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CHAPTER -I
INTRODUCTION

1.1 Introduction:

The knowledge of cultivating soil, rising and harvesting of crops, domestication of animals and increasing of livestock is known as agriculture. In its broadest current science the word ‘agriculture’ includes not only the domestication of vegetation and animals useful to man, but also many of the operations involved in marketing them. Majid Husain (1996). The word ‘agriculture’ comes from a Latin word ‘agricultura’ which has its origin in the words ‘ager’ meaning a field and ‘cultura’ meaning to culture or cultivate. Agriculture occupies a significant situation in India and abroad. It provides food, fodder, raw material and thus contributes to on the whole economic growth. According to India’s census figures between 67 to 69 percent of India’s working population is engage in agriculture.

Agriculture in any area is directly related to climatic conditions, particularly temperature and rainfall. Water shortage marks the area as a drought prone area. In such areas if irrigation is developed, use of contemporary agricultural technology, use of high yielding varieties of seeds, use of chemical fertilizers, intensive efforts for soil conservation and enhanced mean of transportation etc. then higher yields can be taken. This requires considerable capital investment. Above all the drastic change in the approach of the farmers is equally significant for changing the cropping pattern in the region. It is against this background that in the present research work we made an effort to investigate the changes in the cropping pattern in the study area from the geographical viewpoint. The Concept of cropping pattern is both a dynamic and relative.

1.2 The Concept of Cropping Pattern:

Cropping pattern connotes the crop-mix grown in a particular area in an agricultural year. Cropping pattern determines the output mix in a particular region. Cropping pattern refers to acceptance of particular type of crops by the
farmers in a particular region. It is expressed at macro level, i.e. district, taluka or village level. A change in cropping pattern implies a change in percentage of area under different crops. It has momentous bearing on widening the geographical inequalities in income allocation. Introduction of new agricultural technologies has influenced the crop-mix which is more well-known in agriculturally developed regions. A dynamic change has been witnessed in agricultural division in our country, particularly during the post-green revolution stage. The technological development in crop varieties and other yield rising factors of production influenced the farmers’ performance which has reflected in the changing cropping pattern from cultivation of low value crops to high value crops in most of the regions.

Agricultural production, being biological in nature shows extensive variations across different agro-climatic regions. Soil, rainfall, topography, temperature and infrastructure facilities like irrigation, marketing greatly influence on cropping pattern of a region. A study of the changes in land utilizes and cropping pattern at the regional level will be helpful to create suitable agricultural policies for the location.

Agricultural land use is one of the fundamental natural resources. It forms the basis for all geological, ecological, human and economical actions. Land is a significant input in agricultural sector, but yield agricultural crops mostly depend upon fertility of the land for raising different crops. Cropping pattern is the essential aspect of the agricultural land use. Cropping pattern means the percentage of area under various crops at a point of time.

Agriculture includes growing of crops from the land, animal husbandry, agro forestry. Agriculture has been experienced in India since time immemorial. So the agriculture and cropping pattern are different with time and place.

The use of land totally depends on physical factors like topography, soil, and climate as well as upon human factors such as population density, period of crops, land tenure and technological levels of the people.
The cropping pattern is however a dynamic idea as it changes over space and time. Crops are normally grown in combination in every region. These crops have its virtual position in terms crop combination. The distributional pattern of crops is every region is an outcome of predominance of definite crops or combination of crops. The cropping pattern of every region is strongly influenced by geo-climatic, socio cultural, economic, historical and political factors Majid Husain (1996)\(^1\). During the last four decades this has been significantly change in agricultural land use in India.

Thus, land use and cropping pattern studies are of particular importance in view of the rapidly increasing population and consequential pressure on the existing land. These phenomenal changes are noticed more principally in the cropping pattern and importance is given to various crops from time to time.

The cropping pattern of India progressively modifying since 1950-51 from food grain crops to non food grain crops. During 1950-51 the share of cereals and pulses in total cultivated area was 61.10 percent and 15.60 percent, which got reduced to 52.63 percent and 12.86 percent respectively during 2003-04.

Whereas the increasing tendency was observed in the share of oilseed 8.19 percent to 13.79 percent, sugarcane 1.30 percent to 2.30 percent, fruits and vegetables 1.70 percent to 4.75 percent. These figures indicate that change occurred in cropping pattern of India in favour of oilseeds, sugarcane, fruits and vegetables in recent years.

The cropping pattern of Ahmednagar district also modifying since 1973-74 from food grain crops to non food grain crops. During 1973-74 the share of food grain and oilseeds in total geographical area of the district was 87.76 percent and 6.86 percent, which got reduced to 86.65 percent and 3.38 percent respectively during 2004-05.

