by 5.218 per cent and in Maharashtra State by 2.878 per cent in linear growth rates.

Aurangabad district reported a significant increase in productivity of total cereals by 4.023 per cent, Marathwada region by 2.772 per cent and Maharashtra State by 2.197 per cent in linear growth rates.

Productivity of tur, summer groundnut and safflower reported a non-significant decline in Aurangabad district, Marathwada region and Maharashtra State. Aurangabad district reported significant increase in productivity of gram by 4.905 per cent, Marathwada region by 2.757 per cent and 2.719 per cent, and Maharashtra State by 3.293 per cent and 3.427 per cent in linear and compound growth rates, respectively.

Productivity of other pulses increased non-significantly in Aurangabad district, while it increased significantly in Marathwada region by 4.121 per cent and in Maharashtra State by 3.607 per cent.

Linear and compound growth rates in productivity of total pulses reported a non-significant increase in Aurangabad district and Marathwada region while significant increase by 2.397 per cent, was reported in Maharashtra State.

Total foodgrains reported significant increase in productivity in Aurangabad district by 3.978 per cent, in Marathwada region by 2.461 per cent and in Maharashtra State by 2.005 per cent in linear growth rates.

Compound and linear growth rates of productivity of sugarcane has shown non-significant increase in Aurangabad district, Marathwada region and Maharashtra State with exception

of Aurangabad district where linear growth rate was negative showing a decline.

Productivity of cotton increased non-significantly in Aurnagabad district and Marathwada region while it increased significantly in Maharashtra State by 3.561 per cent.

Linear growth rate of productivity of kharif groundnut has shown significant increase by 4.398 per cent in Aurangabad district, in Maharashtra State has shown a significant increase of 3.092 per cent in linear growth rate. Non-significant growth in productivity of kharif groundnut was reported in Marathwada region.

Productivity of total oilseeds reported non-significant decline in Aurangabad district and Marathwada region. In contrast, Maharashtra State reported significant increase in productivity of total oilseeds by 3.149 per cent and 3.138 per cent in linear and compound growth rates, respectively.

5.18 Growth rates of fertilizer consumption

Significant increase in nitrogenous fertilizer consumption was reported in Aurangabad district by 6.362 per cent, in Marathwada region by 10.358 per cent and in Maharashtra State by 7.897 per cent in compound growth rates.

Phosphatic fertilizer consumption increased significantly in Aurangabad district by 7.559 per cent, in Marathwada region by 10.853 per cent and in Maharashtra State by 9.077 per cent in compound growth rates.

Linear growth rate of potassic fertilizer consumption was significant in Aurangabad district by 3.516 per cent while compound growth rates of potassic fertilizer consumption were significant in Marathwada region by 7.331 per cent and in Maharashtra State by 6.003 per cent.

Table 5.18. Growth rates of fertilizer consumption in Aurangabad district, Marathwada Region and Maharashtra State (1981-1999).

Crops	Region	'a'	'b'	LGR (%)	'r'	'a'	'b'	CGR (%)	'r'
Nitrogen	Dist.	7490.755	1396.946	6.509**	0.913	10816.100	1.064	6.362**	0.936
	Divi.	8268.946	10331.75	9.259**	0.969	36098.000	1.104	10.358**	0.992
	State	171359.700	44482.16	7.219**	0.985	264462.400	1.079	7.897**	0.988
Phos-phatic	Dist.	1359.789	683.858	8.341**	0.828	3508.408	1.076	7.559**	0.865
	Divi.	2971.914	4464.951	9.376**	0.948	14516.660	1.109	10.853**	0.976
	State	33615.530	19909.07	8.555**	0.952	86853.920	1.091	9.077**	0.989
Potassic	Dist.	2150.193	116.618	3.516*	0.522	2395.186	1.027	2.747	0.473
	Divi.	6285.322	1467.910	7.002**	0.899	9449.481	1.073	7.331**	0.917
	State	52948.160	6903.695	5.659**	0.967	64615.870	1.060	6.003**	0.976

** Significant at 1 per cent level
* Significant at 5 per cent level.

5.19 Socio-economic development of Aurangabad district

Agricultural development and social development in Indian context goes hand in hand, as majority of population is engaged in agriculture.

