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CHAPTER IV
DISPARITIES IN LAND USE PATTERN AND AGRICULTURAL DEVELOPMENT

4.1 INTRODUCTION

For the assessment of disparities in the levels of economic development in a particular region, the agricultural development, the industrial development and various amenities and infrastructural facilities play a very significant role. Agriculture is the most important economic activity in the region under study. The levels of agricultural development may be assessed in terms of spatial land use pattern, agricultural productivity and yield per unit of area. The irrigated land in relation to net sown area, degree of mechanization and input per unit of area are the most important components to assess the disparities in the levels of economic development.

The concept of Land use is related to the use of land for which land is put in a certain region for a given period of time. Land use studies, are important, as they are aimed to explain the occurrence of different uses in different areas. They generally aim of explaining the constant interaction between available land resources on the one hand and human needs and efforts on the other. Land use, thus, is an expression of permanent struggle in which human efforts are applied to the land resources for the satisfaction of human needs. The competition between various types of uses is the result of scarcity of land. Some land is better than other land for a specific use depending on physical, economic and cultural characteristics of land to which its suitability for a particular use is related. Therefore, in agricultural geography it is essential to understand the variations in the land use as a human reaction towards the satisfaction of human wants. The environmental factors no doubt, exert an influence upon the use to which land is put. This is true especially in the case of
rural land use planning such as agriculture, forestry etc. The urban land use planning to a large extent reflects cultural and economic responses.

Land is the basic resource of human society for different types of planning. Its utilization shows a reciprocal relationship between the prevailing ecological condition of a particular region and man. Land is the surface utilization of all developed and vacant land on specific point, at a given time and space. This leads on back to the village farm and the farmer, to the fields, gardens, pastures, fallow land and forest to the isolated farmstead. As a matter of fact, geography deals with the spatial relationship between these aspects and planning. This is because land use changes to meet the variable demand for the land by the society in its new ways and conditions of life. The demand for new uses of land may be inspired by a technological change or by a change in the size, composition and requirements of a community some changes are short lived where as others represent a more constant.

In this way, land utilization is the use made of the land by man, as surveyed maps in a series, pasture, mining, transportation, gardening residential, recreational, industrial, commercial, uncultivable waste and barren and fallow land. It is not normally possible to use land for two or more purposes simultaneously, though, sometimes even this is possible only for the pasture woodland. Landuse is an important aspect of geographical studies particularly to solve agricultural problems and agricultural development planning in the study region.

4.2 MEANING AND IMPORTANCE OF LAND USE

The difference between land use and land utilization is important. Land use is the use actually made of any parcel of land, for houses, apartments and industrial location are land use categories, where as the firm, residential. Industrial and agricultural refer to the system of land
utilization implying roads, neighborhood retail and service activities as well as location of industries and the carrying of agricultural pursuit. In rural areas, tree crops or row crop would identify landuse; whereas herding, truck farming and grazing indicate a system of land utilization. The term 'land utilization' is also used for varied utilization of land and soil surveys e.g. land under cultivation, pasture, barren orchard fallow waste, cultivable waste, settlements, forests and water bodies. According to J. L. Buck "Land Utilization is the satisfaction' which form population derives from the type of agriculture developed, the provision for future production and contribution to national needs". While the definition given by Salter is as follows; "land utilization research can be described as dealing with problem situations in which people in a given locality are in the process of transformation from activities with certain land requirements to activities with different land requirement."

In this sense, land utilization involved an examination of the natural factors affecting both the harnessed and the potential productivity of the land is a changed situation of the locality and its requirements. These factors are the land, temperature, rainfall and soil which in a configuration together constitute the physical background of agriculture and determine the limits of both the cultivability and productivity of the land.

Land utilization planning mainly deals with the problems related to the society and the region as a whole, rather than a private farmer. Landuse planning is mainly related to optimum use of the land limited between the alternative major types of land use. In rural areas, the major type of land use is planned as follows.

(1) Agricultural Land.

a. Non-irrigated lands.

b. Irrigated lands
c. Dry farming areas.
d. Grazing areas.

(2) Village Orchards or forest lands.

(3) Forest land.

a. Forest covered.
b. Forest reclaimed land use.
c. Cultivable or recreational land use.

Land utilization planning is also related to "conservation of land from one major use to another general use." After reclamation of forest land, a question arises as to how the land should be utilized. The rotation of crops and their combination are after all minor problems of land use study. This is because these aspects depend upon personal experience and institution of the farmer who decides which crops should be grown in rotation.

There is an intimate relationship between land economics and land utilization. The efficient use of land depends on the capacity of the man to utilize the land and to manage it. It also depends upon the systems of farming, systems of land tenures, and size of the holdings. Whereas the production efficiency and level of production depend upon the institutional framework and the productive function carried on by the farmer.

The man-land relationship can be experienced in three different aspects, first the land and the individual person who uses it, second, the man and his influence on the use of the land as a means of production. In this case institutional infrastructure should be studied for improved land use. The third relationship between land and man can be expressed in terms of man as a social being and the land as an inexhaustible resource.

For human existence, within certain biotic, ecological and economic conditions the utilization of land is of prime importance. It
involves a relationship that exist between the societies on the one hand and cultural advancement, resource planning and carrying capacity of the land on the other. The intensive use of land depends upon population concentration, economic prosperity through better agricultural production, human establishments, industrial locations, communication and transportation lines, while extensive use of land is related to sparse population, dispersed settlements, the absence of communication lines and the crude forms of transport. However, only the systematic utilization of land can be able to promote economic and cultural advancement. If, there is no utilization of land planning one cannot think of any progress. Thus, the study of land utilization planning is of immense value in tracing out the past use of land and its future trend. Only, through the study of the past land utilization, one can be able to predict for future use and evolve landuse planning of a particular region. The changing population and the economic, the biological and the ecological problems are so alarming that the conservation and the best utilization of land becomes a necessity.

4.3 LAND USE PATTERN IN SOLAPUR DISTRICT DURING 1971 - 2001

The main objective of study is to highlight the changes in general agricultural land use in Solapur district. The growing population and even increasing demand for the extent for food and raw materials, the extent and nature of land use has been changed in the recent past.

The general land use pattern of Solapur district based on the data abstracted from the socio-economic review for different periods since 1971 to 2001. It has been observed that remarkable changes have occurred in general land use pattern during the last three decades.(Table 4.1)
Table 4.1
Changes in general land use pattern in Solapur district.
(1970-71 to 2000 - 2001)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Land Use categories</th>
<th>Years</th>
<th>Volume of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Geographical Area</td>
<td>15010</td>
<td>15010</td>
</tr>
<tr>
<td>2</td>
<td>Area Under Forest</td>
<td>324 (2.16)</td>
<td>320 (2.13)</td>
</tr>
<tr>
<td>3</td>
<td>Area not Available for Cultivation</td>
<td>654 (4.36)</td>
<td>784 (5.22)</td>
</tr>
<tr>
<td>4</td>
<td>Other Uncultivable Land</td>
<td>535 (3.56)</td>
<td>1016 (6.77)</td>
</tr>
<tr>
<td>5</td>
<td>Fallow Land</td>
<td>2333 (15.54)</td>
<td>1231 (8.20)</td>
</tr>
<tr>
<td>6</td>
<td>Net Area Sown</td>
<td>11154 (74.31)</td>
<td>10505 (69.99)</td>
</tr>
<tr>
<td>7</td>
<td>Area Sown more than once</td>
<td>458 (3.05)</td>
<td>473 (3.15)</td>
</tr>
</tbody>
</table>

Note: Figures in bracket indicates percentage.

4.4 LAND USE CLASSIFICATION:

Land use classification is the systematic arrangement of various classes of land on the basis of certain similar characteristics mainly to identify and understand their fundamental utilities, intelligently and effectively in satisfying the needs of human society. Thus, land must be carefully utilized, so that it may fulfill our varied needs after its proper allocation. The best use of each parcel of land requires a scientific and
methodically appreciable classification of the present land use. This may help us in investigation of the land use problems and the basis of planning for the best use of our land after considering the major land use categories.

Land use is an important aspect of studies in agricultural geography and for making the study of land use; it is classified into different categories. The concept of land use has been used in so many ways that no generally accepted scheme of classification exists despite many years of land use studies by geographers. In most of such schemes, activity on the land has been the major criterion for classifying land use which is essential a qualitative rather than quantitative variable.

Land classification is based largely on the quality and intensity of the use of land. Census of India has classified land utilization in nine different categories but in the present study these have been grouped into five major land use categories. On the basis of the statistical data abstracted from the sources referred to above the Solapur district may be divided into five major land use categories. The land use is the result of a combination of both natural genesis and human influences, which have been brought to bear on it in the past, and of those, which are still active in the present. Thus, the utilization of land for different purposes indicates an intimate relationship between prevailing ecological conditions and man. The table 4.1 shows the changes in general land use in Solapur district.

**4.4.1. AREA UNDER FOREST:**

This category includes all areas actually under forests whether state owned or private and classified or administrated as forests under any legal enactment dealing with the forest. The Solapur district has a very limited area under forest i.e. it occupies about 2.14 percent, out of the
total geographical area in the district is lower than the average for Maharashtra which accounts to 17.28 percent in 2001. The changes pattern in the region under study during 1971 to 2001 is represented in table 4.1. The proportion of land under forest has been decreased from 2.16 percent in 1971 to 2.13 percent in 1981. During the period 1981-1991, forest land has tremendously decreased. This has decreased due to the growing pressure of population. Some forest lands were converted into agricultural land and some were denuded of vegetation and soil.