Whereas the increase was observed in the share of sugarcane 4.25 percent to 6.48 percent, cotton 0.37 percent to 0.47 percent and fruits and vegetables 0.74 percent to 3.33 percent.
percent to 3.00 percent. This tendency clearly indicates that the farmer had decided to take economically beneficial crops.

1.3 Significance of the Study Region:

The study region is selected for present investigations. The choice of topic under investigations is influenced by a lot of conditions i.e. physical as well as cultural. Firstly, study region is diversified geographically distinctiveness in terms of rainfall and relief. Secondly, this region has not been so far studied thoroughly from cropping pattern point of view by academicians and therefore this study region has been remained still untouched for development of cropping pattern. Thirdly, technological factors is influencing on cropping pattern on study region. Presently it has considerable impact on changing cropping pattern; lastly researcher belongs to this study region therefore familiar with the region.

1.4 The Study Region:

The south – east part of the Ahmednagar district is selected as study region. This region is located in the drought prone region in Western Maharashtra. This study region comprises the seven tahasils of the district namely Shevgaon, Pathardi, Nagar, Parner, Shrigonda, Karjat and Jamkhed. Geographically this region is located in 18° 20’ N. to 19° 30’ North Latitude and 74° 10’E. to 75° 43’ East Longitude. Basically this area is rural area except Ahmednagar city. Total geographical area is 962990 hectares to be covered by this region. It is 57.06 percent of district total geographical area.

This study region is bounded by Georai and Ashti tahasil of Beed district, Bhum tahasil of Osmanabad district in the East part. Karmala tahasil of Solapur district and Dound tahasil of Pune district in the south part. Shirur tahasil in the south - west and Junnar tahasil of Pune district in the west side. Sangamner, Rahuri Newasa tahasil of the same district and Paithan tahasil of Aurangabad district on the northern side.
The most important source of income is the agriculture. Agriculture is the major economic activity and hence the agricultural resources should be evaluated, therefore, it is a reason for selecting the topic.

1.5 Hypothesis:

There is change in cropping pattern in the study area in Ahmednagar Maharashtra, which is the effect of geographical, economic, technological, social and environmental factors. There are spatial inequalities in the cropping pattern in the study region.

1.5.1 The land use pattern in study area has changed over the years.
1.5.2 The changes in land use pattern are influenced by many factors.
1.5.3 There is a general shift in cropping pattern from cereals to commercial and cash crop.
1.5.4 Changes in cropping pattern are influenced by changes in the prices of crops and non-price factors.

1.6 Objectives:

The present research work is to study the changes in cropping pattern in the study region, during the period of last four decades from the geographer’s point of view. These wide objectives can be broken into the following most important components.

1.6.1 To study the physical, socio-economical and cultural condition of study region
1.6.2. To study the comparative changes in the cropping pattern of the study region during 1970 to 2010.
1.6.3. To assess the crop ranking, crop combination and crop diversification regions in study region.
1.6.4. To analyze the changes in cropping pattern.
1.6.5. To examine the factors contributing to changes in Cropping Pattern.
1.6.6. To suggest the suitable cropping pattern in the study region.
1.7 Sources of Data:

The entire investigation is based on primary and secondary sources of data.

**Primary data** is obtained from twenty three villages through questionnaires. The systematic purposive sampling method was chosen for selection of the sample villages. The questionnaires covers the aspects like general land use, crop land use, family background of the farmers, education, income, problems related to agriculture etc. Besides this second questionnaires are filled from particular tahasil, gramshevak or sarpanch of the villages to get additional information of sample villages.

**Secondary data** is collected from, socio economic review and district statistical abstracts of Ahmednagar, Maharashtra State, District Census Handbook Ahmednagar, District Gazetteers, Season and Crop Reports, Agricultural Statistical Information of Agriculture Department of Ahmednagar Districts, Maharashtra and some published and unpublished reports and records maintained by Zilha Parishads, Irrigation Department etc. The secondary data is also collected from various Government Offices and Institutions.

1.8 Methodology

The data collected is analyzed by applying suitable statistical methods and it is presented through tables, maps and diagrams. The spatial and temporal aspects of general and agricultural cropping pattern were studied in depth. The data obtained for the period of 1970-71 and 2010-11 is renewed to the percentage to the total geographical area.

The percentage is categorized in different groups. The volume of change in these categories for forty years was analyzed and mapped. Suitable diagrams are prepared and interpreted the text to show the changing cropping pattern.

