CHAPTER - V

AGRICULTURAL LAND USE

Agricultural landuse is the result of inter-action between man and environment. Besides physical factors such as relief, climate and soils, agricultural landuse are also affected by socio–economic and technological factors. The term “Agricultural Landuse” denotes the extent of the gross cropped area during the agricultural year under various crops. It is the result of the decision made by the farmers regarding the choice of crops and methods for production. Thus, this decision making is based on not only physical constraints and limitations but also on farmer’s perception of the total environment. His perception of environment is related to contents and nature of available information, much of which is based on traditional approach. The physical as well as cultural environment affects on crop growth and production.(Vaidya B.C.)

The present study is mainly directed at the appreciation of variation in agricultural landuse over the area of the Thane district. It is also related to the changes undergone in the spatial distribution of agricultural use of land, which is result of the direct application of efforts to the available land resources. The quality or the nature and the quantity of the efforts applied are related to the decision made by farmers regarding the actual use of land. These decisions are based on his appreciation of the available land resources. The cumulative effects of the farmers decisions regarding the choice of crops, the methods of tillage and his appreciation of the land resources (Physical Environment) is reflected in the spatial as well as temporal variations in the agricultural landuse in an area.

The present chapter attempts to study the spatial variations in the agricultural landuse, It shows a great diversity concerning the
variety of crops, the type of land under cultivation and the crop combinations. In view of these considerations the agriculture landuse is studied in this chapter with reference to the cropping pattern, temporal variation in the cropping pattern, crop ecology and the spatial distribution of various crops, methods of farm operation and to discuss the possible causes for the existing pattern of cropland in the region.

The areas under various crops have been obtained for Thane district and it was converted into percentage to net sown area, which are later used for depicting the distribution of individual crops. The distribution patterns show variations in agricultural landuse in the Thane district. The district census Handbook, Thane District Gazetteer and Socio-economic Abstract of Thane District have been further used for explaining the agricultural pattern of landuse.

The spatial variations in the agricultural landuse are considered in this chapter. These variations find out a direct expression in the cropping pattern in study area which in turn related to crop ecology and tillage of land. In respect of these considerations the agricultural landuse is studied in this chapter with reference to the cropping pattern, temporal variations in the cropping pattern, crop ecology and spatial distribution of various crops.

CROPPING PATTERN:

Variation in the areal proportion under various crops at a point of time in any area results in the cropping pattern. The cropping pattern therefore can be described in terms of areal statistics. Evolution of cropping pattern in any area is mainly the result of decisions made by the farmer. It is in response to various physical
and cultural factors and hence shows spatial as well as temporal variations.

The existing cropping pattern may not be necessarily the most efficient use of land resources and there is always a scope for change in response to the improvement in technology, economic factors and the nature of demand. The term cropping pattern in its comprehensive sense may also incorporate both the time and space sequence of crops based on the identification of the significant crops in the study area, the rotation of crops and intensity of crops.

The agricultural efficiency can be determined by considering the ratio of the total cropped area to the net sown area as one of the parameters. Recognizing the fact that the present land use is a result of interplay of resources and human society, it is necessary to appreciate the present development in relation to the potential in terms of higher level of development in technology.

**AGRICULTURAL SEASONS AND CROPS:**

There are two agricultural seasons in this study area viz. Kharif and Rabi. However the area has a negligible area under cultivation in Rabi season. Kharif is the main season of this region and stretches from June to October. Paddy (rice) is the principal crop of the region grown in this season and stretches from June to October, Followed by rice, most of the net sown area is under grass (Fodder crop) crop and ragi, vari are also grown in this season. Owing to the inadequate irrigation facilities, most of the crops are dependent on monsoon. The first shower of rain in June helps the cultivators to proceed with sowing of paddy for its seedlings. Cultivators begins to prepare the soil for transplanting the paddy
seedling in the month of July. Harvesting of paddy commences in the last week of October and is continued till the end of November.