There are marked variations in tahsil level, ranging from below one percent in Akkalkot to over 5 percent in Mangalvedha. Highest percentage was recorded in Mangalvedha, Pandharpur tahsils with 6.4 percent and 5.8 percent change respectively. Lowest percentage recorded in Akkalkot, Sangola and Malshiras tahsils with zero percent, 0.4 percent and 0.2 percent respectively. Forest, gradually decreased from west to east. Most of the forests in the region are situated on hills and Ghats of Vadashing, Ghat in Barshi, Waghoba and Bodki in Karmala. (Table 4.2)

Both positive and negative changes were experienced in forest area during the period 1980 to 2001. Negative change in forest area was experienced in only Akkalkot (-0.4), tahsil, whereas below 1 percent positive change in forest area was experienced in Barshi (+0.7) and Madha (+0.6) tahsils, during the period of investigation. (Fig.4.1)

4.4.2. AREA NOT AVAILABLE FOR CULTIVATION:

This category includes land put to non agricultural uses, barren and uncultivable land like hill ranges and river beds. These land uses, show that these areas will be no more available for crop cultivation in
<table>
<thead>
<tr>
<th>Talukas</th>
<th>Area Under Forest</th>
<th>Other uncultivated land excluding Fallow land</th>
<th>Fallow Land</th>
<th>Net Sown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>81</td>
<td>Change 81</td>
<td>81 Change</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.Solapur</td>
<td>3.07</td>
<td>-11.6</td>
<td>0.1</td>
<td>-138</td>
</tr>
<tr>
<td>Bashi</td>
<td>2.4</td>
<td>+0.7</td>
<td>-3.6</td>
<td>-9.9</td>
</tr>
<tr>
<td>Akalkot</td>
<td>0.4</td>
<td>0</td>
<td>-3.6</td>
<td>-3.6</td>
</tr>
<tr>
<td>S.Solapur</td>
<td>1.5</td>
<td>+5.2</td>
<td>3.4</td>
<td>+3.4</td>
</tr>
<tr>
<td>Mohol</td>
<td>1.5</td>
<td>+3.8</td>
<td>2.4</td>
<td>+2.4</td>
</tr>
<tr>
<td>Mangalvedha</td>
<td>0.7</td>
<td>+5.7</td>
<td>1.5</td>
<td>+1.5</td>
</tr>
<tr>
<td>Pandharapur</td>
<td>2.9</td>
<td>+5.8</td>
<td>4.9</td>
<td>+4.9</td>
</tr>
<tr>
<td>Sangola</td>
<td>4.8</td>
<td>+2.9</td>
<td>5.5</td>
<td>+5.5</td>
</tr>
<tr>
<td>Malahis</td>
<td>3.8</td>
<td>+0.2</td>
<td>0.2</td>
<td>+0.2</td>
</tr>
<tr>
<td>Madha</td>
<td>1.1</td>
<td>-1.2</td>
<td>-1.2</td>
<td>-1.2</td>
</tr>
<tr>
<td>District Total</td>
<td>2.39</td>
<td>-4.29</td>
<td>4.85</td>
<td>+4.85</td>
</tr>
</tbody>
</table>

Note: Figures indicated percentage.
SOLAPUR DISTRICT
Area Under Forest (2000-01)

Change in Area Under Forest (1981-2001)

Area in percentage
- More than 3
- 1.5 to 3
- Less than 1.5

Area in percentage
- More than 2.5
- 1.0 to 2.5
- Less than 10

Figure 4.1
future. These areas which are not available for crop cultivation sort a
close association with other and uncultivated land and net shown area,
will be transferred to this categories and this may happen particularly due
to increasing urbanization, predominantly the spread of the cities of south
Solapur, Pandharpur and Barshi. The land under this category cannot be
brought under cultivation but for a very high price, it can be brought
under cultivation. About 5.3 percent of area belongs to this category
which is much less as compared to Maharashtra average of 8 percent.

The area not available for cultivation in the region also experienced
area not available for cultivation, slightly decreased and became 4.85
percent in 1980-1981, while it increased during the next decade of 1980-
81 to 1990-91 and it increased by 0.42 percent. It must be noted that
during 1990-91 to 2000-01 area not available for cultivation slightly
increased by 0.08 percent. This increase in the area not available for
cultivation may be attributed to shifting of land for other production of
the crops, during the next season and area for housing purposes and
industrial establishment.

In Solapur district, Sangola, Mohol, Pandharpur, Karmala, North
Solapur and Barshi tahsils have substantial proportion (above the region
average of 5 percent) of areas marked as land not available for
cultivation. In Solapur district, Akkalkot and Madha recorded a lesser
proportion of land which is below 3 percent under this category. (fig.4.2)

Both positive and negative changes were observed in area not
available for cultivation during the period 1981 to 2001. Below one
percent negative change in uncultivable land was not noticed while below
one percent positive change in uncultivable land was noticed in only
Madha (+0.2) tahsil during the period of investigation. Most of the
SOLAPUR DISTRICT
Area not Available for Cultivation (2000-01)

Area in percentage
- More than 6
- 3.0 to 6
- Less than 3

Change in Area Not Available For Cultivation (1981-2001)

Area in percentage
- More than 4
- 2.0 to 4
- Less than 2.0
- Less than 2.0

Figure 4.2
farmers are very poor in the study region hence; they are unable to bring such land under cultivation.

4.4.3 Other Uncultivable Land Excluding Fallow Land

This category of land consists of (a) Cultivable waste (b) Permanent pastures and grazing land and (c) land Under miscellaneous trees crops etc., cultivable waste land includes the land which can be brought under cultivation but which have not been cultivated for some time and not been cultivated successively for more than five years. The category of miscellaneous trees, crops includes lands under casuarinas trees, grass bamboo bushes or other trees used for fuel. Actually, these are the lands which are put to some agricultural use but whose area extent is not included in the category of net area sown.

Total area under this land use category is 5.1 percent which is much less as compared to Maharashtra average of about 7.2 percent in 2001. The lands under the category of uncultivated excluding fallow land have also recorded a considerable decrease during 1970-71 to 1980-81 period, which slightly decreased by 0.04 percent. While during 1980-81 to 1990-91, the land under this category increased by 6.98 percent and became 11 percent during 1990-91 to 2000-01. Other cultivated land was as low as 5.1 percent. The reasons behind, it may be attributed to several uses of the land in the sectors of housing, industries and development of Solapur Corporation boundaries, as number of villages have merged in the Municipal Corporation during the period in 1991-2001, which has resulted in the tremendous decline in the land of other cultivated land excluding fallow land. (Fig, 4.3)
There are marked variations in tahsil level ranging from under one percent in Mohol tahsil to over ten percent in Sangola and Malshiras tahsils. Regional distribution under this category varies from below 5 percent to over 15 percent. Sangola and Malshiras tahsils recorded high (10 percent to 15 percent) percentage of area under this category. Only Barshi tahsil have 5 to 10 percent of land classified as other undedicated land. Rest of tahsils such as North Solapur, Akkalkot, South Solapur, Mohol, Mangalvedha, Pandharpur, Karmala and Madha recorded very low proportion of land in this category.

Below one percent negative change is for uncultivable land was not noticed, while above one percent positive change for uncultivable land was found in Madha tahsil.

4.4.4 Fallow Land:

The term fallow land is applied to land not under cultivation at the time of reporting, but which had been under cultivation in the past. The Fallow land includes current fallow land and old fallow land which are largely found due to inadequate water supply or excess of moisture supply, extensive holding and heavy clayey soils difficult for tilling at proper time. Sometimes, they are kept fallow for preserving fertility and to prevent soil exhaustion. Thus, efficiency of fallow land system in preserving fertility and maintaining crop yields to be acknowledged. Taking into consideration the period of fallow land, Census of India has dividend these categories into two types: for example, land kept as a fallow land during one year is called current fallow land, and when it is kept fallow for one to five years, and then it is called as permanent fallow land. However, in the present study, both the sub categories are grouped together.
Solapur district has a substantial proportion of fallow land with an average of 24 percent of the total geographical area. This is much more of the state average of 7.2 percent in 2001. Now days, there is tendency among the farmers to get high yield per hector from the agricultural land, this has been reflected from the fact that during last decades (1990-2001), the land under fallow category is consistently increasing. This is clear from the fact, that was 10.83 percent in 1970-71 and became as high as 24 percent in 2000-01.

There are marked variations within the region as regarded to fallow land. North Solapur, Barshi, Akkalkot, and Sangola tahsils recorded high percentage (above 25 percent) while South Solapur, Mohol, Mangalvedha, Pandharpur, Malshiras, Karmala and Madha recorded low percentage. The highest fallow land was observed in Barshi (54.9 percent) where as the lowest fallow land was observed in Pandharpur (15.5 percent) during 2000-2001.

During 1991-2001 the proportion of fallow land declined by 5 percent in Mangalvedha, Pandharpur and Madha tahsils, whereas, below 5 percent positive change in fallow land was noticed in Malshiras tahsil during the concerned period. (Fig. 4.4)

4.4.5 Net Sown Area:

This category constitutes the extent of cropped land in any region and therefore, it is of vital significance in studies related to agricultural geography. The net area sown is the same cropped area in that year. Total area under this land use category is 59.6 percent which is much less as compared to Maharashtra in 2001. Since, the region under study is relatively urbanized
SOLAPUR DISTRICT
Fallow Land (2000-01)

Change in Fallow Land (1981-2001)

Area in percentage
- More than 30
- 20 to 30
- Less than 20

Area in percentage
- More than 15
- 10.0 to 15
- 5.0 to 10
- Less than 5

Figure 4.4
because it is dominated by city of Solapur and the merging of the number of villages in the municipal corporation of Solapur. The net area sown, therefore, declined gradually during the last decade, this may be due to the shifting of land in the other categories such as land for housing; industrial establishment and various other purposes. This is clear from the facts that the proportion under net area sown became 4.29 percent in 1970-71, 0.95 percent in 1980-81 and further, it increased to 8.32 percent in 1990-91.