For the calculation of crop combination of the region Rafiullah maximum positive deviation method is used. Rafiullah, (1956)\(^3\) based on Weaver’s method,

The technique devised by Rafiullah’s may be expressed as follows:

\[
    d = \frac{\sum D^2p - \sum D^2n}{N^2}
\]

Where,

- \(d\) = is the deviation between actual crop percentage and the appropriate crop percentage in theoretical distribution
- \(P\) = is the positive difference.
- \(n\) = is the negative difference.
- \(N\) = is the number of the crops in the region.

The year 1970-71 and 2010-11 is selected for demarcation of crop combination and ten crops are selected for delineation of crop combination.

For the computation of crop diversification regions Jasbir Singh’s formula has been applied. Jasbir Singh’s, (1976)⁴ formula is applied to work out crop diversification for the region is as given below:

\[
    \text{Percentage of total cropped area under ‘n’ crop} \\
    \text{Index of Crop Diversification} = \frac{\text{-----------------------------}}{\text{Number of ‘n’ crop}}
\]

Where, ‘n’ indicates the crops which are individually occupy five percent or more than five percent of total cropped area.

The systematic purposive sampling method was chosen for selection of sample villages. The selection of these sample villages was based on administrative revenue circles in the study region. One village from each administrative revenue circle has been selected.

Total twenty three revenue circles in the study region So total twenty three villages has been selected covering aspects like Spatial-Temporal analysis of cropping pattern, problems faced by farmers related to agriculture. Lastly,
problems of agriculture have been identified and possible suggestions were given for suitable cropping pattern in the study region in Ahmednagar district.

1.9 Review of Literature:

A review of past investigate helps in identifying the theoretical and methodological issues applicable to the present study. This point attempts a short review of the important research literature that has accumulated on the area related to this study. Keeping this vision the objectives of the study, the review is presented under the following subtopics.

1.9.1. Temporal Changes in Land Use Pattern
1.9.2. Factors Responsible for Changing the Land Use Pattern
1.9.3. Changes in Cropping Pattern
1.9.4. Factors Contributing to Change the Cropping Pattern.

1.9.1 Temporal Change in Land Use Pattern:

Pandey and Tiwari, (1987)\(^5\) made an effort to study the ecological implications of land use dynamic in Uttar Pradesh. They reported that, there was a constant increase in fallow lands in all the regions despite approximately a constant net cultivated area. The cultivable waste land was declining constantly, except hilly area

Pal and Mruthyunjaya, (1990)\(^6\) considered silvipastural scheme for improvement of waste lands of dry areas in Rajasthan using time series data of sixteen years from 1970-71 to 1986-87. The compound growth rate reveals that the area under forest, grazing land, cultivable waste land, gross cropped area, area sown more than once registered a significant positive growth during the period of investigation. The growth rate of forest was maximum (4.16 percent) followed by doubled cropped area (4.10 percent). The increasing of barren and uncultivable land was negative. They suggested that the land use plan for the development of dry areas of Rajasthan which envisaged that the proportionate area under crops should reduce from 44.98 percent to 33 percentage of total area.
Ramanaiah, (1990)\textsuperscript{7} considered the significance of forest land utilize in Andhra Pradesh and reported that, the increase in percentage of forest land in the state during the period 1963-64 to 1978-79 was insignificant. The non cultivable land shows increased by 14.9 percent of the total area in 1963-64 to 16.4 percent in 1978-79. The percentage of cultivable waste land decreased by 1.8 percent and arable land shows decreased by 0.1 percent for the same period.

Singh, (1990)\textsuperscript{8} considered the land utilize pattern in the challenging areas of the entire agro- climatic zone in Uttar-Pradesh in the year 1988-89. He reported that, the hilly area had maximum area under forest, permanent pastures, grazing land, tree crops and groves, non cultivable wastelands and land under non agricultural uses. He also reported that, the area sown more than once and the total cropped area had been found the highest in the eastern region and the lowest in the mountainous areas. He suggested that the slopes of the mountainous areas of the region could be effectively developed for the plantation of temperate fruits.

Shrivastava, (1991)\textsuperscript{9} studied the dynamic land utilize and cropping pattern method in Tawa command area of Hoshangabad district in Madhya Pradesh. They assessed the impact of the project on cropping pattern and land use in the area during the pre project period for 1972-73 to 1974-75 and post project period for 1975-76 to 1979-80. They observed that the decline in the woodland area as a result of illegal felling of tree for household purposes. They also stated that, fallow land increased since the construction of the project.