Rabi season commences from October and continues till the end of January. Some pulses like Val and Gram are grown in this season. They are sown in October-November and harvested in February-March. At the same time and during rest of the year vegetables are grown, wherever the irrigation facilities are available in the region.
## Temporal Variation in Agricultural Landuse Pattern (1981-2009)
### Area Under Food Crops (Percentage of The Net Sown Area)

<table>
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<tr>
<th>Year</th>
<th>Cereals</th>
<th>Pulses</th>
<th>Total Food Crops</th>
<th>Condiments and Spices</th>
<th>Fruits</th>
<th>Total Vegetables</th>
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<td>Vari</td>
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**Source:** Season and Crop Reports for the respective years Commissionerate of Agriculture, Pune, Government of Maharashtra

Table - 5.1
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<th>Year</th>
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<th>% of Total Edible Oil seed</th>
<th>Total Non Edible oil seed</th>
<th>% of Total Non Edible oil seed</th>
<th>Total % of Total Oil Seed</th>
<th>Drugs And Narcotics</th>
<th>% of Grass &amp; Babbu l</th>
<th>Oth er fodder Crops</th>
<th>Total fodder Crops</th>
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Source: Season and Crop Reports for the respective years Commissionerate of Agriculture, Pune, Government of Maharashtra. 

Table - 5.2
Temporal Variation in Agricultural Landuse

Fig.5.1
TEMPORAL VARIATION IN AGRICULTURAL LANDUSE PATTERN

The cropping pattern undergoes changes in response to the changing physical and cultural environments. For an appreciation of such temporal variations in the study area, these changes are analyzed over period of twenty years by studying areal strength of individual crops in relation to the net sown area. Moreover, there is a steady change in cropping pattern. The factors for such changes in cropping pattern differ from village to village and from region to region.

Table - 5.1 displays the temporal variation in cropping pattern in the Thane district from 1981-82 to 2008-09. The identified possible main features of temporal variations in cropping pattern can be summarized as below.

Some individual crops are grouped together for computational convenience. The major classes of crops are:

1) Cereals : Rice, Nagali, Vari, (Hill Millets)
2) Pulses : Gram, Green gram (Mung), Tur, Black gram (Udid),
            Indian Bean, Cow pea, Horse gram, etc.
3) Oil Seeds : Ground nut, Seasamum, Coconut, Mustard, Niger seed, etc.
4) Cash Crops : Fresh fruits and dry Fruits
                Vegetables Condiments and Spices

Cereals:
The ever increasing demand for food in a densely populated country like India is reflected in the areal spread of cereals which
have occupied about 45 percent of the net sown area in 2009. The volume of change is considerable throughout the period of about last three decades. Importance of cereals somewhat declined in the decade of 1981 to 1991 (69.67 to 49.86 percent). After that in the next decades i.e. 1991-2001 (48.87 percent) and in 2001-2009 it declined to 44.99 percent. Total decrease in cereals during the study period is 24.68 percent.

**DISTRIBUTION OF CROPS**

1) **RICE (PADDY):**

As Rice is the most important crop in the tropics, it is the first important crop among the first ranked food crops in the study area too and occupied 57.76 percent of net sown area in 1981. Many varieties of rice are grown according to their local conditions. Rice is predominant in the area under review since 1981. The areal extent of rice has recorded steady decrease during the study period.

The total decrease in rice cultivation is 19.91 percent from 1981-82 to 2008-09. (Table 5.1) Rice cultivation in the year 1981-82 was 57.76 percent and it decreased by 19.91 percent in 2008-09 (37.85 per cent). Change in agricultural landuse and cropping pattern may be responsible for decreasing area of rice cultivation in the region.

2) **Hill Millets:**

All the hill millets together occupied significant proportion (7.12 per cent of NSA) of the cropland of the district in 1985. Hill millets like Ragi, Vari, Nachani etc. were grown successfully before 1981 in the district. It consisted of 7.26 per cent Ragi and 4.48 per cent Vari to total NSA (1981-82). The volume of Ragi has decreased by 2.96 per cent (7.26 per cent in 1981 and 4.30 per cent in 2008-09) and that of
Vari decreased by 1.68 per cent (4.48 per cent to 2.80 per cent 1981-82 and 2008-09). Hill millets display a remarkable volume of change in last three decades.