Below 5 percent positive changes in net sown area were found in Pandharpur, Karmala and Malshiras tahsils during 1980-81 to 2000-01. While on the other hand, below five percent negative changes were observed in A Mohol and Mangalvedha tahsils during the concerned period. (Fig. 4.5)

4.5 AGRICULTURAL LANDUSE PATTERN:

The study of land use is mainly related to variations in agricultural land use over the area of the district. It also gives an idea of changes which are undergone in the spatial distribution of agricultural land use over time. The agricultural use of land is the result of the direct application of efforts to the available land resources. The quality and the quantity of the efforts applied, is related to the decisions made by formers regarding the actual use of land. These, decisions are based on his choice of the available land resources. The farmer’s response to these resources as conciliated by the knowledge passed from generation to generation and his appreciation of the demand for various agricultural commodities in the market. The cumulative effects of the farmers decisions regarding the choice of crops, the methods of tillage and his appreciation of the land resources is reflected in the agricultural land use in a particular area.
• **AREA UNDER DIFFERENT CROPS:**

In simple words, cropping pattern means the proportion of the area under various crops at a point of time. It is a dynamic concept, because no cropping pattern can be said to be ideal for all times. It changes, in space and time with a view to meet the requirements and is governed largely by the physical as well as cultural and technological factors. The change in cropping pattern in a particular span of time clearly indicates the changes that have taken place in the agricultural development. These changes are brought about by the socio-economic influence. "In most of the situations the physical environment reduces the choice of the enterprise, either by prohibiting the growth of certain crops altogether or by reducing their level."

The proportions of area under various crops and their changes have been shown in the table 4.3. The major crops that are grown in the region under study may be grouped into two categories namely:

1) **Food Crops:** The food crops include the production of rice, wheat, Jawar, Bajra, Pulses, Sugarcane and other crops.

2) **Non Food Crops** The non-food crops include the production of different crops such as ground nuts, oil seeds (fruits, vegetables etc.)

The overall cropping pattern according to tahsilwise trends during 1981-2003 are under different food grain, non food grain crops in Solapur district, which have been shown in the table 4.4, cropping pattern means the proportion of area under different crops at a point of time. Substantial changes have occurred in the cropping pattern of the region during the period under study, spatial variations in the cropping pattern as depending upon the physical, socio-economic and technological environment. These are different from the regions overall characteristics.
Therefore, a detailed analysis of various crops distribution based on the quinquennial averages of 1980-81 and 2000-2001. It also depicts the changes therein. These changes are found in the various tahsils, due to the, combine effect of physical and non physical determinants. The changes in agricultural pattern also depend upon the traditional habits of the people in a particular region.

**4.5.1 Food Crops:**

The census department has grouped entire crops under the two broad categories namely food crops and non food crops. Among the food crops, cereals, pulses condiments and spices, sugarcane, fruit and vegetables are included. In the Solapur district, the crops occupy the largest area of 84.8 percent of the total cropped area.

In order to understand the trends of change of land use pattern in the region under study for the area under different crops, the proportion of changes considering crops, the proportion of changes considering 1970-71 as a base year, the proportion of land under different crops has been calculated for the years 1970-71, 1980-81, 1990-91 and 2000-01. The area under food crops and non food crops, together make the total land under crops which is fluctuating from 85.6 percent in 1970-71 and 84.8 percent in 2000-01. This is the area under different food crops, which is fluctuating due to the fact of variable in amount of rainfall from one year to another. This may also be partly due to the grazing land and fallow land as vary from year to year. More than 80 percent areas of the land cultivation have been under the use of various food crops during the last three decades.
Table 4.3

Area Under different crops in percentage and its changes in Solapur district (1971-2001)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>85.6</td>
<td>87.4</td>
<td>88.9</td>
<td>84.8</td>
<td>+1.8</td>
</tr>
<tr>
<td>Wheat</td>
<td>2.3</td>
<td>4.7</td>
<td>1.7</td>
<td>10.4</td>
<td>+2.4</td>
</tr>
<tr>
<td>Jawar</td>
<td>5.4</td>
<td>62.2</td>
<td>66</td>
<td>22.6</td>
<td>+8.2</td>
</tr>
<tr>
<td>Bajra</td>
<td>11.4</td>
<td>3.3</td>
<td>4.9</td>
<td>2.3</td>
<td>-8.1</td>
</tr>
<tr>
<td>Pulses</td>
<td>6.4</td>
<td>4.2</td>
<td>4.4</td>
<td>8.6</td>
<td>-2.2</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>1.2</td>
<td>1.7</td>
<td>3.3</td>
<td>28.1</td>
<td>+0.5</td>
</tr>
<tr>
<td>Other Food Crops</td>
<td>9.7</td>
<td>10.8</td>
<td>8.31</td>
<td>20.63</td>
<td>+1.1</td>
</tr>
<tr>
<td>Total Non food</td>
<td>14.4</td>
<td>12.6</td>
<td>11.1</td>
<td>15.2</td>
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Source: Socio-economic review of Solapur district (1971-2001)

i) Rice -

Rice is the staple crop, which is grouped under food crops. Rice requires hot humid climate and alluvial lomi soils for its high production. The district of Solapur is a region, which belongs to the rain shadow area, and hence, area under rice has been slightly fluctuating from 0.6 percent in 1970-71 to 0.7 percent in 2000-01. The land under rice has been less than one percent of the total cropped area during the concerned period. Out of the total grass cropped area, below one percent area was under rice in North Solapur, South Solapur, Mohol, Mangalvedha, Pandharpur,
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<th>Mangalwadha</th>
<th>Pandharpur</th>
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**Source:** Socio - economic review of Solapur district, 1980-2001

**Note:** Figure indicate percentage
Sangola and Madha Tahsils. While 1 to 3 percent gross cropped area was found under rice in Akkalkot and Malshiras tahsils. Above 3 percent gross cropped area, was observed under rice in only Barshi tahsil (22.9 Percent) during 2000-01 period.

Both, positive and negative changes in area under rice were found in the study region. Below one percent negative change in rice area was observed in North Solapur, South Solapur, Mohol, Pandharpur, Karmala and Madha tahsils on the one hand while below one percent positive change in rice area was noticed in Mangalvedha, and Malshiras tahsils. Rainfall variability and decision of the farmers are the responsible factors for the positive and negative changes in rice area under study. (Fig. 4.6)  

ii) Wheat -

Like rice, wheat is also a staple crop for mankind, commonly it is grown in the temperate region of Maharashtra, The production of wheat is not appreciable due to the unfavorable climate condition, and poor soil in Solapur district. The Solapur is no exception for this trends, this is clear from the fact that the Table 4.1 represents the area under wheat, which is also below 5 percent of the cropped area, during the first two decades wheat crop is fluctuating from 2.3 percent in 1970-71 to 4.7 percent in 1980-81. its percentage in 1990 was 1.7 which tremendously increased to 10.4 percent in 2000-01.

The area under wheat varies from tahsil to tahsil in the study region. Out of the total gross cropped area of the region, below five percent area was found under wheat cultivation in Madha and Mangalvedha tahsils. Whereas five percent to ten percent gross cropped area was observed under wheat in Sangola, Akkalkot, North Solapur, South Solapur, Mohol and Barshi tahsils, above ten percent, area under wheat was observed in Malshiras and Pandharpur tahsils, during 2000-01 (Fig. 4.7).
Both positive and negative changes in area under wheat were found in the study region. Below one percent positive change in wheat area was observed in Mangalvedha and Karmala tahsils and above one percent positive change in wheat area was found in North Solapur, Akkalkot, Pandharpur, Sangola and Malshiras tahsils, Below one percent negative change in wheat area was observed in Barshi tahsil.

iii) Jawar -

Jawar is an important crop in the cropping pattern of the region. Jawar is well adapted to the environment and provides not only food for the people but also fodder, for livestocks. It is raised both in Kharif and Rabi seasons in the study region. It is grown in variety of soils, ranging from light sandy to heavy clays. Its performance is better in medium and deep black soils. Out of the total cropped area, about 22.6 percent was found under Jawar crop during 2000-01.

Jawar is the second most important crop in Solapur district, due to favorable climatic conditions and the increase in irrigation facilities, the land under, Jawar declined during the during 1990-91-2001. The proportion of Jawar is less than 15 percent in South Solapur and Malshiras tahsils. More than 30 percent Jawar was observed in Madha and Sangola tahsils. Only negative changes took place in the study region, less than 25 percent negative change was noticed in Sangola and Madha tahsils, while more than 50 percent negative changes were observed in Mohol tahsil. (Fig.4.8)
SOLAPUR DISTRICT
Jawar Cropping (2000-01)

Area in percentage
- More than 30
- 15.0 to 30
- Less than 15

Change in Jawar Cropping (1981-2001)

Area in percentage
- More than 50
- 25 to 50
- Less than 25

Figure 4.8
iv) Bajra -

This is another stable food grain grown in the drier part of the Solapur region. Bajra is a Kharif crop and generally grown during the rainy season. Due to the climatic variability and unsuitable soil conditions which are responsible for lower proportion of land under Bajra. About 2.3 percent of the total gross cropped area in the district is under Bajra.

The spatial distribution of Bajra in the region is shown in Fig.4.9. It is grown almost in all tahsils ranging from below two percent to four percent. Sangola and Malshiras tahsils have recorded Medium proportion of area of about two to four percent, and low proportion of area under Bajra is recorded in Akkalkot, North Solapur, South Solapur, Mohol, Madha and Barshi tahsils. Fewer than two percent area is recorded in Pandharpur tahsil is because of rainfall conditions. Map showing, changes in Bajra area, recorded increases for below one to over three percent. Below one percent positive change was recorded in eastern Solapur tahsils. While more than three percent increased was observed in Karmala and Malshiras tahsils during the 1970-2001.

v) Pulses -

Pulses occupy an important position in the agrarian economy of the Solapur district. These serve as an excellent nutrition food which is grown, both as Kharif and Rabi crops. The proportion of area under pulses in the regions is 8.6 percent during 2000-01. Figure 4.10 shows the variations in the share of pulses area ranging from below one percent to twelve percent.

The pulses growing areas are Karmala, Sangola and Mangalwedha tahsils. Elsewhere, the proportions are moderate. Fig.4.10.B. the changes in pulses areas, mostly high increased, were observed in the tahsils level during 1971-2001. Karmala, Sangola, Mangalwedha, Akkalkot, South
SOLAPUR DISTRICT
Bajra Cropping (2000-01)

Area in percentage
- More than 4
- 2.0 to 4
- Less than 2

Change in Bajra Cropping (1981-2001)

Area in percentage
- More than 3
- 1.0 to 3
- Less than 1

Figure 4.9
Solapur, North Solapur, Barshi and Mohol tahsils recorded more than four percent increase in the district.