Singh and Kaur, (1991)\textsuperscript{10} studied the changing pattern of land operation in Punjab for the period of 1966-67 to 1987-88. The study indicate that the reported area for land utilization still constant while the area under forest, area not available for cultivation, net sown area increased during the period of investigation. Due to intensification of agriculture, gross cropped area, cropping intensity is increased. They also reported that the Punjab agriculture had occurred extreme changes due to green revolution.
Vaidya and Sikka, (1991)\textsuperscript{11} considered the land utilization pattern in Himachal Pradesh in the period of 1966-67 to 1986-87. They reported that there had been no uniform trend in the changes in the land use classes. The area under forest increased while the other categories had shown decreased. They have projected the land use pattern in 2000 on the basis of compound growth rate calculation. The projection shows that the area under all categories increased except the current fallow land.

Sharma and Pandey, (1992)\textsuperscript{12} considered the dynamics of land utilize in different states of India. This study indicates that the general declining tendency in the area under permanent pastures, grazing lands, barren and uncultivable lands. The area under non agricultural uses, cultivable wastes, and fallow land shows a positive growth in most of the state in India. With regards to area under forest, negative growth rate was indicated in the state of Assam, Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra and Tripura while Jammu and Kashmir and Orissa observed negative growth rate for area put to non agricultural uses. The annual rate of increase in area under non agricultural uses was very high in Gujarat, Tamil Nadu, Rajasthan, Uttar Pradesh, Maharashtra, Karnataka and Madhya Pradesh. Increasing trend was observed in the area under permanent pasture and grazing land in Bihar, Maharashtra, Mizoram and Uttar Pradesh. Correspondingly decreasing trend was indicated in the area under miscellaneous tree crops in Andhra Pradesh, Gujarat, Haryana, Kerala, Orissa, Punjab Tripura and Uttar Pradesh.

Mishra, (1994)\textsuperscript{13} studied the changing outline of agriculture in Orissa and observed that the changes in cropping pattern for the period of 1950-51 to 1990-91. He reported that there was regular increase in the proportion of the net area sown at the cost of land under categories such as area not available for cultivation, other uncultivable land without fallow land. He also stated that there was a regular fall in the share of area under rice and other cereals which has been turn for production of pulses and oilseeds, the proportion of which has constantly increased.
Negi, (1994)\textsuperscript{14} considered the agricultural growth in Himachal Pradesh for the period 1972-73 to 1980-81. The study indicates that the net area sown remained constant, while the area under forest increased from 21 percent to 27 percent during the study period.

Nagbhushan, (1994)\textsuperscript{15} considered the dynamic of land use in Dharwad District of Karnataka state for the period of 1979 to 1991. He reported that the growth rate of area under woodland, fallow land, net sown area, total cultivated area, and doubled cropped area were significant and positive. He also stated that the improvement in the management practices was the prime reason for the increase of double cropped area.

Padmanabhan and Chinnadurai, (1994)\textsuperscript{16} considered the land use pattern in Tamil Nadu for the period of 1960-61 to 1988-89. The study reveals that the total cropped area of Tamil Nadu had decreased from 7.32 to 6.44 million hectares during the study period and double cropped area decreased from 1.32 to 0.90 million hectares. Over the year total cropped area had been continuously decreasing at the same period area under current fallow, other fallow, and lands under non agricultural use had been increasing year by year.

Managoli, (1997)\textsuperscript{17} considered the land use dimensions in Bijapur district in Karnataka for the period from 1971-72 to 1992-93. The study shows that no change in the forest area in study area. The growth rate of area more than onces and land put to non agricultural uses were positive and important in study area. The growth rate of area under crops like jowar Bajara and maize were positive and important.

Prashantkumar, (2003)\textsuperscript{18} studied that land use pattern in dry region of Karnataka. He reported that there was a decrease in the area under non agricultural uses, cultivable waste, current fallow land in zone first and area under cultivable waste land and net sown area. The positive growth was occurred in barren and uncultivable land, current fallow land and other fallow land.

Goswami and Challa, (2004)\textsuperscript{19} considered the land use pattern in India for the period of 1950-51 to 1997-98. They reported that the forest land had...
improved from 40.08 million hectors to 68.65 million hectors in the study period. They also reported that there was a significant increase in area under non agricultural uses from 9.36 million hectors to 12.3 million hectors in the period of investigation. It also indicates that net sown area is increased during the study period

Sreeja, (2004)\(^\text{20}\) studied the dynamic of land use pattern in Kollam district of Kerala. The study reveals that there was a considerable increase in the current fallow. He reported that there was an adverse relationship between rainfall and fallow land, barren and uncultivable land, land under mixed tree crops and groves and cultivable waste recorded a significant negative growth

Harish, (2006)\(^\text{21}\) studied the land use dynamic in Mandya district. He reported that the area under fallow, current fallow, cultivable waste and land under mixed tree crop indicate positive increasing.