3) **PULSES:**

The areal extent under pulses in the region is 5.33 percent (2008-09). Pulses was successfully cultivated before (1981-82) in the region (3.93 per cent of total net sown area). Pulses form an important source of protein supply in the daily diet of people, about 5.33 per cent of NSA is occupied by pulses. There is steady increase area under pulses registered every year. It has increased by 1.4 per cent in 2008-09(5.33 per cent of total in net sown area). Gram, Horse gram, red gram and black gram are important pulse crops grown in the region. Black Gram and Gram are important pulses which occupied 2.50 percent of net sown area in 2009. With a slight increase from 1981 to 2009 (2.21 to 2.50 percent). Total pulses showed an increase in the volume in 1991 and 1993 and a negative trend in 1998 (4.04 percent). Again the volume has shown signs of increase in 2001-2002 (6.24 percent) and 5.33 percent to total NSA in 2009.

4) **FRUITS:**

Fruits are mostly grown in the coastal area. The important fruits grown in the region are bananas, mangoes, chikus etc. They occupied an area of 4.25 per cent to net sown area in 2008-09. The table number 5.1 shows the area under fruits in the region. The area under fruits in the region in 1981 (0.65 per cent to net sown area) has increased by 3.60 per cent in 2009. After 1981 area under fruits continuously increased from 0.65 per cent to 4.25 per cent in 2009. The introduction of new high yielding varieties of fruits and keen
interest taken by the government for increasing area and yield of fruits may be responsible for increasing area under fruits in the region.

5) **VEGETABLES:**

Vegetables occupied an area of 1.99 per cent of total net sown area in 2009. Brinjal, lady’s finger, radish, chilli, sweet potato, cabbage, fenugreek, etc. are the main vegetables grown in the region. Table - 5.1 shows 0.99 per cent to net sown area under vegetable in 1981-82. Vegetable grown has increased during 1981 to 2009 by 0.97 percent to net sown area. It is observed that area under vegetables has slightly increased from 1981 to 2009.

6) **Grass (fodder):**

Grass occupies second place after rice in the district, as it has occupied 42.14 per cent of net sown area in the region (2009). In this region in 1981, 23.10 per cent of total land to net sown area was devoted to grass. Grass is mentioned as a crop by revenue authorities in this region, because grass has high economic value. The annual harvest of grass per farmer ranges from less than 500 kg. to 5000 kg. Output is not a product of effort and input but is related to the amount of land under grass.

The area under grass has increased from 1981-82 (23.10 percent) to 2008-09 by 19.04 per cent (42.14 to net sown area). Area under grass steadily increased. Total area under grass increased by 19.04 per cent during study period i.e.1981-82 to 2008-09. This area under grass increase may be the result of decrease in area under forest and rice cultivation.

7) **Coconut:**

Coconut is mostly grown in coastal villages. It extended over the areas of 0.61 per cent to net sown area in 2008-09. Area under
coconut has steadily increased from 1981-82 to 2008-09. In 1981-82, area under coconut was 0.08 per cent to net sown area, thereafter it has increased by 0.53 per cent in 2008-09. (i.e. 0.61 per cent to net sown area in 2008-09).

Pests and plant diseases cause a serious loss to agriculture production. It is not always possible to estimate accurately the extent of loss caused by the pests as it depends upon the severity of infestation in any particular year.

There are various pests of crops known to the region, Rhinoceros beetle is stoat elongated, kind of pest and is harmful to coconut plant and big trees. It may be the cause of insignificant area under coconut in the region.