**vi) Other food crops**

Apart from Rice, Wheat, Jawar, Bajra and maize, there are also many other cereals, which are grown in the region under study. During 1970-71 to 2000-01, there has been decreased in the proportion of cereals. The area under other food crops was 12.4 percent in 1971 which decreased to 11.1 percent in 2001.

**4.5.2 Non food crops**

In the foregoing analysis, the food grain crops and non-food grain crops are considered. Now, in this category of landuse sugarcane, Cotton, Sunflower and Groundnut has been discussed. The area under non food crops have been of the magnitude of around 12.6 percent in the 1970-71, which is increased to 20.8 percent in 20001. Crops like oil seeds (Sunflower, groundnut) and other non food crops also grown in the region under study, which are sizable due to the demand of oil by the people in day to day life.

Apart from this, there are many crops under the category of non-food crops, which are equally important for the farmers. Choice and interest have led farmers, to nonfood crops; hence, a sizable area was recorded in 2001, which was as high as 20.8 percent which has been increase in the area under the different staple crops, in Solapur district.

**i) Sugar Cane**

Sugarcane is one of the most important cash crops, grown in the region under study. The cultivation of sugar cane has been steadily increasing because of the opening of number sugar factories in the district and also due to the increase in the irrigation facilities. Sugarcane is only
irrigated crop and is grown all over the district in deep black soils. Malshiras tahsil occupies the largest area under sugarcane.

It is a water-loving tropical crop; therefore, it requires high temperature, maximum moisture and irrigation facilities. Sugarcane cultivation has considerably increased in the canal areas since the opening of Nira Canal and Ujani Canal. About 7.7 percent of the total gross cropped area in the district is under sugarcane.

Sugarcane is the principal crop in the cropping pattern of the region. Sugar cane is tremendously increased in land use pattern during 1970-71 to 2000-01. The area under sugar cane has been below two percent during 1970 to 1980. It increased from 6.1 percent in 1970-71 to 2000-01 and hence, became major and principal crop in the Solapur

Sugarcane cropped area is shown in fig. 4.11, ranges from below ten percent to above twenty percent of the total gross cropped area. The tahsil of Pandharpur recorded 26.4 percent, area under sugarcane which is followed by Malshiras (21.9 percent) and South Solapur tahsils. The lowest area is recorded in Madha, Sangola, Solapur North, Barshi and Mangalvedha tahsils. Rests of the tahsils have a moderate proportion.

The figure 4.11, exhibits the pattern of change is sugarcane cropping in the region. The area under sugarcane has increased during, the period under investigation. Due to the irrigation facilities and positive approach of farmers two tahsils namely Pandharpur and Malshiras has recorded high change in area under sugarcane crop during the 1970-71 to 2000 -01.
Figure 4.11

SOLAPUR DISTRICT
Sugarcane Cropping (2000-01)

Change in Sugarcane Cropping (1981-2001)

Area in percentage
- More than 30
- 15.0 to 30
- Less than 15
ii) Cotton:

The cotton is very useful in many ways as it is used both for edible and industrial purposes. Cotton is grown mostly in the black soil which constitutes an important group of cash crops. Area under Cotton is decreased from 1.0 percent in 1970-71 to 0.6 percent in 2000 – 2001. Malshiras tahsil has recorded the highest declining in area under cotton crop during the study period.

iii) Sunflower:

Sunflower is major oil seed crop which is mostly grown in rainfed area. It is grown in both kharif and rabbi seasons. The Table concerned represents the area under sunflower, which is also below 4.7 percent of the total cropped area, its percentage in 1970-71 was only 0.6 which tremendously increased to 4.7 percent in 2000-01. Tahsils Akkalkot and Solapur North have recorded more than 10 percent area under sunflower in 2000-01.

iv) Groundnuts:

Groundnut is a Kharif crop. According to Indian census department it is included in non-food crop category. It can be grown on light sandy soil, red loam, and alluvial loam and also on black soil of good depth. The average area of groundnut in this region is 2.6 percent in 2000-01. The higher concentration of above 5 percent area of groundnut is in the tahsils namely Karmala and Madha, whereas moderate concentration that is 2 per cent to 5 percent area under Groundnut are recorded in Akkalkot and Pandharpur tahsils. Remaining tahsils are recorded less than 2 percent area under groundnut.

The change in groundnut cropped is exhibited in Nine out of eleven tahsils of Solapur district. Some tahsils should have increased in the properties of seeds in ground nuts. Decline in the proportion of area under
groundnut was recorded in Akkalkot, Pandharpur tahsils during the concerned period.

iii) Other non food crop -

Other non food crops are minor oil seeds, spices, chilly, turmeric, onion and garlic. The proportion of area under other non food crops to the gross cropped area has been increased by 5.12 percent during 1970-71 to 2000-01. Thus, it is rather difficult to map these, especially because the area and such non-food minor crop is very insignificant in comparison to total cropped area of the district Solapur.

4.6 IRRIGATION AND TECHNOLOGICAL DETERMINANTS OF AGRICULTURE:

Means of Irrigation and various technological determinants are the most crucial factors determining the pattern and pace of agricultural growth in any region. It includes all the available means, which improve the efficiency of converting scarce resources into products which satisfy human wants. It manifests, itself in the use of new inputs and knowledge leading to an upward shift of the production, function in the long run.

The changes in agricultural production are the results of the whims of nature that have played in our agriculture. But technological factors have a great influence upon agriculture, as the agricultural production has increased since last three decades. The food grain production is increasing day by day, and now the country is self-sufficient in the food grain production due to the technological development.

The first five year plan, particularly from 1955, the traditional face of agriculture is steadily changing. These changes are reflected in both, expansion and intensification of cropping. The growth of sugar factories, have played an important role in the agricultural changes of the region. Therefore, the modern agriculture is a sector of economy, which stands to
develop fanning and industries. Thus, the technological factors have played a dominant role in the transformation of Indian agriculture. Agriculture is the chief source of raw materials for various industries in urban and rural areas.

TECHNOLOGICAL FACTORS -

There are a number of factors influencing agricultural development in a region like Solapur District. Very recently introduced technological factors of the region include irrigation, agricultural implements and machinery, adoption to improved seeds, use of chemical fertilizers, agricultural credit etc. In the following lines, an attempt has been made to analyze the regional pattern of these technological factors and changes therein in Solapur district the region under study.

IRRIGATION -

In a monsoonal region like India, the rainfall is most erroneous and unpredictable. In such conditions, the irrigation becomes the most important factor for agriculture in the district, because, the rainfall is very less and irregular. It is observed that the cultivators having irrigational facilities tend to adopt improved form practices more than those of cultivators who practices agriculture without irrigation. Therefore, irrigation is a pivot of modern agricultural growth.

Irrigation is the artificial application of water to overcome the deficiencies in rainfall for the growing of crops. It is essential for the better yield and for assurance of the crops. Irrigation development in Solapur district has to be viewed, in the context of the climatic conditions, especially rainfall with a wide difference in rainfall from one part to other part of the district and from year to year. The area which is affected by the variations in rainfall is mainly located in the district.
Agriculture is highly speculative venture under such harsh conditions which affect the agricultural production and efficiency. Therefore, irrigation is vital for the success of agriculture in these parts. Moreover, rainfall of the district is seasonal and it is handicapped by lack of water from November onwards, hence the Rabi crops usually fail. In order to sustain Rabi crops in Solapur district, the artificial supply of water becomes most essential and necessary.

**Sources of Irrigation -**

Considering, the major sources of irrigation such as river, lake, canal, tanks and tube-well as parameters, responsible for the changes in the agricultural pattern in different parts of the region under study. Broadly, these sources in the study region are classified into two categories namely; surface irrigation and underground water into the total net irrigated area.

**4.6.1 Net Irrigated Area:**

The total net irrigated area in the region was about nine percent in 1970-71, which increased to 31.1 percent in 1980-81 to total cultivable area and thereafter remarkable decline was noticed in the year 1990-91, which became 10.8 percent. This decline in proportion of irrigated land to total cultivable land may be due to the scarcity of rainfall. During the last few decades the source of irrigation was only the rainfall, which fills the tanks, lakes and dams as well as underground water. Surprisingly the net irrigated area during the recent decades of 2001 was very high. The proportion of irrigated land to total cultivable land due to the improvement in irrigated land was very impressive (25.7 percent). Implementation of the modern technologies and facilities provided to farmers by the government in the district of Solapur is quite satisfactory. (Fig. 4.12.)
4.6.2 Surface Irrigation:

Surface irrigation includes rivers, tanks, lakes, canal and small dams. The total surface irrigation area in the region was about 24.2 percent in 1970-71 which slightly decreased to 23.5 percent in 1980-81. Thereafter it increased to 40.8 percent in the year 1990-91. This is clearly indicated by the proportion of surface irrigation which increased due to Government of Maharashtra and Zilla Parishad. Solapur have constructed number of percolation tanks and canals in this region under the employment Guarantee scheme. During the recent decade of 2000-01, the surface irrigation has tremendously decreased due to improvement of underground water irrigation like tube wells; hence, the area under surface irrigation was 24.1 percent in 2000-01.

Table 4.5
Sources of irrigation and its changes in percentage in Solapur district
(1970-71 to 2000-2001)

<table>
<thead>
<tr>
<th>Source of irrigation</th>
<th>Year</th>
<th>Volume of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface irrigation</td>
<td>24.2</td>
<td>23.5</td>
</tr>
<tr>
<td>Underground water irrigation</td>
<td>75.8</td>
<td>76.5</td>
</tr>
<tr>
<td>Net irrigated area</td>
<td>9</td>
<td>13.1</td>
</tr>
</tbody>
</table>


It reveals that overall intensity of irrigation varies remarkably in different parts of the district. The highest intensity of surface irrigated area, were found in south eastern Solapur tahsils consisting of Pandharpur, Sangola and Mangalvedha. The proportion ranges from 20 percent to 30 percent in Karmala, Barshi, Madha and Akkalkot tahsils.
The intensity is low in rainfed areas of central and eastern part of the district.