Ramappa and Naidu, (2009)\(^\text{22}\) studied the land utilization pattern in Andhra Pradesh. The study reported that the possibility for widespread agriculture was very restricted since the area under agricultural uses had already reached the highest level. The area under non agricultural uses had increased crop time to time. This certainly reduces the volume of cultivable land. Changes in cropping pattern were also necessary to make the most competent use of land.

1.9.2. Factors Responsible to Change the Land Use Pattern:

Rajesh and Ramasamy, (1998)\(^\text{23}\) considered the extent and determinant of underutilized land in Tamil Nadu. They used independent variables i.e. area under cereal crops, area under irrigation etc and analyses the regression equation for the study of changes in land use. The study indicates that there was more scope for area extension of land for cultivation, as the existence of huge area of land under current fallow, other fallow and cultivable waste which can be brought under cultivation. This land could be cultivated and used for cultivation by applying scientific technique.
Goaswami and Challa, (2006)\textsuperscript{24} considered the socio economic factors disturbing land use in India. They stated that the population pressure and prices of necessary commodities were the most significant factors contributing to change in land use pattern. This study reported that high population pressure on cultivable land induced the rural people to bring extra land under cultivation. Similarly, in the case of necessary commodities whose prices constantly improved, there was a pressure to alternating land from low value output to high value output.

Wani, (2009)\textsuperscript{25} considered the factors of productive and unproductive land utilization in Jammu and Kashmir. Study had chosen cropping intensity as endogenous changeable in productive land utilization and current fallow as a variable in unproductive land utilization. The exponential function for productive land use indicate that the net irrigated area, literacy level and area not available for cultivation were positive and important factors of the variation in cropping intensity. Increase in rural population in relation with cultivated area had considerably contributed to the increase of area under current fallow. The area under rice was observed to be important and positive factor of area under current fallow.

1.9.3. Changes in Cropping Pattern:

Gupta, (1963)\textsuperscript{26} studied the period of ten years from 1949-50 to 1958-59 and measured the changes in cropping pattern in all the states by taking the average percentage over the earlier year. The study focuses on the significance of the irrigation and fertilizer, which induced desirable changes in cropping pattern. He explained that the relative importance of the area devoted to the cereal had decreased where as that of cash crops had increased.

Shah, (1963)\textsuperscript{27} organized a study on cropping pattern in Amritsar and Ferozpur district of Punjab. He observed that food crops were replaced by non food crops and interior crops by superior and commercial crops.
Venkataramanan and Prahladachar, (1980)\textsuperscript{28} considered the growth rate and cropping pattern changes in agriculture in six states from 1950 to 1975. They show that relative acreage under food grain and non food grain in Punjab remain constant but relative shares for wheat and rice among food grain and that of cotton among non food grain enhanced. Unlike in Punjab, Rajasthan the share of food grain crops in the total cropped area, bajara in particularly increased significantly. Compared to Utter Pradesh, yield increases in Bihar were noticeably impressive, through the overall performance was very much behind the Punjab. The soil and the climatic condition in Maharashtra were such that they contributed to an inferior crop pattern and relatively low yield for most crops. The changes in the cropping pattern that occurred in Andhra Pradesh were the improvements in relative shares of rice maize and sugarcane.

Sharma, (1990)\textsuperscript{29} studied the interstate disparities in growth of agriculture in India from 1966-67 to 1987-88. He reported that Punjab, Haryana, Uttar Pradesh and Maharashtra these four states haves experienced growth rate of production in food grains was higher than the national average of 2.72 percent per year. Increased production was statistically non significant in Gujarat Tamil Nadu and Rajasthan where as the other state witnessed growth rate in food grain lower than the national average. He also proposed that interstate disparities in growth performance of agriculture in India could be minimized by bringing the farmer in the scope of competent extension, education and training, sound government policies and efficient supply network of various inputs.

Krishnan, (1991)\textsuperscript{30} considered the growth and insecurity of agriculture in Kerala and noted that the shift in cropping pattern. The cropping pattern shifted to plantation and commercial crops. They also reported that through the shift of cropping pattern was welcome shift in terms of the theories of economic development, it was at the cost of making the state deficient in rice, staple crop of the state. The shift in the cropping pattern was attributed to the excessive wage levels.
Singh and Mohammaed, (1992)\textsuperscript{31} considered the dynamic cropping pattern in North India. This study indicates that the total cropped area and area under cereals, vegetables had enlarged, while millets and cash crops has decreased as far as the special organization of land use was concerned, despite the subsistence economy regular in the area, the predictions of Von Thunen’s assumption would show to be supported by the facts.