8)  **Betel leaf – (Panveli / Nagveli):**

It is purely garden crop grown only for its leaves and is obtained from creeper known as Panvel or Nagvel. In the area under study 0.11 per cent to net sown area was under Betel leaf in 1981-82. The land under betel leaf increased by 0.08 per cent in 1988-89. After 1988-89 area under this crop again decreased by 0.14 percent in 2008-09. These changes in the area under betel leaf may be due to various factors i.e. physical and cultural. The cultivation of betel-vines is very costly and requires adequate financial strength.

9) **Oil Seeds:**

Variety of oil seeds cultivated in the region, occupied very insignificant proportion of net sown area. Ground nut, mustard, seasamum (Til) and other non edible oil seed like niger seed occupied 0.97 per cent to net sown area in 2008-09. Area under oil seeds has decreased by 0.41 per cent (1.38 per cent in 1981-82 and 0.97 per cent in 2008-09).
9) OTHER MISCELLANEOUS CROPS:

Other miscellaneous crops have remained unaffected during the study period.

The temporal variation reflects the major changes with upward trend in the area under grass fruits and vegetables and hence, the hectarage of these crops have steadily increased. Rice, ragi and vari have not registered increase in hectarage in the region. The area under pulses and coconut have steadily increased over the year.

The net sown area has not changed much in last two decades i.e. 1991 to 2009 but the area cropped more than once has increased noticeable since 1981.

CROP ECOLOGY AND SPATIAL DISTRIBUTION OF AGRICULTURAL LANDUSE

Crop Ecology:

Crops show a marked tendency to adopt themselves to a wide range of environment but the crops also require a specific set of physiological elements for their optimum growth. The spatial distribution of crops is better understood if correlation with crop ecology. Crop ecology is the study of physical environmental requirements of crops. The physical environment is represented by the following factors:

2. Physiographic factor: Relief i.e. altitude and slope.
3. Edaphic factor: Soil characteristics and distribution.
4. Biotic factors: Association of different plants which may be helpful, neutral or harmful.
The Thane district is agricultural dominant region of North Konkan, involving 24.00 percent working force in agricultural practice. The crops, namely, rice, pulses, vegetables, fruits, grass, coconut, betel leaf are cultivated in the region. The variation in areal extent under these crops is mostly depending on local environment and traditional approach of farmers in the area under review. Besides these soil types, nature of relief (slope), Irrigation facilities etc. influence the crop cultivation and cropping pattern.

The relative significance of crops and their spatial variations in the area under review was studied in detail with studying crops ecology and spatial distribution of crops in the region.

**AGRICULTURE LANDUSE OF THANDE DISTRICT (2008-09):**

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Crops</th>
<th>Area (In ‘00’ Hectares)</th>
<th>Percent of Net Sown Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rice (Paddy)</td>
<td>1406</td>
<td>37.89 %</td>
</tr>
<tr>
<td>2.</td>
<td>Hill Millets</td>
<td>264</td>
<td>7.19 %</td>
</tr>
<tr>
<td>3.</td>
<td>Pulses</td>
<td>198</td>
<td>5.38 %</td>
</tr>
<tr>
<td>4.</td>
<td>Vegetables</td>
<td>73</td>
<td>1.97 %</td>
</tr>
<tr>
<td>5.</td>
<td>Fruits</td>
<td>158</td>
<td>4.24 %</td>
</tr>
<tr>
<td>6.</td>
<td>Oil Seeds</td>
<td>36</td>
<td>0.97 %</td>
</tr>
<tr>
<td>7.</td>
<td>Grass and Other Fodder Crops</td>
<td>1571</td>
<td>42.36 %</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>3706</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

Source: Revenue Village Record for the respective Tahsil’s of Thane District. (2008-09)  
Table - 5.3

1) **RICE (PADDY):**

Rice is the principal crop in the study area. It is rain fed crop cultivated in Kharif season. This crop is cultivated in one hundred and twenty eight villages occupying 12319.33 hectares (57.23 per
Cent to net sown area). The average annual rainfall amount and climatic conditions in the region favour the cultivation of rice in every village.