There are many tanks such as Ekruk (North Solapur), Buddehal (Sangola), Gheradi (Sangola), Tawale (Sangola), which are the main source of surface irrigation in the region under study.

Besides, there are many other tanks in other parts of the district such as Pathri, Barshi, Hotgi in South Solapur, Wadshivane, Karamala and Saptane in Madha which provide irrigation in the concerned region. Canal irrigation plays important role in the overall irrigation of the district. The area under canal irrigation increased by the major Ujani irrigation project on river Bhima, near Ujani village in Madha tahsil of Solapur district. (Fig. 4.13)

Tahsilwise sources of irrigation are not available for 1970-71 so base years is considered here as 1980-81. Both, positive and negative changes in surface irrigation were found in the study regions, during 1980 to 2001. Karmala, Malshiras, Pandharpur and Madha tahsils recorded less than ten percent increased, while North Solapur, Sangola and Mangalwedha tahsils recorded more than 20 percent increase in surface irrigation in the district (Table 4.6)

4.6.3 Underground Water Irrigation:

Tube wells are the major source of underground water irrigation in the Solapur district. The total underground water irrigation in the region was about 75.8 percent of the total net irrigated area in 1970-71 and it was 76.5 percent in 1980-81. Thereafter, it considerably decreased (59.2 Percent) in 1990-91. During the recent decade, it has increased by 75. 9 percent due to improvement of tube wells in the region under study.
Table 4.6

<table>
<thead>
<tr>
<th>Tahsils</th>
<th>Surface irrigation</th>
<th>Under ground water irrigation</th>
<th>Net irrigated area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solapur North</td>
<td>9.2</td>
<td>29.8</td>
<td>+20.6</td>
</tr>
<tr>
<td>Barshi</td>
<td>4.1</td>
<td>22.1</td>
<td>+18</td>
</tr>
<tr>
<td>Akkalkot</td>
<td>N.A.</td>
<td>23.2</td>
<td>--</td>
</tr>
<tr>
<td>Solapur South</td>
<td>1.8</td>
<td>17.6</td>
<td>+15.8</td>
</tr>
<tr>
<td>Mohol</td>
<td>1</td>
<td>17.1</td>
<td>+16.1</td>
</tr>
<tr>
<td>Mangalwede dha</td>
<td>11.4</td>
<td>37.5</td>
<td>+26.1</td>
</tr>
<tr>
<td>Pandharpur</td>
<td>53.9</td>
<td>32.9</td>
<td>-21</td>
</tr>
<tr>
<td>Sangola</td>
<td>8.8</td>
<td>31.6</td>
<td>+22.8</td>
</tr>
<tr>
<td>Malshiras</td>
<td>45.8</td>
<td>15.7</td>
<td>-30.1</td>
</tr>
<tr>
<td>Karmala</td>
<td>20.7</td>
<td>26.6</td>
<td>+5.7</td>
</tr>
<tr>
<td>Madha</td>
<td>22.8</td>
<td>20.4</td>
<td>-2.4</td>
</tr>
<tr>
<td>District Total</td>
<td>23.5</td>
<td>24.1</td>
<td>+0.6</td>
</tr>
</tbody>
</table>


Wells are the principal source of underground irrigation. Concerned table shows, the distribution of wells in each tahsils, classified as useful for irrigation and other which are not useful for irrigation. There are about 65364 tube wells in the district out of them 6841 are not useful
for irrigation. The density of wells is high in the low leveled to moderate undulating terrain of the district than the hilly terrain. The largest number of irrigation tube wells is found in Pandharpur tahsil (11217) while number of tube wells not useful for irrigation is more in south Solapur tahsil.

Table 4.7

Density of well irrigation in Solapur District (2001)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsils</th>
<th>Total wells</th>
<th>Useful for irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Solapur North</td>
<td>1722</td>
<td>1215</td>
</tr>
<tr>
<td>2.</td>
<td>Barshi</td>
<td>4994</td>
<td>4189</td>
</tr>
<tr>
<td>3.</td>
<td>Akkalkot</td>
<td>9170</td>
<td>8823</td>
</tr>
<tr>
<td>4.</td>
<td>Solapur South</td>
<td>5871</td>
<td>4007</td>
</tr>
<tr>
<td>5.</td>
<td>Mohol</td>
<td>3817</td>
<td>3524</td>
</tr>
<tr>
<td>6.</td>
<td>Mangalvedha</td>
<td>6390</td>
<td>5877</td>
</tr>
<tr>
<td>7.</td>
<td>Pandharpur</td>
<td>11217</td>
<td>9911</td>
</tr>
<tr>
<td>8.</td>
<td>Sangola</td>
<td>8506</td>
<td>7863</td>
</tr>
<tr>
<td>9.</td>
<td>Malshiras</td>
<td>3220</td>
<td>3009</td>
</tr>
<tr>
<td>10.</td>
<td>Karmala</td>
<td>3895</td>
<td>2998</td>
</tr>
<tr>
<td>11.</td>
<td>Madha</td>
<td>6562</td>
<td>6150</td>
</tr>
<tr>
<td></td>
<td>District Total</td>
<td>65364</td>
<td>57566</td>
</tr>
</tbody>
</table>

**Source:** Socio economic review and district statistical abstract of Solapur 2000-01.

Figure 4.14, shows the proportion of underground water irrigation in the Solapur district in 2000-01. It clearly reveals that overall intensity of irrigation varies remarkably in different parts of the district. The highest intensity of underground water was found in Malshiras, Mohol and South Solapur tahsils. The less than ten percent intensity was observed in Sangola and Pandharpur tahsils.
Both, positive and negative changes in underground water irrigation were found in the region during 1980-81 to 2000-2001. Malshiras tahsil recorded more than 30 percent positive change while Pandharpur tahsil has recorded 15 to 30 percent positive change. Rest of all the tahsils having less than fifteen percent increased in the district. (Fig. 4.14.)

Solapur district is located in the rain shadow area so that, there is a more need of irrigation. Firstly, the major and medium irrigation project like the Nira right bank canal is not utilized sufficiently. Wells become dry in summer period and also increase the problem of drinking water in the study region.

4.7 FARM IMPLEMENTS MACHINARY:

Farm implements are closely adjusted to their environment. There is little possibility of change in the application of agricultural implements. The agricultural implements in the region are few in number, small in size and light in weight. Tilling, cultivation and many agricultural operations are dependent on the various types of implements and machinery. The implements and machinery used in the region are ploughs for ploughing. Harrows for crushing the clods, seeds driller for sowing, hoes for inter culture, most, oil engines and electric pumps for water lifting, carts for transport and tractor for many agricultural operations. Out of these, iron and wooden ploughs, electric pumps, tractors and other machinery are wide spread implements in the Solapur district. In the following lines, an attempt has been made to analyze the regional distribution pattern of plough, carts, oil engine, electric pumps and many other modern implements in the district of Solapur.
SOLAPUR DISTRICT
Underground Water Irrigation (2000-01)

Area in percentage
- More than 80
- 70.0 to 80
- Less than 70

Change in Underground Water Irrigation (1981-2001)

Area in percentage
- More than 30
- 15.0 to 30
- Less than 15

Figure 4.14
4.7.1 Ploughs:

Locally, these are called 'Nangar' these are of two types namely, Wooden and Iron. Both the ploughs are widely used all over the region, but there are regional variations in the distribution. (Fig. 4.15.) Iron ploughs are dominant in the region particularly in Akkalkot, South Solapur, Pandharpur, Malshiras and North Solapur, where per hundred hectare of cultivated area its density is high. The regions average number is 532 ploughs per 100 hectare of cultivated area, In the central part, there are less than 400 plough per 100 hectare of cultivated area. In some tahsils like Karmala and Pandharpur, above 400 to 500 the numbers of ploughs per 100 hectare of cultivated area are noted.

During 1981-2001, the total number of wooden ploughs have slightly increased from 14844 to 15037 and on the contrary iron plough have decreased. The wooden ploughs are generally used by poor farmers and. iron ploughs are used by rich formers in the region of Solapur district (Table 4.8).

4.7.2 Carts:

The carts are generally used for many purposes, therefore, carts have significant variation in the distribution pattern in the region. (Fig.4.16) Region's average density is 362 per 100 hectares of cultivated area. Carts are relatively more in Malshiras and Akkalkot tahsil which comes to above 500 carts per 100 hectare of cultivated area. There is tremendous decrease in number of carts from 51049 in 1981 to 35485 in 2001. This decline may be due to increase in number tractors to solve this purpose.
SOLAPUR DISTRICT
Plough per 100 hectare of Cultivated (1880-81)

Area in percentage
- More than 500
- 400 to 500
- 300 to 400
- Less than 300

Plough per 100 hectare of Cultivated (2000-2001)

Area in percentage
- More than 600
- 500 to 600
- 400 to 500
- Less than 400

Figure 4.15
Figure 4.16

SOLAPUR DISTRICT
Carts per 100 hectare of Cultivated (1880-81)

Carts per 100 hectare of Cultivated (2000-2001)
Table 4.8

Growth of agricultural implements and machinery in Solapur district (1980-2001)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Plough</td>
<td>54645</td>
<td>76431</td>
<td>52217</td>
</tr>
<tr>
<td></td>
<td>A) Wooden.</td>
<td>14844</td>
<td>5744</td>
<td>15037</td>
</tr>
<tr>
<td></td>
<td>B) Iron</td>
<td>39801</td>
<td>50687</td>
<td>37180</td>
</tr>
<tr>
<td>ii.</td>
<td>Carts</td>
<td>51049</td>
<td>27866</td>
<td>35485</td>
</tr>
<tr>
<td>iii.</td>
<td>Oil engine pump for irrigation purpose.</td>
<td>19681</td>
<td>10784</td>
<td>7464</td>
</tr>
<tr>
<td>iv.</td>
<td>Electric pumps for irrigation purpose.</td>
<td>23022</td>
<td>41188</td>
<td>5236</td>
</tr>
<tr>
<td>v.</td>
<td>Sugarcane crushers</td>
<td>1123</td>
<td>824</td>
<td>1781</td>
</tr>
<tr>
<td></td>
<td>C) Worked by power.</td>
<td>1064</td>
<td>646</td>
<td>996</td>
</tr>
<tr>
<td></td>
<td>D) Worked by bullocks.</td>
<td>59</td>
<td>187</td>
<td>785</td>
</tr>
<tr>
<td>vi.</td>
<td>Tractors</td>
<td>429</td>
<td>1060</td>
<td>3747</td>
</tr>
</tbody>
</table>


4.7.3 Agricultural Machinery:

The application of mechanical power to agriculture is one of the major technical developments of the post independence period. The mechanization of agriculture in India simply means the use of tractors and power-operated pumps sets. It is labour and time saving and gives more time to look other farm work.