Table indicates socio-economic development of Aurangabad district during study period of 1983-84 and 1998-99.

5.18.1 Demographic development

Increased urbanization due to industrialization along with agricultural development resulted in increase in population as much as 149.74 per cent, while sex ratio dropped from 934 to 919 which is a cause of concern although female population increased along with male population.

5.19.2 Human resource development

Literacy among women increased by appreciable amount while total literacy also increased significantly. However, number of primary schools, secondary educational institutions, adult education centres and industrial training centres not increased appreciably but their intake capacity was increased. Hospitals, clinics, primary health centres increased in number still there is a scope of quantitative and qualitative improvement of these facilities.

5.19.3 Livestock development

Cattle and poultry population increased significantly during the period. This was due to increase in demand of animal products due to increase in population.

5.19.4 Irrigation and agro-industrial infrastructure development

Although no new large irrigation project was developed, Jayakwadi project still provides irrigation to majority

part of district along with ten medium projects. Still a greater part of Western Aurangabad district is rainfed, it needs such development to quinch irrigation thirst.

Number of sugar factories and ginning mills increased appreciably still there remains scope for further agro-industrial development. Here needs a massive investment.

5.19.5 Social welfare and employment generation

There is gigantic increase in families below poverty line (BPL) living in the district. Government's intention to provide at least hundred days employment to rural unskilled labour reflected in Employment Guarantee Scheme (EGS). Tentative increase in BPL families and number of beneficiaries under EGS denotes our failures in post-independence demographic and rural development policies.

5.19.6 Rural self-Government and co-operation

The number of rural self rule bodies like Panchayat Samities and Gram Panchayat's increased appreciably in district at the same time co-operative societies like primary agricultural credit societies, marketing societies and urban credit societies also increased. They can play a catalytic role in agricultural development in the district.

Table 5.19. Socio-economic indicators of Aurangabad district.

Sr. No	Particulars	Unit	Year 1983	Year 1999	Percent Change
1.	Total population	Lakh	19.5	29.2	49.74
2.	Sex ratio	--	934	919	-2.03
3.	Literacy	Percentage	56.98	73.63	29.22
4.	Literate males	Percentage	66.73	85.07	27.48
5.	Literate females	Percentage	34.64	61.28	76.90
6.	Density	Per sq. km.	219	289	31.00
7.	Male population	Lakhs	11.1	15.21	37.02
8.	Female population	Lakhs	8.4	13.98	66.42
9.	Total cattle population	Thousand	869	1250	43.86
10.	Cows and bull	Thousand	443	613	38.37
11.	Buffalo population	Thousand	85	103	21.17
12.	Sheep and goat population	Thousand	299	505	68.89
13.	Poultry	Thousand	247	523	111.74
14.	Co-operative societies	No.	3548	4312	21.53
15.	Primary agricultural co-operative societies	No.	689	698	01.30
16.	Dairy co-operative society	No.	430	540	25.58
17.	Loan provided by PACS	Crores	35	158	351.42
18.	Irrigation development				
	Large project	No.	1	1	00.00
	Medium project	No.	4	10	30.00
19.	Registered factories	No.	390	747	91.50
20.	Registered running factories	No.	370	650	75.67
21.	Co-op. Sugar factories	No.	2	6	200.00

22.	Ginning mills	No.	2	5	150.00
23.	Electrified villages	No.	1279	1300	01.64
24.	Hospitals	No.	9	12	33.33
25.	Clinics	No.	26	34	30.76
26.	Primary health centres	No.	43	43	00.00
27.	Primary schools	No.	1595	1780	11.59
28.	Secondary educational institutions	No.	348	365	04.88
29.	Adult education centres	No.	5775	6269	08.55
30.	Industrial Training Institutes	No.	4	16	300.00
31.	Rail route	Km	102	102	00.00
32.	Total road length	Km	7590	7883	03.86
33.	IRDP families below poverty lines	Lakhs	0.40	0.72	80.00
34.	Employment Guarantee Scheme	Mandays in lakhs	13.37	51.31	283.76
35.	Ration shop	No.	1598	1648	03.12
36.	Cities	No.	8	8	00.00
37.	Villages	No.	3139	3144	00.15
38.	Panchayat Samiti	No.	5	8	60.00
39.	Gram Panchayat	No.	727	831	14.30
40.	Dist. Central Co-operative Bank	No.	1	1	00.00
41.	Primary Agril. Credit Society	No.	677	698	04.17
42.	Urban credit society	No.	3	12	00.00
43.	Marketing society	No.	5	8	60.00