**ECOLOGICAL CONDITIONS:**

Rice is mainly a tropical crop. It thrives well under high temperature and humidity. The distribution of rice depends upon climatic conditions than soil types. Rice is a crop of very wide physiological adaptability. The temperature range for the rice cultivation is between $20^\circ C$ to $37^\circ C$. Rice can grow in all types of soils. Lateritic soils shallow and loam soils, and alluvial soils can be useful for rice cultivations. Rice requires heavy rainfall throughout the growing period and hence in study area it is grown during the southwest monsoon period. It grows well in the area where rainfall is between 1000 mms and 1100mms. The crop matures in 100 to 120 days sown in June or July it is harvested in September or October, November.

**SPATIAL DISTRIBUTION:**

The spatial distribution of rice in the region is shown in Map - 5.1. Rice cultivation is widespread in the region due to favorable geographical conditions. The average annual rainfall between 1500 – 2000 mms and prevalent temperature are conducive to growth of rice in the region. The alluvial coastal soil in the region is also responsible for wide cultivation of this crop and hence the spatial distribution and its areal extent is continued by these factors. The spatial distribution of rice is shown in Map - 5.1. It is obvious from Map - 5.1 that this crop is found in three categories as under.

1) High concentration of rice in the coastal alluvial plain.
2) Moderately concentrated area under rice is dispersed in low land and upland areas.
3) Low concentration of rice is found in northeast part on coarse shallow soils in the region.

More than 75 percent area under rice are found in hundred and fourteen villages in three pockets in the southern, northern and western parts of the area under study. The major villages are located in western part confined to coastal lowlands and in the southern and south west part of the region.

Three hundred fifty three villages having 50 to 75 percent area under rice to net sown area is found in north west, western and southern part in the region (Map - 5.1). The area under rice increases its areal extent toward south, north and west. In the central part there are few pockets in this group. The increase in area can be attributed to the local fertile soils (i.e. coastal alluvial soil) on which this crop is cultivated.

Maximum number of villages (633 villages), where rice is found between 25 to 50 percent to net sown area is along the eastern and central parts and three pockets in the north west and south east part of the region. Most of the villages under this group are at the eastern margin of the coastal plain, where foot hill villages and coarse shallow soil is present. Less than 25 percent of net sown area under rice is confined to far eastern part and dispersed in nature into four-five pockets. Three pockets are in northern part two is in central or south central part of the region. Three hundred thirty six villages have less than 25 percent net sown area in the study region (Map- 5.1)
2) **GRASS:**

Grass is one of the oldest crop in this region. In most of the villages more than 40 per cent of the cultivated land is under grass. The fields under grass are not resown with other crops. Grass is listed as a crop by revenue authority. On this grass growing area, land grazing of animals is not practiced. This crop provides fodder to livestock. Grass occupies 1,57,100 hectares (36.25 per cent to net sown area) and stands second in rank in the region.

**ECOLOGICAL CONDITIONS:**

Grass is mainly tropical and subtropical crop grown in Kharif Season. The grass growing region is around 15-25 meters above the sea level. Almost all the rainfall is received during rainy season and
there is no winter rainfall. The rainfall amount is between 1500mm to 2000mm. The temperature between $20^\circ C$ to $35^\circ C$ coarse to shallow medium coarse black soils determines the areal extent. This is an ideal condition for growing grass.

Varieties of grass grown in this region are Fool which is low quality grass, Rohida is good and Baradi, Beru etc. Best quality of grass which has high economic value.

**SPATIAL DISTRIBUTION:**

The spatial distribution of grass is found in all villages in the region. Except close to coastal tracts, grass growing is widespread in the region due to favourable geographical conditions. The average annual rainfall amount is between 1500 mm to 2000 mms. High yielding varieties of grass found in this region i.e. Beru, Bardi, Mushee etc. have high economic value. It is seen from the plate No-5.2 that the areal spread of grass increases from the west to the east and central part in north to south direction, which is at the height of 15-25 meters from sea level.

The grass distribution in the region falls into three categories.