Behura and Naik, (1994)\textsuperscript{32} considered the changes in the cropping pattern for the period of 1966-67 to 1990-91 in Orissa. The study shows that the area under rice which was most significant crop in the area, it is come down by 58 percent of the total cropped area in 1966-67 to 38 percent in 1990-91. They reported that the declining of the area under rice was mainly due to substitution of paddy by other crops.

Lal and Singh, (1994)\textsuperscript{33} examined the structural changes in Haryana agriculture. The study indicate that the shift in the cropping pattern and value shares in terms of paddy and wheat principally grown in relatively better resource endowed area. This resulted in a notable growth in the production of these two cereals where as the coarse cereals were by passed the growth process. They felt that extra concentration should be given towards yield improvement in non food grain. So the stability could be maintained in the food grain basket of the state.

Shivkumar, (1994)\textsuperscript{34} stated that in Karnataka there was shift from food based agriculture to horticulture, sericulture, dry land crops, forestry etc. He reported that the area under food crops decreased by 75.76 lakh hector to 72.91 lakh.hector from 1989-90 to 1991-92, where area under oil seeds increased from 22.65 lakh hector to 29.09 lakh hector in the same period.

Vivekananda and Sathyapriya, (1994)\textsuperscript{35} studied the changing cropping pattern in Karnataka for the period 1956-57 to 1989-90. They mentioned that the area underneath all cereal crops declined from 55.percent to 47 percent. They also stated that cultivation of jowar bajara wheat is increased in the share of area under rice and ragi among the cereal crops. Maize a new entrant in the cropping pattern of the state, though, registered an increase in its share from only 0.10
percent to 2.10 percent. The increase had been quite considerable in the case of oil seeds and sugarcane i.e. 12.23 percent to 19.77 and 0.52 to 2.16 percent respectively.

Parmar,(1995)\(^{36}\) studied the degree of change in cropping pattern in south Gujarat for the period of 1960-61 to 1989-90. The period of study was divided into three phases i.e. 1960.61 to 1969-70, 1970-71 to 1979-80, and 1980-81 to 1989-90. He measured the changes in cropping pattern by applying rank correlation coefficient. The study reveals that the fluctuations in cropping pattern was observed to be severe in Bharuch district moderate in Surat and Valsad and least in Danya. In Bharuch district the acreage under tur increased more while other crops decreased.

Sawant and Achuthan, (1995)\(^{37}\) explained the India’s agricultural growth in all crops and regions from 1967-68 to 1992-93. They observed that the food grains output in the 1980’s expanded at the low rate of 1.32 percent in Andhra Pradesh and remained constant with non significant growth in Karnataka. Shift in area from food grain to non food grains was prominent and the presentation of non food grains production was better in 1980’s which was mostly attributed to area extension. In Karnataka the yield per hectare of cotton increased at the rate of 9.63 percent during 1980’s while groundnut output growth was not considerable.

Singh,(1997)\(^{38}\) considered the cropping pattern during pre and post green revolution period in different agro climatic zone in Bihar. (1959-60 to 1968-69 & (1969-70 to 1990-91) They stated that the rice was the important crop of these region occupying more than 70 percent area of total cultivated area, its contribution remain constant in all zones of the region. They reported that there had been insignificant change in share of maize in total cropped area in pre green revolution period, where as wheat and maize indicate marked changes during the post green revolution period. The area under pulses decreased but after the introduction of high yielding varieties programme, the cropping pattern has shifted in favour of wheat, potato and other vegetable crops in this region.
Kumar and Singh, (1998)\textsuperscript{39} studied and explain the cropping pattern in North Bihar during post green revolution period of 1970-71 to 1993-94. This study introduced that the cropping pattern of north Bihar was predominated by cereal crops. The high percentage of cereal crops in the cropping pattern was attributed to the food grain shortage in the project area and biochemical and genetic innovations in principal cereal crops during the period of study.

Kebebe, (2000)\textsuperscript{40} considered the diversification of agriculture in Haryana state. The study shows that cereals commercial crops, vegetables and fruits were observed comparatively more diversified as compared to pulses and oilseeds. Diversification towards high tech innovative enterprises inside the agricultural sector such as fruits vegetable and towards agro food processing and rural non farm sector has been gaining momentum in the state.

Hazra, (2001)\textsuperscript{41} considered the changes in cropping pattern in all India level by taking into consideration the area share of crops and crop groups at four time points, respectively the triennium ending average of area at 1966-67, 1976-77, 1986-87, and 1996-97. The study shows that there was shift from conventionally grown less remunerative crops to extra remunerative crops. They also reported that the crop changes due to government policies and thrust on some crops.