Chapter-VI

SUMMARY AND CONCLUSIONS

Conventionally agriculture is seen as a source of food and raw material. During the course of development the agriculture sector has played a vital role in the development of the country. In India, agriculture sector accounts for about 27 per cent to the national income and provides employment to about 67 per cent of the total population. Agricultural export accounts for about 5 per cent of total agricultural production and about 22 per cent of country's total export.

The main purpose of this chapter is to summarise the research work carried out on this topic and to draw useful conclusions on the basis of analysis of data.

The existence and feeling of problem of regional disparity, deserves the study work for development of agriculture in the Aurangabad district in past 19 years i.e. 1980-1999, as agriculture still to be a major occupation of majority of people .

Since the objective of study was to examine the growth of agriculture in Aurangabad district, time series data were obtained from secondary sources like Epitomes of Agriculture, District Statistical Abstracts and other published reports of the government of Maharashtra. The broad conclusions of the study are summarised below.

Total geographical area of Aurangabad district is 10100 sq.km. while the geographical area of the Marathwada region is 63918 sq.km. and that of Maharashtra State is 307710 sq.km. The density of population in the Aurangabad district was low (289) as compared to Maharashtra State (314) but it was high as compared to Marathwada region (198). The proportion of rural

population was less in Aurangabad district (61.30 per cent) as compared to Marathwada region (64.89 per cent) and Maharashtra State (64.97 per cent). On the contrary proportion of urban population was more in Aurangabad district (38.7 per cent) as compared to Maharashtra State (35.11 per cent) and Marathwada region (35.03 per cent). Total population in Aurangabad district was 29.20 lakh, while total population in Marathwada region was 156.22 lakh, and in Maharashtra State it was 967.52 lakh. The literacy percentage in Aurangabad district was 73.63 which was higher than Marathwada region (68.52 per cent) but was lower than in Maharashtra State (77.27 per cent).

The percentage of working population to total population was 41.59 per cent in the Aurangabad district as against 37.06 per cent in Marathwada region and 42.06 per cent in Maharashtra State. Agricultural workers were 59.58 per cent in Aurangabad district, 72.07 per cent in Marathwada region and 53.37 per cent in Maharashtra State. The sex ratio was 919 in Aurangabad district, 845 in Marathwada region and 922 in Maharashtra State. Land man ratio was 0.28 in Aurangabad district, 0.48 in Marathwada region and 0.39 in Maharashtra State.

The distribution of total geographical area under different categories of land utilization indicates that proportion of area under forest, culturable waste land, land under miscellaneous trees, crops and grooves not included in net area sown was low in Aurangabad district as compared to Marathwada region and Maharashtra State. On the other hand, proportion of area under barren and uncultivable land, permanent pasture and other grazing land was higher than Marathwada region and lower than Maharashtra State. Area under current fallows and net sown area was higher in the district as compared to the State but lower

than the division. Areas under other fallows, area sown more than once and gross cropped area was more in the district as compared to the Marathwada region and Maharashtra State. The cropping intensity reported in the district (145.01 per cent) was higher than that reported in Marathwada region (134.22 per cent) and Maharashtra State (125.08 per cent). The proportion of total bovine to total livestock was 49.06 per cent in Aurangabad district, 60.62 per cent in Marathwada region and 59.08 per cent in Maharashtra State. The total livestock was 12.50 lakh in Aurangabad district, 84.76 lakh in Marathwada region and 413.51 lakh in Maharashtra State. The number of cattle per hundred hectare area was 39.35 in Aurangabad district, 59.87 in Marathwada region and 58.35 in Maharashtra State.