1) The area which has less than 25 percent to net sown area is found in two hundred eighty villages.

2) Moderate concentration of grass between 25 to 50 percent to net sown area is found in four hundred seventy three villages.

3) High concentration of grass where more than 50 percent of net sown area is devoted to grass is found in six hundred fifty villages which display the spatial distribution of grass in the region. The major concentration of grass (covering more than 50 percent land to net sown area in) is found in six hundred fifty villages.
Among these north eastern and eastern villages has maximum land (more than 75 percent to net sown area) devoted to grass. The patches are found in north, central and south eastern parts in the study area.

Four hundred seventy three villages have 25-50 percent area under grass. These villages are extended throughout the western coastal plain area. Maximum concentration of villages is in the western parts where lowland region and coarse shallow soil, which is devoted to grass growing in the region. Some patches are found in the northwest, central and southeast part in the region.

The spatial distribution of grass in the region occupying less than 25 percent of net sown area is found in two hundred eighty villages, these villages are mainly concentrated in northern, northeastern and southern parts of the region (Map No-5.2). The minimum area under grass in this category is found in the northeastern part of the region.
3) **FRUITS:**

Fruits rank third in the western coastal plain. It accounts for 2.73 percent to net sown area (587.65 hectares). The fruits are cultivated for commercial purposes. The most important fruits are Chiku, Bananas, Mangoes etc. Area under fruits (Horticulture) has been increasing day by day and farmer preferred plantation of various fruits according to local conditions i.e. soil and irrigation facilities.

**VARIOUS FRUITS GROWN IN THIS REGION**

**CHIKU:**

It is grown mostly in the coastal villages in Thane District. Coastal climate of area and about 75” to 100” of rainfall from June to September suits the crop. Planting is done in Monsoon or in
November-December. Plants are usually spaced thirty feet apart. In general for cultivation, the whole garden is hand dug at the end of the monsoon. Manure of sheep dung, bone-meal and groundnut cake are usually applied twice in a year. Once in September-October and again in March. The trees are usually irrigated after the end of Monsoon. Chiku starts to bear fruits after three years of planting and continues for about 75 to 100 years, if well cared for. The flowers appear on the tree almost throughout the year, though flowering is most profuse during the rainy season. The fruit takes about six months to be ready and the maximum crop is obtained from November to April, though fruits are available almost throughout the year. An average tree yields of about 2,000 fruits per year.

**BANANAS:**

The famous varieties of bananas in this region are Rajeli, Tambdi, Saphed Velchi, Sonkeli and Basrai. The best period for plantation is from May to June. Banana requires ample water, hence irrigation is required at an interval of 6 to 8 days in the hot season.

**ECOLOGICAL CONDITIONS AND FARM OPERATIONS:**

The Best period for plantation is from May to June. Banana requires ample irrigation. Flowering starts after about nine months and continues for three to four months or more. The crop takes from eighteen to twenty months for maturing after planting. It can be allowed to multiply in the same field. The crop is harvested when the fruits get rounded and dry petals drop down. The plant is cut down immediately after the bunch is harvested.
**MANGOES:** Is an important fruit crop in the north Konkan i.e. Palghar Tahsil. The best varieties are Hapus, Payari, Kala Hapus, Bangadi Payari, Majgaon, Batli, Farnandis and Ladva.

**ECOLOGICAL CONDITIONS:**

The Mango crop requires deep well drained soils, and the tree attains very large size measuring 50’, 50’ in fertile soils. The climate best suited is the equable climate with little variation in maximum and minimum temperature as prevalent in the coastal area of the region. Planting of Mango grafts is the only way to develop good gardens. Since the plants do not develop deep roots they have to be regularly watered. Watering is essential for about three years after which the roots go deep enough.

4) **VEGETABLES:**

Vegetables rank fourth in the study area. It accounts for 2.55 percent of net sown area (548.91 hectares). Brinjal, Sweet Potato, Bhendi (Lady’s Finger), Radish, Bitter – Gourd (Karle), Snake-gourd (Padval), Little-gouvd (Tondli), Bottle-gourd etc. are the main vegetables grown in the region.