Spatial difference in the use of modern agricultural machinery is closely related to irrigation, size of holdings and poverty which mainly controls the use of modern machinery, change in the implements is more significant in the areas of commercial farming. The modern agricultural machinery used in the region under study are oil engine, sugarcane, crushers, electric pumps, tractors and others. In the following lines, an
attempt has been made to show the distribution pattern of oil engines, electric pumps, sugarcane crushers and tractors etc (Table 4.8).

4.7.4 Oil Engines:

It is used to lift the water from rivers and wells. Their number has decreased due to increase in electric pumps from 19681 to 7464 during the period of 1981-2001. In Solapur district, Karmala and Pandharpur tahsils have more number of oil engines. While on the other hand, Mohol and Mangalwedha tahsils have less number of oil engine used in the region under study.

4.7.5 Electric Pumps:

Electric power is available for irrigation purpose with, the increasing rural electrification, so the number of, electric pump in the district has increased from 20322 in 1981 to 52366 in 2001. This shows, that electric pumps are more in Malshiras arid Pandharpur tahsils. Higher change that is more than 3000 number of electric pumps during the period of 1980-2001 has been observed specially in northern and eastern tahsils of Solapur district. Tahsils namely South Solapur, North Solapur, Mohol and Mangalwedha have recorded moderate change (1500 to 3000 electric pumps). In recent decade, more than 2500 electric pumps have increased. (Fig. 4.17)

4.7.6 Sugarcane Crushers:

Gur making is a rural traditional industry in the district. Previously, the sugarcane crushers were bullocks driven, but now they are operated with the help of oil engines or by electricity. In 1980-81, there were 1923 crushers and out of them 1064 worked by power and 59 worked by bullocks. In 2000-01 the number of crushers driven by bullocks has
decreased by 726 while crusher worked by power has been increase by 418 number of. But the total numbers of sugar cane crushers have decreased from 1431 to 1123 during the 1980-2001. This decrease may be attributed to increase in number of sugar factories in the study region.

4.7.7 Tractors:

With the use of tractors, many farm implements driven by bullocks were improved while other was replaced by better and more efficient implements. In the regions, the number of tractors was only 429 in 1980-81 which is increased to 3747 tractors in 2001. The concentration of tractors in certain irrigated areas in Malshiras, Pandharpur and South Solapur is more while low in Barshi tahsils on the other, while, the number of tractors is moderate in Madha, Mohol, Mangalvedha and Karmala tahsil of Solapur district.

4.8 IMPROVED SEEDS:

Generally, the big as well as small cultivators preserve seeds from their previous harvest. Only the poor cultivators who cannot afford to do so depend on the outside supply for meeting their seed requirements. Besides, those cultivators who want do replace their old seed for new promising varieties and those who want to undertake cultivation a fresh, also depend upon the outside of seed supply. Now a day the cultivator is very careful about the selection of good quality seeds for his field to grow crops. He takes care that the grains preserved by him are bold and healthy and are lustrous in colour.

The improved varities of food grain crops evolved by the department of agriculture give about 10 to 15 percent increased yield over the local varieties of seeds of improved variety and strains for the use in the district of Solapur (Table 4.9)
There are ten tahsils in the district where seed multiplication farms have been established. The foundation seeds of various improved grains are produced on these farms. The foundation seeds are further distributed to the seed villages through zilla parishad.

The hybrid seeds such as Jawar-CSH-1, CSH-2, Bajra-HB-1, Maiz Deccan double hybrid are also produced on the cultivator's field under the supervision of seed certification authorities and the same are purchased by the marketing federation unfortunately. The tahsil level data about improved seeds is not available. Hence, the distribution pattern of seed use is not tried. It gives an idea of improved seed only on district level.

### Table 4.9
#### Improved Varieties of Major Seeds

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the seed</th>
<th>Name of the Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Jawar</td>
<td>M-35-1</td>
</tr>
<tr>
<td>2.</td>
<td>Wheat</td>
<td>N-917, N-747-19, N-59, HY-65</td>
</tr>
<tr>
<td>5.</td>
<td>Cotton</td>
<td>Laxmi.</td>
</tr>
<tr>
<td>7.</td>
<td>Groundnuts</td>
<td>K-4-ll, K-3</td>
</tr>
<tr>
<td>8.</td>
<td>Tur</td>
<td>N-84</td>
</tr>
<tr>
<td>9.</td>
<td>Sunflower</td>
<td>N-62-8</td>
</tr>
<tr>
<td>10.</td>
<td>Mug</td>
<td>Jalgaon</td>
</tr>
</tbody>
</table>

### 4.9 CHEMICAL FERTILIZERS:

The most essential requirement in stepping up agricultural production is the use of adequate manures and fertilizers. Fertilizers along
with better seeds are the key to the expected per acre production achievements, thus, the importance of increase in the use of fertilizers was known form beginning of planning. The major break through the consumption of fertilizers came into existence with the introduction of new farm of technology. The application of fertilizers and manures has become essential to make agronomy more profitable and to meet the increasing demand for food grains. The farmyard manure which is prepared out of dung, urine of cattle, ash and other refuse is not enough to meet the local, requirements of farmers. The cultivators, therefore, have started applying the chemical fertilizers extensively to enhance the crop production in the district. The use of chemical fertilizers in the district is shown as under:

**Chemical fertilizers**

a) Ammonium sulphate  
b) Super Phosphate  
c) Super Nitrogen Phosphate  
d) Fertilizer Mixture  
e) Urea  
f) Others

The chemical fertilizers require abundant supply of water. Heavy doses of fertilizers are applied wherever enough irrigation facilities are available. They are used both for food crops and non food crops and also for commercial crops. The cultivators have realized the value of chemical fertilizers due to the fact that they have obtained higher yield of the crops through their application.

**4.10 AGRICULTURAL CREDIT:**

Credit societies provide loan for cultivators in order to help and enhance the inputs per unit of area. Majority of the villages in Solapur
district have co-operative credit societies. The table 3.10 shows in position of agricultural credit societies in the district for the years 1980-81 to 2000-2001.

Table 4.10

Agricultural co-operative credit societies in Solapur district (2001)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Items</th>
<th>Credit Facilities (Rs in 000')</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1980-81</td>
</tr>
<tr>
<td>1.</td>
<td>Number of Agricultural Societies</td>
<td>849</td>
</tr>
<tr>
<td>2.</td>
<td>Number of Membership</td>
<td>227187</td>
</tr>
<tr>
<td>3.</td>
<td>Share Capital</td>
<td>48852</td>
</tr>
<tr>
<td>4.</td>
<td>Working Capital</td>
<td>238955</td>
</tr>
<tr>
<td>5.</td>
<td>Loan Advanced</td>
<td>96286</td>
</tr>
<tr>
<td>6.</td>
<td>Loan Recovered</td>
<td>82520</td>
</tr>
<tr>
<td>7.</td>
<td>Loan Outstanding</td>
<td>196499</td>
</tr>
<tr>
<td>8.</td>
<td>Loan Overdue</td>
<td>106915</td>
</tr>
</tbody>
</table>


It is observed that numbers of agricultural credit societies are increasing gradually in recent time. However, there is increasing trend in respect of their memberships. It is however, discouraging to note that with an increased advances over 1980-81, the amount of overdue are also increasing year by year for farmers.

Tahsil wise variations are not uniform in the district. Numbers of agricultural credit societies are more in Madha, Barshi and Pandharpur tahsils. However their memberships are more in Barshi and Pandharpur tahsils.
4.11 AGRICULTURAL PRODUCTIVITY AND MARKETING:

The measurements of production and inputs required for the yield and output is known as agricultural productivity. The study of the spatial variations in agricultural productivity is useful for identifying, the different areas of agriculture. In developing countries like India, land is limited for making expansion into cultivated area. Further, increasing pressure of population on land compels the scientists to think for the improvement of agricultural productivity. Thus, to solve the food problem a suitable way is, to increase the production per unit area and per unit of time, Hence, a measurement of the existing agricultural productivity becomes necessary before any remedial steps can be taken.

Agricultural productivity is the interplay of a multitude of many factors, such as environmental, socio-economic and technological factors. The agricultural productivity is closely related to the per hectare yields, where as the agricultural efficiency is much more than agricultural productivity and conveys a more comprehensive meaning. Agricultural productivity is the actual performance of the land in terms of per hectare yield, where as agricultural efficiency is a ratio between the achievement in terms of agricultural production and the actual potential of the land productivity is a physical rather than a value concept and describes the changing relation between output and one of the major inputs like land, labor, and capital.

4.11.1 Productivity of Major Crops:

Wheat, Jawar, Bajra, Maiz, Tur, Gram, Sugarcane, Cotton and Groundnut are the important crops of the Solapur District. Sugarcane and Jawar account for more than 50 percent of the total cultivated area of the region. Jawar can be grown in both Rabi and Kharif season in study region. Wheat is more common in dry areas, where as Sugarcane is the principal crop in the irrigated part of the region. It is a late arrival in the
field of cash crops. Its cultivation is confined to the areas receiving adequate and timely irrigation.

The crop productivity changes have occurred in response to many technological developments during the last few decades. The adoption of seeds, fertilizers and irrigation has resulted into increase of farm production and diversifying the production pattern. The soil conservation has been an addition, for increasing the productivity. Thus, all these factors intract the changes in agricultural production.

- LEVELS OF JAWAR PRODUCTIVITY

There are wide variations in the yield of Jawar in the region under study. The average productivity of the region as a whole is 449 Kg per hectare in 2000-01. The tahsil wise yield ranges from 225.4 Kg. per hectare to 812.8 Kg per hectare. In the region, the three tahsils have recorded a yield level of greater than 725 Kg. per hectare. The very high productivity is observed in Mangalvedha tahsil with an average productivity of 812.8 Kg per hectare. The improved dry fanning techniques assured supply of water, use of new strains of seeds, use of fertilizers, and modern methods in Jawar husbandry, all of them are responsible for higher production. The moderate level of productivity is noted in Karmala, Pandharpur, Mohol and South Solapur. At the other extreme, due to the adverse climatic conditions remaining all tahsils has low productivity of less than 425 Kg per hectare (Fig. 4.18).

- LEVELS OF BAJRA PRODUCTIVITY -

There are wide variations in the average level of productivity of bajra. The average productivity of bajra, in the region is 415 Kg per hectare during 2000-01. In the region understudy the four tahsils have
productivity above district average and seven tahsils have below average. The major parts of Solapur district i.e. Mohol and North Solapur have high level of bajra productivity. The moderate productivity is recorded in Barshi, Karmala, Malshiras, Sangola and Mangalvedha tahsils. In Madha, Pandharpur, South Solapur and Akkalkot, the productivity is low. Recently new strains and the improvement in dry farming techniques have improved productivity of bajra.

The highest yields of 415 Kg per hectare are recorded in 2001. And production is recorded of 22100 metric tons region as a whole.

- **LEVELS OF WHEAT PRODUCTIVITY**
  
  The distribution pattern of wheat productivity is shown in Fig 4.19. The average productivity of wheat in the region is 1100 Kg per hectare. There are only four tahsils which have a yield above 1500 Kg per hectare. These four tahsils namely, Karmala, Malshiras, Pandharpur and North Solapur all together make a major contribution to wheat output in the region. The moderate production of wheat is observed in Madha, Mohol, and south Solapur tahsils and low production in Barshi, Akkalkot, Mangalvedha and Sangola tahsils with an average productivity of 1000 Kg per hectare, during the period 2000-01.

  It is observed that the yield and production of wheat are the highest in the region, but slowly declined from 1991. (Fig. 4.19)

- **LEVELS OF TUR PRODUCTIVITY**

  Tur is a more important food grain of the region. The average productivity of the region is 387 Kg per hectare. There are three tahsils namely, North Solapur, Solapur South, and Akkalkot, which have recorded productivity level higher than 500 Kg per hectare. At the extreme, the four tahsils namely Barshi, Karmala, Malshiras, and
SOLAPUR DISTRICT
Yield Level of Wheat (2000-01)

Productivity Kg./Hec.
- Red: More than 1500 (High)
- Green: 1000 to 1500 (Moderate)
- Yellow: Less than 1000 (Low)

Yield Level of Tur (2000-01)

Productivity Kg./Hec.
- Red: More than 500 (High)
- Green: 250 to 500 (Moderate)
- Yellow: Less than 250 Low

Figure 4.19
Mangalwedha which have productivity levels less than 250 Kg per hectare, Sangola, Pandharpur, Madha, Mohol tahsils have productivity ranging between 250 to 500 Kg. per hectare (Fig. 4.19). The levels of tur productivity are very high in those parts of the district where tur concentration is significant. Tur is used by the people in daily diet as a pulse and hence, it is grown by the people in sizable area of the Solapur District. The highest yield and production in 2000-01 recorded 387 Kg per hectare and total production of 12500 metric tones, where as the yield per hectare and production was relatively low in 1980-81.

**LEVELS OF GRAM PRODUCTIVITY**

The average productivity of region is 564 Kg per hectare. There are four tahsils namely Barshi, Karmala, Malshiras and South Solapur which have productivity, levels higher than 500 Kg per hectare. There are three tahsils which have productivity levels, less than 250 Kg per hectare. Low productivity occurs in North Solapur, Mangalvedha and Mohol, where local factors such as poor soils, relief and low intensity of irrigation directly affect the level of gram production. Elsewhere, the level of gram production ranges from 250 to 500 Kg per hectare. (Fig.4.20)

The yield of gram in 1980-81 was 355 Kg per hectare and total production was 11300 metric tones. The highest yield and production have been recorded during 2000-01.

**LEVELS OF GROUNDNUT PRODUCTIVITY**

Groundnut is an important oilseed crop of the region and its area of concentration is in southern part of South Solapur tahsil. The average productivity of region is 932 Kg per hectare during 2000-01. It recorded high productivity with an average productivity of 653 Kg per hectare while low productivity is in Akkalkot tahsil with an average productivity of 269Kg per hectare. Elsewhere, the levels of production are moderate due to agronomic limitation and the competition with grain crop (Fig.4.20)
Figure 4.20

SOLAPUR DISTRICT
Yield Level of Gram (2000-01)

Productivity Kg./Hec.
- More than 500 (High)
- 250 to 500 (Moderate)
- Less than 250 (Low)

Yield Level of Groundnut (2000-01)

Productivity Kg./Hec.
- More than 450 (High)
- 350 to 450 (Moderate)
- Less than 350 Low
- Not Available
Table 4.11
Yield per hectare of important crops in Solapur District

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crops</th>
<th>Yield per hectare in Kg.</th>
<th>Production in 00' tones.</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Jawar</td>
<td>349</td>
<td>443</td>
<td>449</td>
</tr>
<tr>
<td>2.</td>
<td>Bajra</td>
<td>282</td>
<td>383</td>
<td>415</td>
</tr>
<tr>
<td>3.</td>
<td>Wheat</td>
<td>942</td>
<td>1035</td>
<td>1100</td>
</tr>
<tr>
<td>4.</td>
<td>Tur</td>
<td>199</td>
<td>243</td>
<td>387</td>
</tr>
<tr>
<td>5.</td>
<td>Gram</td>
<td>355</td>
<td>497</td>
<td>564</td>
</tr>
<tr>
<td>6.</td>
<td>Groundnut</td>
<td>915</td>
<td>1688</td>
<td>932</td>
</tr>
</tbody>
</table>

Source: Socio-economic Abstract of Solapur district (1980-2001)

In 1980-81 the total production was 61200 metric tones for region as a whole, and yield per hectare was 915 Kg. After that the production and yield were increased in 1991. Then, there has been a decline in the production and yield per hectare during the 2000-01 periods.

The productivity level of individual crop do not give the average picture of agricultural productivity, hence, the overall level of agriculture productivity is attempted by applying standard quantitative method as below.

4.11.2 MEASUREMENT OF AGRICULTURAL PRODUCTIVITY

Identification and delineation of various areas of agricultural productivity have been attempted by many scholars by using many techniques. In the present investigation, two methods such as Kendal's, ranking co-efficient methods and yield index method have been used for the measurement of agricultural productivity. The weakness of Kendal's
ranking co-efficient method namely; neglect of the aerial strength of crops was removed by Sapre and Deshpande, (1964). After that, further, modification has been attempt by Bhatia (1967).

- **MEASUREMENT OF PRODUCTIVITY BY KENDAL'S RANKING CO-EFFICIENT METHOD**

  Here, the Kendal's ranking co-efficient method (1968) is used while applying this technique; six major crops grown in all the tahsils of the district are selected. The crops have been ranked in order to their yield per unit area. Then the arithmetic mean of these ranks is obtained which Kendal's called as ranking co-efficient and the same is represented cartographically. Lower the co-efficient value, higher is the productivity level of agriculture.

**Results and discussion:**

Three areas of agricultural productivity have been identified as shown in (Fig. 4.21)

I. Areas of high productivity.

II. Areas of moderate productivity

III. Areas of low productivity.

**I. Areas of high productivity**

This category is confined largely to northern and eastern part of Solapur district comprising the tahsils of South Solapur, North Solapur, Mohol, Barshi, and Karmala. The rivers in this area provide water for irrigation in Rabi Season. The river basins have fertile soils and many farmers in this area are adopting new inputs in agriculture by using, Fertilizers, machinery, improved seeds etc. All the favorable factors and human efforts have resulted into the high agricultural productivity in the region of Solapur district. (Fig. 4.21)
II. Areas of Moderate productivity

This category of productivity covers four tahsils. The co-efficient value in this area ranges from 5.5 to 6.5. Akkalkot tahsil is quite famous for pulses cultivation. Other tahsils like Akkalkot, Sangola, Pandharpur, Malshiras have fertile soil but paucity of water for irrigation and high variability of rainfall have resulted into moderate agricultural productivity.

III. Areas of low productivity

The low productivity areas cover two tahsils (Appendix-I) where the coefficient value is above 6.5. The high variability of rainfall and low intensity of irrigation have led to low agricultural productivity in dry areas of the district.

MEASUREMENT OF PRODUCTIVITY BY YIELD INDEX

METHOD:

The regional imbalance in agricultural productivity of Solapur district is measured by using index method. While applying this method, the six crops grown in most of the tahsils are selected. The yield index of each crop is calculated by the equation given below:

\[
\text{Yield of crop} = \frac{\text{Yield of crop 'a' in the areal unit}}{\text{Yield of crop 'a' in the region.}} \times 100
\]

Then the composite yield index was obtained for each tahsil and the same is represented cartographically on the map of Solapur district.

Results and discussions:

Three categories such as: (1) Areas of high productivity. (2) Areas of moderate productivity and (3) Areas of low productivity have been identified as below:
I. Areas of high productivity

It is mainly confined to the central and eastern part of district excluding south Solapur tahsil. Thus the tahsils of Mohol, Karmala and North Solapur recorded high productivity.

II. Areas of moderate productivity

This category of productivity is mainly observed in western part of Solapur district except Karmala. The rainfall is low in sangola tahsil. Irrigation facilities are not more developed. The average yield of crop is low. Kharif crops are dependent on monsoon and Rabi crops are grown only where water is available for irrigation.

III. Areas of low productivity

In the central part of Solapur district low production is recorded. These parts consist of Madha, Pandharpur, Mangalvedha and Akkalkot tahsils. Hence, the yield of crops is very low. The irrigation facilities are not developed. Agricultural implements are old and traditional. Rainfall is uncertain, thus, the combined effect of all these factors leads to the low agricultural productivity. (Fig. 4.22)

4.11.3 Agriculture and Marketing:

There is a close relationship between agricultural productions on the one hand, and availability of enough food grain on the other. In subsistence type of agriculture, a small portion of agriculture production is also sent to market for earning cash. Therefore, in the following paragraph an account of agriculture market centers and pattern of agriculture marketing is also attempted.
SOLAPUR DISTRICT

AGRICULTURAL PRODUCTIVITY BY YIELD INDEX METHOD

Index Value

<table>
<thead>
<tr>
<th>Category</th>
<th>Color</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Red</td>
<td>More than 115</td>
</tr>
<tr>
<td>Moderate</td>
<td>Green</td>
<td>90 to 115</td>
</tr>
<tr>
<td>Low</td>
<td>Yellow</td>
<td>Less than 90</td>
</tr>
</tbody>
</table>

Fig. No.4.22
Agricultural marketing is one of the manifold problems which have a direct bearing upon the prosperity of the cultivator. The problem of marketing is greater in agriculture than industries, as the agricultural products are bulky and perishable. The products of agricultural goods are scattered over large rural areas and the entire surplus is not consumed by the people locally and it is sent to a distant urban centers, hence, the cost of transport is also high.

Marketing system in the region is of three types namely regulated, retail and wholesale and periodical. As far as the farmers and agriculture of the region are concerned, regulated, wholesale and periodical marketing are more important. Regulated and wholesale market centers are located at the tahsil headquarters and other urban centers. The regulated markets in the district are the wholesale trade centers which are mainly the export centers of surplus commodities, All the regulated markets are established under the new Act of 1963 which was actually implemented in this district since 1967. All the tahsils in the district are served by regulated markets. The objectives of this establishment of market centers are (i) To bring about equity in bargaining power among the agriculturists and traders (ii) To prevent malpractices and iii) To promote mutual confidence.

Hence, an attempt is made to analyze the role of agricultural market centers in the respect of agriculture of the region under study. The marketing activity of major centers is given below. There are number of market centers in the Solapur district. Every tahsils centre has a market to purchase the agricultural produce.
MARKET CENTERS

BARSHI -

The agricultural produce market committee at Barshi was established on 11th June 1948. It is the biggest and the most important market in the district. This market is commonly called as 'Gateway of Marathwada' in the field of agricultural trade. A large amount of agricultural produce is brought for sale at this market. It is served by convenient means of transport and communications which attract agriculturists and traders from Marathwada region. The Latur-Miraj railway line of south central railway as well as many state high ways serves the centre. The important regulated commodities are groundnut, mug, udid, sunflower, jawar, bajara, wheat, gram, chillis, gur etc. Besides, the market committee has along regulated cattle trade consisting of cows, bullocks, buffaloes, sheep and goats since 1964.

The Barshi market is an assembling as well as distributing center of all agricultural commodities. Of the total assembled produce, 20 percent retained for local consumption and 80 percent is exported to distant market centers. The following commodities are exported to the destinations mentioned against them.

SOLAPUR

The Solapur market is one of the biggest wholesale markets in Maharashtra State. It is served by railway and road transport facilities. The Central and South Central railway lines as well as the National and State highways have brought the city into close contact with distant trade centers in Maharashtra, Andra Pradesh, Tamilnadu and Karnataka states. Also a considerable produce from Osmanabad district is brought to Solapur for sale. The area of operation of the market committee extends over two tahsils namely south and north solapur. In this market, the
commodities as under are marketed. They are groundnut (shelled and unshelled), tur, mug, jawar, gram, wheat, chillies, rice, gur, onions and live stocks such as goat, sheep, and buffaloes, cows and bullocks. The market is famous for groundnut and jawar, it is exported to other markets. The market committee has introduced the commercial grading system since 1963 and has a unit of five graders. The Maharashtra state warehousing corporation has build four godowns on the market yard, the storage capacity of each of these being 72,000 bags.

AKLUJ -

The agricultural produce market committee at Akluj was established in 1950. It is one of the big markets in the district. It is however, handicapped by the lack of convenient means of rail transport.

The market has regulated the commodities such as gur, cotton, groundnut, sunflower, tur, gram, jawar and wheat. The cattle trade consisting of sheep, goats, buffaloes and horses are also regulated, since, independence of India. Gur is important commodity in this market. In the cattle market, the sheep and goats are very popular to sale and purchase. (Fig. 4.23)

KARMALA -

The Agricultural produce, market committee at karmala was established on 1st January 1943. The market has jurisdiction over 96 villages which are frequented by recurring conditions of scarcity. Some villages from Karjat and Jamkhed tahsils of Ahmadnagar, district and some villages from Parenda and Ashti tahsils of Osmanabad and Beed districts get the benefit of this market. Though, Karmala is in the chronic drought area, there is a considerable turn over of trade. Though the market is situated in the drought stricken area, about 70 percent of the assembled
produce is exported outside of the Karmala tahsil after meeting the local demand.

**The direction of export trade is as under. (Crop Destination)**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bajari</td>
<td>Nasik, Thane, pune and Bombay.</td>
</tr>
<tr>
<td>Wheat</td>
<td>Bangalore, Andra Pradesh, Solapur, Satara and pune.</td>
</tr>
<tr>
<td>Groundnut</td>
<td>Pune, Bombay and Solapur.</td>
</tr>
<tr>
<td>Gur</td>
<td>Barshi, Kolhapur, Ahmandnagar, Pune and Gadag.</td>
</tr>
<tr>
<td>Chills</td>
<td>Bombay and pune.</td>
</tr>
<tr>
<td>Mug</td>
<td>Madras, Gujarat, Mysore, Bombay and Andhra Pradesh.</td>
</tr>
</tbody>
</table>

**PANDHARPUR**

Pandharpur market committee was started in 1949 and has developed into a very big market of agricultural produce. The market yard of Pandharpur is conveniently located as regard to easy means of transport and communications. It is served by the Latur-Miraj line of the south central railway and many important state highways. In this market all agriculture commodities such as groundnut, sunflower, tur, gram, jawar, wheat, and onion are marketed. Besides, the market committee has also regulated the trade of cows, bullocks, horses, sheep, goats and buffaloes.

About 30 percent of the total produce is retained by the agriculturists, and about 70 percent is brought for sale. The import and export of agricultural produce is done by motor transport as well as by railway. The transport charges per quintal from Pandharpur to Mumbai are rupees 80, for Kolhapur rupees 50 for Satara and Sangli are Rs. 40. The Co-operative marketing societies have played an important role in the regulation of trade in this market.
This market was started in 1956. The area of operation of the market committee is whole Mohol tahsil. This market has not much scope for its development as a large quantity of agricultural produce is diverted to other markets. Jawar, Bajari, wheat, maize, gram, tur, mug, gur, onions, chillis and groundnut are the important commodities of this market.

KURDUWADI -

This market committee was established on 1st May 1950. The market is served by convenient means of transport and communication. The Mumbai Pune Chennai railway line and Latur-Miraj Railway line of the South Central Railway as well as the state highway are the important trade routes passing through Kurduwadi. The area of operation of the market extends over the entire Madha Tahsil. Groundnut, wheat jawar, chillis, gram, tur, mug, gur, maize, bajari are the regulated commodities. Cattle market is famous center in this region.

About 80 percent of the total agricultural produce is brought for sale in the market and 20 percent is consumed locally. Jawar is the main commodity of this market. The agriculturally, Jawar is the main commodity of this market. The agricultural produce is exported to Mumbai-Chennai, Aurangabad, Pune and Gujarat State. The daily attendance of the agriculturists at kurduwadi market ranges from 400 to 500.

SANGOLA -

Sangola is situated within the chronic drought belt. This factor has reduced its importance as a centre of trade in agricultural commodities. It is very famous for the trading of live stocks such as bullocks of the Khilar breed and also for sheep and goats. The regulated commodities are
groundnut, tur, Jawar, Bajari, wheat, chillis, gur, and mataka. About 70 percent of the total produce is retained by the agriculture while only 30 percent is handled at the market yard.

AKKALKOT -

Akkalkot market committee was established in 1952, the convenient transport facilities have helped for development of the market. The area of operation of the market committee extends over the entire Akkalkot tahsil. The regulated commodities are groundnut, tur, mug, udid, Karadi, gur, chillis, jawar, wheat, bajara, gram, onions, ambadi, and cattle market. The Akkalkot tahsil Kharedi Vikri Sangh limited play an important role in marketing activities.

MANGALWEDHA -

The Mangalvedha market committee was established in 1961 at Mangalvedha. Till that date there was a sub-market yard at Mangalvedha under the change of the Pandharpur market committee since its establishment, the committee has maintained steady development in regard to the regulation of agricultural commodities. Groundnut, Sunflower, tur, gram, jawar, bajara, wheat, hulga, mataka, gur are the market commodities in this market. There is a cattle market also in Mangalvedha famous in the region under study.

The agricultural productivity is not accidental or stagnant. It can be transformed into different grades, such as desert soils can be made productive, by application of fertilizers and irrigation and vice versa and the good fertile soils can be classified as poor agricultural productivity, if market facilities and other inputs are not available cheaply. In view of the preceding discussion it may be concluded about the agricultural productivity regarding the region under study.
The physical conditions of the region play an important role in determining the agricultural productivity. So the agricultural productivity is the outcome of agricultural inputs and local physical conditions.

There are remarkable disparities in the level of agricultural productivity in the region. The high productivity zone is continued in the middle pan of the region. Other area may be regarded as weaker zone in respect of agricultural productivity. In Solapur district, there is a considerable scope to increase the agricultural productivity. If the farmers are provided with implements, adequate amount of fertilizers, better seeds and the necessary irrigation facilities, than agricultural productivity may be increased.

In Solapur district all the tahsils are served by regulated markets. Barshi and Solapur market are the biggest market centers in the district and are famous for tur dal and Jawar. They are assembling as well as distributing centers of the agricultural commodities. Many market centers are served by convenient means of transport and communication, hence, different commodities are sent to distant trade centers from other states. Every market centers besides, agricultural commodities, also regulate the cattle trade.
REFERENCES