Bajra is an important crop of the district whereas rabi jowar occupies prime position in Marathwada region and Maharashtra State. Bajra and rabi jowar occupied 16.83 per cent and 21.06 per cent of total cropped area in the district. However, the proportion of total foodgrains to total cropped area was comparatively higher in Aurangabad district (70.67 per cent) than in Marathwada region (61.36 per cent) and Maharashtra State (59.17 per cent). The proportion of area under total oilseeds in the district was lower (8.58 per cent) than that in the division (11.86 per cent) and in the state (12.17 per cent). The proportion of area under sugarcane was more in Aurangabad district (1.94 per cent) than in Marathwada region (1.77 per cent) but was lower than in Marathwada region (2.39 per cent), whereas area under cotton was higher in Aurangabad district (18.79 per cent) as compared to Marathwada region and Maharashtra State. Out of total production of rabi jowar and bajra in State, Aurangabad district accounts for 6.69 per cent and 16.88 per cent, respectively and Marathwada region accounts for 35.29 per cent

and 45.74 per cent. Productivity of rabi jowar and bajra was higher in Aurangabad district (665 kg/ha and 890 kg/ha) as compared to Marathwada region and Maharashtra State. The percentage share in production of total foodgrains of the Aurangabad district was 4.07 to the state production while Marathwada region contributed by 24.91 per cent to the state production. Productivity of total foodgrain was lower in Aurangabad district (908 kg/ha) as compared to Maharashtra State (974 kg/ha) but was higher than Marathwada region (826 kg/ha). Productivity of total oilseeds was less in Aurangabad district (499 kg/ha) than in the Maharashtra State (966 kg/ha) but was more than in Marathwada region (481 kg/ha).

Aurangabad district contributes by 2.93 per cent and Marathwada region by 18.29 per cent to the sugar production of Maharashtra State, while the productivity of sugarcane was higher in Aurangabad district (87533 kg/ha) than in Marathwada region but was lower than that in Maharashtra State. With highest productivity of cotton (162 kg/ha), Aurangabad district contributes by 5.66 per cent to the total cotton production of Maharashtra State.

The percentage of net irrigated area to net sown area was lower i.e. 15.36 per cent in Aurangabad district as compared to Marathwada region (19.31 per cent), but was higher in Maharashtra State (14.48 per cent). Percentage of gross irrigated area was more in Aurangabad district (26.80 per cent) than Marathwada region (26.38 per cent) and Maharashtra State (15.18 per cent).

The average per hectare fertilizer consumption in the district was worked out to 64.8 kg whereas corresponding figure for the Marathwada region was 57 kg and Maharashtra State it was 75 kg.

The area under forests in Aurangabad district, Marathwada region and Maharashtra State has shown non-significant growth rate, while area under barren and uncultivable land has shown significant increase in Marathwada region and non-significant decline in Aurangabad district and Maharashtra State. Area under non-agricultural use has shown non-significant increase in Aurangabad district, and significant increase in Maharashtra State, while it has decreased non-significantly in Marathwada region. Area under permanent pasture and other grazing land has shown non-significant decrease in district, division and state. Land under miscellaneous trees and grooves has shown non-significant increase in Marathwada region and Maharashtra State, while Aurangabad district has shown a declining trend. Area under current fallow increased non-significantly in Aurangabad district and Marathwada region but Maharashtra State has shown significant increase. Area under other fallow increased non-significantly in Aurangabad district and Maharashtra State. Net area sown has shown non-significant decline in Aurangabad district and Marathwada region while in Maharashtra State it was non-significantly increased. Area sown more than once showed significant results in Aurangabad district and Maharashtra State. The linear growth rate was non-significant and compound growth rate was significant in Marathwada region. Total cropped area in Aurangabad district decreased non-significantly while it has shown significant increase in Marathwada region and in Maharashtra State.

Area under wheat, kharif jowar, rabi jowar, bajra, total cereals, other pulses, total foodgrains, kharif groundnut, safflower and total oilseeds has shown non-significant decline in Aurangabad district whereas area under sugarcane and summer

groundnut increased nonsignificantly in the district. On the other hand, Aurangabad district is showing significant increase in the area of other cereals, tur, gram and cotton.

In Marathwada region, non-significant decline in growth rate of area was reported in wheat, kharif jowar, total cereals, other pulses, kharif groundnut and safflower while non-significant increase was reported in the areas of rabi jowar, total foodgrain, summer groundnut and total oilseeds. Significant increase in Marathwada region was reported in the areas of bajra, other cereals, tur, gram, total pulses, sugarcane and cotton.

In Maharashtra State, nonsignificant decline in growth rate of area was reported in crops like wheat, kharif jowar, rabi jowar, total cereals, total foodgrains, kharif groundnut and safflower while nonsignificant increase was reported in bajra and other pulses. Area increased significantly in Maharashtra State in crops like other cereals, tur, gram, total pulses, sugarcane, cotton and total oilseeds. Linear growth rate of area under summer groundnut has shown nonsignificant increase while compound growth rate has shown significant increase.

In Aurangabad district, nonsignificant increase was reported in growth rates of production of wheat, rabi jowar, total cereals, tur, total pulses, total foodgrains, sugarcane and kharif groundnut while non-significant decline was reported in kharif jowar, other pulses, summer groundnut, safflower and total oilseeds. In Aurangabad district, significant increase in production was reported in bajra, other cereals, gram and cotton.

In Marathwada region, nonsignificant increase in growth rate of production was reported in wheat, kharif jowar, rabi jowar, total cereals, tur, other pulses, total pulses, total

foodgrains and summer groundnut while nonsignificant decline was reported in kharif groundnut, safflower and total oilseeds. In Marathwada region, significant increase in production was reported in bajra, other cereals, sugarcane, gram cotton.

In Maharashtra State, nonsignificant increase in growth rate of production was reported in wheat, kharif jowar, rabi jowar, total cereals, kharif groundnut, while nonsignificant decline was reported in production of safflower in Maharashtra State. In Maharashtra State, significant increase in growth rates of production was reported in bajra, other cereals, tur, gram, gram, other pulses, total pulses, total foodgrain, sugarcane, cotton and total oilseeds.

In Aurangabad district, nonsignificant increase in growth rate of productivity was reported in other pulses, total pulses and cotton while nonsignificant decline was reported in tur, summer groundnut, safflower and total oilseeds. In sugarcane and kharif jowar for productivity, linear growth rate was negative while compound growth rates were positive. In Aurangabad district, significant growth rate was seen in productivity in crops like wheat, rabi jowar, bajra, other cereals, total cereals, gram and total foodgrains.

In Marathwada region, nonsignificant increase in productivity was found in crops like bajra, total pulses, sugarcane, cotton and kharif groundnut, while nonsignificant decline in productivity was found in tur, summer groundnut, safflower and total oilseeds. Significant increase in productivity in Marathwada region was found in crops like wheat, other cereals, gram and other pulses. In case of productivity, linear growth rate was significant in kharif jowar, rabi jowar and total

foodgrains respectively, while their compound growth rates shown nonsignificant increase.

In Maharashtra State, nonsignificant increase in growth rate of productivity was reported in sugarcane, while nonsignificant decline in productivity was found in summer groundnut. Significant increase in growth rate of productivity was found in wheat, kharif jowar, bajra, other cereals, total cereals, gram, other pulses, total pulses, total foodgrains, cotton, kharif groundnut and total oilseeds. Linear growth rate was found to be significant in rabi jowar while its compound growth rate was non-significant.

The growth rates of nitrogenous fertilizer consumption in Aurangabad district, Marathwada region and Maharashtra State increased significantly. Similarly the consumption of phosphoric and potassic fertilizer was significant in Aurangabad district as well as Marathwada region and Maharashtra State.

CONCLUSIONS

1. The density of population was low in the district in comparison with Maharashtra State, while it was high in comparison with Marathwada region,
2. Land:man ratio was low in the district as compared to Marathwada region and Maharashtra State.
3. The sex ratio in the district was more than that of Marathwada region and less than that of Maharashtra State.
4. The proportion of land under forest culturable waste land and land under miscellaneous trees, crops and grooves was lower in the district as compared to Marathwada region and Maharashtra State. Proportion of gross cropped area was

more in the district as compared to Marathwada region and Maharashtra State.