**BRINJAL:**

This is the most important among the vegetables crop grown in the region. It grows well on medium brown soils, in garden land with the help of manure and water in considerable quantities. In dry land it is sown in June in see-beds, planted during July, begins to bear fruits in September and if occasionally watered, goes on bearing for four months.
SWEET POTATO (RATALE): It is grown in small patches in the region though not very extensively. The crop grown during the cold season and under irrigation. It matures in about five months.

BHENDI (LADY’S FINGER):
It can be cultivated throughout the year but thrives well in kharif season.

BITTER –GOURED (KARLE):
It is grown either as a rain-fed crop or in garden lands.

LITTLE GOURED:
It is a common wild creeper growing on bushes and hedges in the region. It is a perennial crop growing vigorously for three to four years. Any type of soil and climate is suitable for this crop.

ECOLOGICAL CONDITIONS:
The above mentioned crops can grow in varied climatic conditions and soil types. Generally these crops are cultivated in all seasons in the presence of irrigation.

It is observed that twelve villages have more than 10 percent land under vegetables (Map - 5.3) these villages are in northeast, central and two patches are in in northeast, central and southern part. Five to ten percent land under vegetables is found in seven villages (Map - 5.3) as show three patches in northeast, central and southern part.

Thirty four villages have less than five percent land under this crop. These villages are scattered throughout the region. Most of the villages are concentrated in central part surround by Palghar Town.

SPATIAL DISTRIBUTION: (Fruits and Vegetables)
The spatial distribution of fruits in the region is shown in Map - 5.3. Horticulture mostly depends on the farmers attitude. Map - 5.3
reveals that the distinct areas of fruits and vegetable distribution are as under:

1) The areas of more than thirty percent net sown area are found in eight villages.

2) About fifteen to thirty percent area under fruits to net sown area is in forty eight villages and

3) The area having less than 15 percent under fruits to net sown area is found in two hundred thirty three villages.

The land with more than fifteen percent to net sown area under horticulture is found in the western coastal parts in the region (Map - 5.3). More than thirty percent land to net sown area is found in three patches in the western coastal region. The north eastern villages have coarse shallow soil at uplands.

Less than 15 percent land area under fruits and vegetables was observed in two hundred thirty three villages, covering wide spread in six patches in the region (Map - 5.3). Wide distribution of fruits and vegetables is found along the western side, north west, central and northeast part of the region.

The distribution of fruits is largely influenced by the attitude of farmer. It was observed that there is no specific pattern of horticulture in the region.

The vegetables particularly, Brinjal, Sweet potato, Bitter- gourd, Lady’s finger and chili’s are cultivated on alluvial soil to medium soils. The production of this crop is sold to Mumbai and in local Market.
PULSES:

Various kinds of pulses are grown to a small extent, chief among them being udid (black gram), Tur, Val, Harbhara (Gram), Chavali, Kulthi (Horse Gram), Mug (Green Gram) etc. pulses occupied an area of 0.52 percent to net sown area (111.93 hectares). Pulses are grown to a small extent in this region. Pulses like Tur, Val, Gram, Chavali and Mug (green Gram) are grown along the eastern part of the region.

ECOLOGICAL CONDITION:

A pulse like ‘Tur’ is generally sown in June-July. The crop is harvested from January onwards. The crop is favorite among the
cultivators as it has the highest demand and it serves as a restorative rotation crop. It adds to the nitrogen contents of the soil due to its being a legume. ‘Val’ is taken as rabi crop or as a second crop in rice fields. It is damaged by heavy rains, cloudy and cold weather when flowers begin to fall off and fertilization fails to take place. Usually val is sown in November and harvested in March. The crop is ready for harvest in 130 to 150 days.

**GRAM (HARBHARA):**

It is grown as a rabi crop, usually after rice. After the rice crop is harvested, fields are ploughed once or twice, and gram is sown, they mature in about three months.

**MUNG (GREEN GRAM):**

It is grown both as a rain-crop in sandy soils and as a cold weather crop in low water fields.

**CHAVALI:**

It is grown as a rabi crop. As the crop is grown along with paddy it gets a well prepared soil. It is sown in rows about six feet apart by broad casting the seed. The crop flowers in six weeks and during the same period the pods are ready to be picked up.

**SPATIAL DISTRIBUTION:**

Map - 5.4 reveals the spatial distribution of pulses in the region. The spatial distribution of these crops is attributed to soil types. It is observed that eastern and northeastern part of the district cultivating this crop. There are forty five villages having more than fifteen percent land area under pulses in eastern, northeastern and southeastern part and some patches in the northwest and central part. Three hundred thirty six villages have less than fifteen percent land under pulses in eastern and southeastern parts, confining to shallow coarse soils. two patches found in western part.
Maximum hectare under this crop is at northeastern corner (forty percent to net sown area) while minimum is recorded in western coastal plain (3 percent to net sown area.)

Map - 5.4

**Hill millets:**

This group of crops includes Nagali, nachani or ragi (Eleusine coracana G.), vari (Panicum miliacenum L.) are the important constituents. Hill millets cover an insignificant area of 26500 hectares ranking third among the crops grown in the district. They occupy 7.12 per cent of the net sown area.
ECOLOGICAL CONDITIONS:
Ragi and vari are generally grown on poor, lighter soils while rala thrives best in red loamy soils. They can be grown in areas with a wide range of rainfall, from dry lands to wet lands i.e. 500mm to 1000mm of rainfall.

Farm Operations:
The hill millets are grown in kharif season in the district. These millets are sown in June or July mostly by broadcasting. These crops are not manured and not much of interculture is done. The harvesting season starts from September and lasts up to January depending upon the period of sowing.

SPATIAL DISTRIBUTION:
These millets have high nutritional value but in the areal distribution they are the weakest group of crops. All these hill millets are associated with rice in the eastern hilly and heavy rainfall region. In the rice growing areas hill millets are grown as a supplementary crop. In spite of the competition from rice, hill millets occupy a very strong position in the areas which are physiographically most adverse to the cultivation of other crops. They ranked first occupying sometimes a major proportion of the area up to 70 per cent of the net sown area in the north eastern part of the district. In other areas where rice ranks first, hill millets occupy second or third important crop.

Hill millets allotted the lands which are not suitable for cultivation of rice. Such areas unfit for rice are moderate to steep slopes with a thin soil cover. Thus, the nature of the slope and the amount of rainfall are strongly associated with the areal distribution of hill
millets. Maximum concentration of hill millets is observed in the areas receiving rainfall over 2000mm in the northern, northeastern and eastern part, westward from this zone of concentration their areal strength is decreases and in coastal plain region millets are practically absent.

**OIL SEED:**

Variety of oil seeds cultivated in the region, occupied very insignificant proportion of net sown area. Ground nut, mustard, seasamum (Til) and other non edible oil seed like niger seed occupied 0.97 per cent to net sown area in 2008-09. Area under oil seeds has decreased by 0.41 per cent (1.38 per cent in 1981-82 and 0.97 per cent in 2008-09).
SPATIAL DISTRIBUTION

The spatial distribution of oilseeds is largely influenced by the amount of rainfall received and temperature condition during specific stages in growth. Oilseeds are grown on variety of soils, therefore soil as a factor influencing their spatial distribution is not that significant.

In some of the physical regions, particularly in the western portion of the district, oilseeds are totally absent and in some villages the proportion of oilseeds in the net sown area is very small i.e. less than five percent (Map - 5.6). In the northeastern part eight villages cover more than fifteen percent of the net sown area. Though oilseeds are spread in the southeastern part of the district, their proportion to the net sown area varies from 1 to 26 percent. Map - 5.6 reveals the areas of high and medium to low concentration of oilseeds in the district.