Jayakumar and Velayudhan, (2002)\textsuperscript{42} considered the agricultural stagnation in Kerala and introduced that agriculture through stagnant for the last many years was still a main segment of Kerala economy. They stated that the area and the production of food crops had been decreased over the years, while the area production and productivity of cash crops had increased. They accomplished that the prevalence of obsolete knowledge in the state and the relative profitability influenced the farmers’ decision to allocate land under different crops and resulted in agricultural stagnation.

Virendrakumar, (2002)\textsuperscript{43} considered the shifting cropping pattern in Himachal Pradesh during the period of 1972 to 1996. The study indicates that the total cropped area enlarged from 16.69 percent to 17.06 percent of the total
Goawami, (2003)\textsuperscript{44} considered the changes in cropping pattern in Mizoram and reported the maximum growth rate in pulse cultivation. It is 13.82 percent followed by tapioca (9.46 percent) maize (3.25 percent) Area under sugarcane and cotton was indicated a significant positive expansion of 2.56 percent.

Goswami and Challa, (2004)\textsuperscript{45} considered the changes in cropping pattern for the period of 1951 to 1998. They reported that there was regular shift in study area from food crops to non food crops showing more diversification in modern time. The proportion of area under total cereal to total cropped area is decreased by 61.1 percent to 53.08 percent during the study period.

Rao and Shahid,(2005)\textsuperscript{46} considered the dynamics of cropping pattern in sorghum growing states in India. They stated that at the district level, Dharwad had set of competing crops like groundnut and cotton to sorghum while the Belgaum district had another set of competing crops like pearl millet and maize to sorghum. The Transition probability matrix demonstrated that Karnataka had sorghum area retention of 31 percent in 1970-73.

Dinesh,(2007)\textsuperscript{47} considered the crop diversification in Chattisgarh and reported that the pattern of land use and cropping pattern has changed during pre-reform, and post -reform period. They observed that the area under forest increased in plains and northern hills while it has declined in Bastar plateau. Land put to non agricultural uses and cultivable waste land had increased in the plain region while it has declined in northern hill. The permanent pasture in plain and plateau were depleting very fast. On other side paddy area has been increasing continuously in past three decade. The increase was observed at the expense of coarse cereals and minor millets area.

Munish,(2007)\textsuperscript{48} considered the expansion and changes in Indian agriculture. This study shows that agricultural sector was conventionally regarded having low price responses. He reported that cropping pattern was diverse in
different area because of economic and technological reasons, but the change was slower.

Subrata, (2007)\textsuperscript{49} organized a micro level study on economic of cropping pattern changes in relation to credit in West Bengal. He reported that the credit accessibility from institutional and non institutional sources had made a momentous involvement on the changes in cropping pattern. Impact of credit accessibility on cropping pattern change has been more important in the case of small size of land holdings. The profitability was more in the case of small and marginal farmers. The income per acer from non food grain cultivation was extra than the food grains.

Batla, (2008)\textsuperscript{50} considered the regional dimension of inter crop diversification in India and reported that inter crop area was shifted in favour of high yielding crops these are. Wheat, rice, oilseeds, fiber, sugarcane up to 1980’s and towards paddy sugarcane, fruits vegetables, fibers plantations during the 1990’s and early 2000. The area under wheat and paddy had extended solely at the cost of low yield growth crops like coarse cereals and pulses due to price support and high yielding variety programme. The high worth commercial crops have benefited both from area shifted as well as fresh land brought under cultivation.

Tingre, (2008)\textsuperscript{51} made an effort to study the cropping pattern changes and crop diversification in Akola district of Vidarbha in Maharashtra. The study shows that mass of cereal crops indicate negative and low growth rate of area during the study period. Soya bean had occurred important situation in the cropping pattern. The trend of crop diversification and cropping intensity increased considerably.

Meenakshi and Indumathy,(2009)\textsuperscript{52} considered the land operation and cropping pattern in Tamil Nadu. This study indicates that there was a considerable decrease in the cultivation area and therefore output was affected to a huge extent. The cropping pattern in the state had a high quantity for
maladjustment for crops. Near about 53 percent of the cultivated area was being used for rising inappropriate crops.

1.9.4 Factors Contributing to Change the Cropping Pattern:

Kshirsagar, (1990)\textsuperscript{53} considered the dynamics of cropping pattern in semi arid region in India. The study explains that the farmers of these regions have developed their own cropping pattern and have attempted to maximum returns from agriculture with use of limited wealth. This study indicates that the value is the most important factor, which favored the expansion area under non food crops.