5. The proportion of total cattle to the total livestock was higher in the district as compared to Marathwada region and Maharashtra State.
6. Jowar and cotton were major crops in the district which occupied 21.06 per cent and 18.79 per cent area of the total cropped area. Percentage area under total foodgrains was more in the district as compared to Marathwada region and Maharashtra State.
7. The production of jowar, bajra and total foodgrains was satisfactory in the district.
8. The productivity of cotton was higher in the district as compared to Marathwada region and Maharashtra State. Maharashtra State dominated in the productivity of total cereals, total pulses, total foodgrains, groundnut, total oilseeds and sugarcane.
9. The proportion of net irrigated area to net sown area and gross irrigated area to gross cropped area was higher in the district as compared to Marathwada region and Maharashtra State.
10. The proportionate growth in area under forest, land under non-agriculturable use, current and other fallows was nonsignificant in the district, but the area sown more than once increased significantly in the district.
11. The growth rates of area under other cereals, gram, tur and cotton was significant in the district.
12. The growth rates of production of bajra, other cereals, gram and cotton was significant in the Aurangabad district.

13. The productivity of wheat, jowar, bajra, other cereals, total cereals, gram total foodgrains and kharif groundnut showing positive growth in the Aurangabad district.

In general, the positive rates were observed in terms of area, production and productivity of majority of important crops. This indicates that the agricultural development is taking hape in desired direction.

SUGGESTIONS

1. Irrigation facilities are satisfactory in the district but for sustainable agricultural development more attention is needed in vital management areas like soil and water conservation, irrigation, research and development and human resource development.
2. There is a lot of prospectus for horticultural development in the district, it can be possible by bringing cultivable waste land under horticultural crops and through integration of cropping pattern.
3. There is great scope for development of food processing industry due to availability of infrastructure, irrigation , marketing facilities in Aurangabad district.
4. Animal husbandry is very important next to agriculture and horticulture but it is not much developed in the district. Efforts should be done to grow pastures and develop processing and marketing facilities.
5. Area under forests is low in the district. In view of this, special efforts should be made through social forestry, commercial forestry. Co-operative efforts are needed here to establish, manage, sustain and market the forests and

forest produce for commercial exploitation of such resources.

6. Adoption of frontier technologies like biotechnology, remote sensing, post harvest technologies can act as a catalyst in development of agriculture in the district.
7. Fresh look at credit policies along with well intended efforts to make farmers competitive in market are necessary.

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ABSTRACT

Agriculture is considered as backbone of Indian economy as it is a source of livelihood of 65 per cent of its population and contributing upto 15 and 26.40 per cent to our exports and GDP respectively. Green revolution and globalization had a immense impact on growth and development of agriculture sector in India. Well intended government efforts and farmers hard work is bringing fruits of success at National, State and regional level. Therefore to assess the development of agriculture, particularly in Aurangabad district of Marathwada region is taken with objectives like to study land utilization pattern of Aurangabad district, to examine changes in cropping pattern of the Aurangabad district, to study the performance of important crops in the district with respect to area, production and productivity and to study the agricultural development with respect to different socio-economic indicators over a period of time. The requisite data was collected from various government reports for a period of 20 years and was tabulated and analysed with suitable statistical tools like means, percentages, coefficient of variation (C.V.), linear growth rate (LGR) and compound growth rate (CGR).

The elaborate and systematic analysis of data revealed the facts that the proportionate growth in area under forest, land under non-arable use, current and other fallow was non-significant in the district, but the area sown more than once increased significantly. The growth rates of area under other cereals, gram, tur and cotton was significant in the district. The growth rates of production of bajra, other cereals, gram and cotton was significant in the district. The productivity of wheat, jowar, bajra, other cereals, total cereals, gram, total foodgrains and kharif groundnut shown a positive growth in the Aurangbad district. Other socio-economic indicators as well as infrastructural growth was appreciable in the district. Consumption of inputs like irrigation and fertilizers also increased.

Thus, in general crawling growth in agriculture sector can be enhanced through well intended planning and its implementation in that direction, with efforts like diversification, specialization, integration and intensification of efforts.