Herdt, (1992)\textsuperscript{54} used functional approach for studying the rainfall pattern and its impact on area and yield in Punjab during 1907 to 1946. The study indicates that rainfall has a considerable impact on area planted and yield of crops. He also observed that rainfall in June to September has a strong impact on the acreage of post monsoon crops.

Krisnakumari and Swaminathan, (1992)\textsuperscript{55} studied the changes in cropping pattern, crop combination crop area and crop diversification of crop enterprises in Tamil Nadu. The study indicates that the change were mainly due to change in agricultural inputs, use of high quality seeds, fertilizers, pesticides ,irrigation intensity and use of tractors. They also stated that in north and western region low modernization is because of low rainfall, poor soil and less irrigation facilities.

Singh, (1993)\textsuperscript{56} studied the district wise investigation for identifying the factors affecting area and production of gram in Bihar. They reported that annual rainfall was found to have a significant effect on production only in two districts. The regression co-efficient for irrigated area was negative in most districts implying that as area under irrigation improved, gram was pressed to more insignificant lands and substituted by superior crops.

Vyas, (1996)\textsuperscript{57} according to him number of regulated market centers is the most important factor for determining the cropping pattern. The significant
changes in cropping pattern were incidental to be explained by changes in the relative prices. Apart the agronomic situation, the scientific changes are the most imperative factors which had remarkable impact on the cropping pattern. The cropping pattern had more diversified where the irrigation facilities are available.

Reddy and Achoth, (2000)\(^{58}\) considered the factors affecting on cropping pattern changes in arid land agriculture in Karnataka. The study indicates that mainly of the arid land food crops such as ragi, jowar were non approachable to own price and oil seeds such as sunflower, groundnut responded mostly to their own prices. Most of the crops responded positively to the rainfall. Increase in total cropped area had a positive influence on major dry land food grain crops.

Suhag, (2000)\(^{59}\) considered the factors disturbing on the production insecurity in major crop in Haryana. They observed that the vicinity under crop and yield were major factors contributing to output unsteadiness. Productivity contributed more comparative to area towards fluctuation in rice, bajara, wheat and gram. The reverse holds true for barley corn mustard, potato, sugarcane and fiber. Jowar as well as bajara crops had maximum insecurity coefficients as a result of their highest yield fluctuations.

Gadge, (2003)\(^{60}\) studied on the influence of cropping pattern changes on farmer’s economic status in Karanja block of Wardha district in Maharashtra. The study shows that, education, economic condition, size of farm land, annual income, economic motivation and extension contact related to each other for the change in cropping pattern.

Joshi, (2004)\(^{61}\) considered the factors affecting on agricultural diversification in South Asia. The study focused on independent variable i.e. irrigation, productivity, markets literacy, rainfall, land holding etc. This study reported that irrigation facility is important factor for contributing diversification of Fruits and vegetable were more profitable when compared to cereal and other crops. High profits of horticultural crops encouraged their cultivation but uncertain prices and high yield instability limited their wide cultivation.
Bhupinder and Santosh, (2010) explain the diversification of agriculture in Haryana by using the principal data from a total of 420 respondents. They have preferred variables for study related to the problem expressed by farmers. The farmers have noted the number of problems such as cost, transportation, funding, literacy, irrigation, facilities number of regulated market etc. The major problems faced to farmers were price fluctuations and finance related aspects.

1.10 Out Line of the Work:
The chapterization of this work is as given below.

The First chapter deals with the introduction of the entire research work. It describes the conceptual framework and various approaches to the changes of cropping pattern, choice of the research topic and the region. It also presents the hypothesis, objectives of research work, methodology and database. A detailed review of the previous research work related to changes in the cropping pattern.

The Second chapter deals with physical and cultural setting of the study region. This chapter includes site and situation of the study region, Physiographic and drainage pattern, types of soils, climate, vegetation, crops and population of the study region.

The Third chapter deals with the spatial and temporal changes in general land use pattern in the south east part of Ahmednagar district.

In the Fourth chapter the cropping pattern of the study region with distribution patterns of major crops and volume of change there in, within the period under investigation has been analyzed.

The Fifth chapter describes the ranking of the crop, crop combination as well as crop diversification regions of the study region.

The Six chapter deals with the incentives and detailed studies of general land use and agricultural land use of twenty three selected sample villages.

Chapter Seven includes findings and the suggestions.
1.11 Limitations of the Study:

Researcher has faced some restrictions, these limitations is given below:

• The present study is mainly based on data available at tahsil level for getting a clear idea of the cropping pattern in study region.
• The approach of some government officers of concern departments has created more difficulties for collection the data.
References:


