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CHAPTER-IV
AGRICULTURAL LANDUSE PATTERN

4.1 Introduction

After examining general landuse in Baramati tahsil, it is necessary to evaluate agricultural landuse. Agricultural landuse means 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 the physical constraints and limitations but also on farmer’s perception of the total environment. This is a result of socio-economic, physical as well as climatic conditions of the study region. The farmers’ decision are generally associated with their socio-economic conditions, purchasing power and price fluctuations in markets both in local and regional. The present chapter focuses on spatial distribution of agricultural crops in the Baramati tahsil. The spatial distribution and their temporal variations have been studied for the period from 1991-2011. The data regarding crops have collected for 117 villages from concerned talukas from talathi, sarpanch and tahsil office. The collected data was then converted into percentage to net sown area. Later on, these crops percentages were arranged into different groups and finally spatial distribution was studied for nine crops in the study area.

Moreover, personal visits to these villages have helped to get additional information about landuse. Besides this, District Census Handbook, Socio-economic Abstract of Baramati tahsil and Agriculture Department Baramati were used to collect secondary data. The spatio-temporal variations in agricultural landuse pattern have been studied for Baramati tahsil. The study of temporal variation for crops in study region was computed for twenty years (1990-91 to 2010-11). Due to lack of data every year in study area the present study relies on the latest data available for 2010-2011 and therefore spatial distribution of nine crops have studied only for one time point i.e. 2010-2011. Kharif and rabbi are two major agricultural seasons in the study area. Kharif season begins in month of June or July and ends in September. Jowar, bajara, sunflower are major kharif crops in study area of Baramati tahsil. Rabbi season commences from September or October and ends in March or April. Wheat, jowar, gram, and maize are major rabbi crops grown in study region. Sugarcane and vegetables are sown both in kharif and rabbi seasons. Sugarcane is the main crop in the study area requires a long
duration for maturing (15 to 18 months). This crop needs hot and humid climate during the growing period.

4.2 Temporal Variations in Agricultural Landuse Pattern

The croppattern in any region cannot remain static due to the variations in the rainfall amount and nature of inputs and environmental instability. Moreover, introduction of new high yielding varieties of seeds, irrigation facilities and technical knowledge are responsible for temporal changes. The factors for such changes in cropping patterns differ from village to village and region to region. Therefore, it is worthwhile to study isolated causes of changes occurring through space and time. Table-4.1 and Fig. 4.1 display temporal variations of nine crops in study region from 1990-91 to 2010-11. The cropping pattern undergoes changes in response to the changing physical and cultural environment. For an appreciation of temporal variations in study area twenty years have been taken into account and study was made with considering areal strength of individual crop. Table-4.1 displays the temporal variations in cropping pattern in the study area of Baramati tahsil from 1990-91 to 2010-11 (Fig.4.1). Jowar occupies 23359 hectares in 2010-11 accounting for 22.44 percent of net sown area in Baramati tahsil which is higher than the state as well as the district averages of the area under jowar to the net sown area (Pune district 13.27 percent and Maharashtra State 21.54 percent).

Table-4.1: Temporal Variations in Agricultural Landuse Pattern

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the Crops</th>
<th>1990-91</th>
<th>2000-01</th>
<th>2010-11</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Area (Hectares)</td>
<td>Percent to NSA</td>
<td>Area (Hectares)</td>
<td>Percent to NSA</td>
</tr>
<tr>
<td>1</td>
<td>Jowar</td>
<td>29015</td>
<td>30.35</td>
<td>25669</td>
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<tr>
<td>2</td>
<td>Wheat</td>
<td>12581</td>
<td>13.16</td>
<td>16215</td>
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<td>3</td>
<td>Bajara</td>
<td>21342</td>
<td>22.32</td>
<td>19440</td>
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<td>4</td>
<td>Sugarcane</td>
<td>13570</td>
<td>14.19</td>
<td>21397</td>
</tr>
<tr>
<td>5</td>
<td>Fodder Crops</td>
<td>12580</td>
<td>13.16</td>
<td>12891</td>
</tr>
<tr>
<td>6</td>
<td>Oilseeds</td>
<td>3788</td>
<td>3.96</td>
<td>2851</td>
</tr>
<tr>
<td>7</td>
<td>Pulses</td>
<td>4090</td>
<td>4.28</td>
<td>3325</td>
</tr>
<tr>
<td>8</td>
<td>Fruits</td>
<td>984</td>
<td>1.03</td>
<td>1695</td>
</tr>
<tr>
<td>9</td>
<td>Vegetables</td>
<td>766</td>
<td>0.8</td>
<td>913</td>
</tr>
</tbody>
</table>

Source: Revenue Record, Talathi Office, Baramati
Temporal Variations of the Baramati tahsil of major crops

(1990-91 to 2010-11)

Fig.4.1
Jowar is staple food crop cultivating in kharif season in the study area. This crop can be used for the livestock as food. Jowar thrives well on clayey deep soil yielding higher production. This crop is generally cultivated in rotation with groundnut, pulses, and sugarcane in study region. The total area under jowar in 1990-91 was 30.35 percent to total cropped area (Fig. 4.1). In 2010-11, jowar accounted for 22.44 percent land total cropped area under jowar. The hectarage of to this crop during the study period (1990-91 to 2010-11) has steadily declined. Table 4.1 clearly indicate that jowar was widely cultivated in 1990-91 (30.35 percent to net sown area) in the area under review. But the hectarage under jowar has reduced further to 22.44 percent during the study period. The maximum hectarage of jowar declined in 2010-11 by 7.91 percent to total aerial extent of the study region. Wheat is cultivated in rabi season and it requires four months for its maturity. It could be raised on subsoil moisture. Traditionally, this crop is grown in study region. Fig. 4.1 reveals fluctuation of wheat crop in Baramati tahsil. Wheat occupies 15.76 percent net sown area in study region and it is increased by 2.6 percent in 2010-11. Increasing irrigation facility is the main cause of this change in the study region.

Bajra is known as perl millet or bulrush millet. It requires rainfall between 40 and 50 cms. and dry weather condition. Shallow, black, red and light soils are suitable for this crop. Bajra covers 19.2 percent to net sown area in this tahsil. The total reduced of bajra in Baramati tahsil is 3.12 percent from 1990-91 to 2010-11. Sugarcane the cash crop covers 21.25 percent to its net sown area which is greater than Pune district (5.44 percent) and Maharashtra state (4.36 percent). Due to irrigation, sugarcane is grown extensively in study region. This crop requires a long duration for maturity (15 to 18 months). It requires a hot and humid weather throughout the growing period. Total area under sugarcane cultivation in 1990-91 was 31.68 percent to total cropped area. The areal extent of sugarcane has recorded steady increase during the study period. The total increase in sugarcane is 7.06 percent from 1990-91 to 2010-11. Fig. 4.1 reveals that there is significant variation in the volume of change in sugarcane.

Fodder crop includes maize, kadwal and green grass. It occupies 12.71 percent in study area. Among these fodder crops, 6.85 percent land is under maize, 3.16 percent under kadwal and green grass accounts for 2.7 percent. Baramti tahsil witnesses reduced of area under fodder crops during 1990-91 to 2010-11 by 0.45 percent. Oilseeds comprises sunflower, safflower and groundnut in study region. These are intercrops and are cultivated with jowar and bajra. This crop accounts for 2.85 percent in study region which is less than Pune district (7.12 percent) and Maharashtra state (19.01 percent).
Fig. 4.2
Fig. 4.3
Groundnut covers 1.82 percent, safflower 0.78 and sunflower 0.25 percent to net sown area. This crop shows decreasing trend during study period. The areal extent under pulses in the study region had successfully cultivated before 1990-91 on the area of 4.28 percent to total net sown area. The reduction of in area under pulses was registered for the following years. It has been reduced by 3.08 percent in 2010-11. The total decline of pulses from 1990-91 to 2010-11 is 1.2 percent respectively in the basin. Vegetables contributed 1.02 percent in study region. This crop is produced by farmers in order to fulfil their limited family requirements and very less percent products are sold in markets. Multiple cropping of vegetables is traditionally practiced where irrigation is available for a short period. Pune district has recorded 4.61 percent area in 2010 under vegetables whereas Maharashtra state shows 2.0 percent. The study region has shown increase under vegetable i.e. 0.22 percent. Horticulture crops like sweet lime, guava, pomegranate, chiku, grapes and bananas are grown. The farmers are less interested in fruit crops due to uncertainty of rainfall, water scarcity, unaffordable cost of saplings and being a labour intensive crop. There is less assurance in local market for fruits. The area under fruits increased by 1.98 percent in 2010-11 due to introduction of high yielding variety of fruits. Table-4.1 shows the temporal variations in the volume of change of fruits during the period of 1990-91 and 2010-11. The temporal variation reflects major changes with upward trend in the area under wheat, sugarcane, vegetables and fruits have increased their acreage in study region, but jowar, bajara, fodder crops, oilseeds and pulses have found decline area in this tahsil during study period (Appendix-F, G & H).

4.3 Spatial Distribution of Agricultural Landuse

The Baramati tehsil is an essentially agricultural dominant region involving 89 percent working force in agricultural practice. The crops namely, jowar, wheat, bajara, sugarcane, fodder crops, pulses, oilseeds and fruits are cultivated in the study region. The variations in areal extent under these crops are mostly depending on adaptation of improved varieties of seeds for sowing, local environment and traditional approach of farmers in the area under review. This study has attempted to assess the spatial distribution of agricultural crops in study area. Jowar, wheat, sugarcane, fodder crops, pulses, fruits, vegetables and other crops are mainly grown in study region on different soil types, amount of rainfall, irrigation and farmers decision (Appendix-H).
4.3.1 Distribution of Jowar

Jowar is a staple food in Baramati tahsil and it is widely grown throughout the region. The distribution of jowar is largely controlled by amount of rainfall and soil types. This crop is cultivated in Kharip and rabbi season occupying 23359 hectares (22.44 percent) area during 2010-2011. Fig. 4.6 reveals the spatial distribution of jowar in study area. The highest area under jowar is found at Morgaon (47.43 percent) lying in west part whereas lowest is observed at Kandaj (0.69) situated in south. From Fig. 4.6 40 to 60 percent net sown area is under jowar lying four villages, namely, Morgaon, Kololi, Jalgaon Kade Pathar and Rui located in west, north and central part of the Baramati tahsil. This part has inadequacy in irrigation. Sixty-five villages from this part has observed 20 to 40 percent of the net sown area under jowar. These villages consisting of two patches lying in north and central part in Baramati tahsil where soils are coarse shallow and medium deep soil. Less than 20 percent net sown area under jowar is identified in fifty-three villages distributed into south part of the study area (Fig. 4.5). These villages are identified in south part on deep black soil. Here concentration of sugarcane is supported by canal irrigation besides transport means.

Table 4.2 Agricultural Landuse of the Baramati Tahsil (2010-11)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Crops</th>
<th>Area (Hectares)</th>
<th>Percent to NSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jowar</td>
<td>23359</td>
<td>22.44</td>
</tr>
<tr>
<td>2</td>
<td>Wheat</td>
<td>16404</td>
<td>15.76</td>
</tr>
<tr>
<td>3</td>
<td>Bajara</td>
<td>19984</td>
<td>19.2</td>
</tr>
<tr>
<td>4</td>
<td>Sugarcane</td>
<td>22127</td>
<td>21.25</td>
</tr>
<tr>
<td>5</td>
<td>Fodder Crops</td>
<td>13229</td>
<td>12.71</td>
</tr>
<tr>
<td>6</td>
<td>Oilseeds</td>
<td>2964</td>
<td>2.85</td>
</tr>
<tr>
<td>7</td>
<td>Pulses</td>
<td>3209</td>
<td>3.08</td>
</tr>
<tr>
<td>8</td>
<td>Fruits</td>
<td>2062</td>
<td>1.98</td>
</tr>
<tr>
<td>9</td>
<td>Vegetables</td>
<td>1067</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Source: Revenue Record, Baramati Tahsil.

4.3.2 Distribution of Wheat

Wheat is cereal crop of rabbi season in Baramati tahsil. For maturity of this crop requires 110 to 140 days. This crop is grown on moisture retentive soil and moderate irrigation. Black fertile soil with fine loamy clay texture is suitable for high yield. 10° to
Fig. 4.5 Distribution of Jowar & Wheat
15° centigrade temperature is required in the beginning of growing period and 21° to 27° centigrade during the period of harvesting. This crop is cultivated in study area both on subsoil moisture and irrigation. It is generally sown in mid - November and it is harvested in the first week of March. Wheat covers 16404 hectares accounting for 15.76 percent to net sown area in study region. Fig. 4.5 displays wheat distribution in study region. The cultivation of wheat is carried in 117 villages. The highest percent of wheat is registered at Pawaimal with 46.3 percent to net sown area lying in south part near left Nira canal irrigation and lowest percentage of wheat is found at Baburdi (3.64 percent) located at north-west part of the study area. Wheat occupies fourth position after jowar sugarcane and bajara. Thirty to forty-five percent of net sown area under wheat is identified in eleven villages, namely, Nepat Valan, Malegaon Bk., Pandare, Yelewasti, Nirawaghaj, Khandobachiwadi, Waghalwadi, Murum, Sadobachiwadi, Kambleshawar and Shirasne located at south part of the study area. Fifty-one villages of wheat is registered 15 to 30 percent net sown area at south part and spread out northern part of the study region. Less than 15 percent of net sown area under wheat north and central part, where inferior soil and less irrigation facility are available (Fig. 4.5).

4.3.3 Distribution of Bajra

Bajra is cultivated in kharif season. It is drought resistant crop. This crop is grown on less amount of rainfall ranging between 25 and 45 cms. Bajra is confined to arid tract in study region on coarse shallow, black and lighter soil. For the growth of bajra, less amount of rainfall is required during its growing period. Bajra is sown on 19984 hectares accounting for 19.2 percent to net sown area in study region. The distribution of this crop is influenced by rainfall amount, terrain characteristics and soil types. The total growth period of this crop is three to four months. The spatial distribution of bajra is exhibited in Fig. 4.8. Sonakaswadi (47.55 percent) and Kololi (45 percent) has highest area under bajra in north and central part and lowest is wanewadi, Murum and Sadobachiwadi (0.00 percent) in south-west parts in study area. Fifteen villages has observed north and central part of 30 to 40 percent land under bajra. Twenty to thirty percent area under bajra have been registered in forty villages in study area (Fig. 4.6) in central and northern parts of the study region. Forty-four villages of Baramati tahsil having less than 10 percent area under bajra are spread into southern parts of the study area. The bajra cultivation in study region has wide spread and well distribution in all parts on medium and coarse shallow soil.
Fig. 4.6 Distribution of Bajara & Sugarcane
4.3.4 Distribution of Sugarcane

Sugarcane is a perennial crop. This crop requires clay to loamy soil containing high organic matter. It can tolerate moderate acidity and alkalinity. Soil rich in ‘Phosphorus’ and ‘Calcium’ are suitable for better juice quality (Das, 2000). The temperature between 20° and 26° centigrade is essential for its growth. The area under sugarcane is 22127 hectares in Baramati tahsil in 2010-2011. The highest area under this crop is registered at Shirasne lying in south (61.54 percent) whereas Sawal records lowest area (2.44 percent) locating in eastern part in the study area. Fig. 4.6 presents spatial distribution of sugarcane in study region. From this figure it is clear that more than 60 percent land under sugarcane is observed in three villages. These villages are identified lying in south on deep black soil. Here concentration of sugarcane is supported by canal irrigation besides transport means. Forty to sixty percent area under sugarcane has been witnessed in twenty-seven villages. These villages are located in south part of the Baramati tahsil (Fig. 4.6). Twenty-five villages have 20 to 40 percent area under sugarcane to net sown area. The distribution of these villages is found in south and northeast parts due to irrigation, both by canal and lift. Moreover, soil of this region is fertile. Less than 20 percent of net sown area under sugarcane is identified in 56 villages. These villages are spread into north and central part, where inferior soil and less irrigation facility are available.

4.3.5 Distribution of Fodder Crops

The fodder crops in Baramati tahsil include kadwal, green grass and maize. This crop is confined to north and southwest parts in study area having livestock dominance. These fodder crops are grown with jowar, barja, sugarcane or wheat. The highest percent under this crop is in Soratewadi village (32.89 percent) in south-west part and lowest is at Sonkaswadi (2.72 percent) in south-central part in study area. More than 20 percent area under fodder crop has been noticed in five villages and are in three patches. Among these, Supe, Pansarewadi and Karkhel villages are lying in north and Dhakale and Umbarwadi are in west part in Baramati tahsil (Fig. 4.7). Eighty-eight villages in study area have witnessed fodder between 10 and 20 percent to net sown area. This distribution is found in five patches. Out of these, five patches are located in west, north-west, southwest and two patch are in southeast and northeast part in the study region. Thirty villages in study region have less than 10 percent to net sown area under fodder crops. These villages are concentrated in dairy dominating area in this tahsil (Fig. 4.7).
Fig. 4.7 Distribution of Fodder Crops & Oilseeds
4.3.6 Distribution of Oilseeds

In 2010-11, Oilseeds have sown on 2964 hectares area accounting 2.64 percent of the total cropped area. Oilseeds consist of sunflower, safflower and groundnut. The highest percent area under oilseed is at Undvadisupe (10 percent) in north and lowest is in south in study area at shirasne (0.01 percent). More than 7.5 percent area under oilseeds is witnessed in four villages are located in northern part in study area. Thirty-seven villages have 2.5 to 5 percent oilseeds to net sown area. Seventy-six villages are widely grown in Baramati tahsil. The oilseeds are grown in Baramati tahsil are widespread (Fig. 4.7). These villages are Oilseed cultivation has less acrage due to larger area is under jowar, sugarcane, wheat and bajra in the study region. Oilseed are commonly grown as an inter-crop with jowar, bajara and wheat in study area.

4.3.7 Distribution of Pulses

Gram, tur, udid, moong, hulga, chavli, kulith are the major pulses in study area. These crops are not grown on a large scale in study region. It is cultivated on 3.08 percent to net sown area. The highest percent under pulses is found in Supe located in north (10.51 percent) and lowest having 0.01 percent at Nirawagaj. Supe, Undavadisupe and Palshiwadi villages in Baramati tahsil have observed greater than 5 percent land under pulses are distribution in north and central part of the study area (Fig. 4.8). Thirteen villages where pulses are grown on area of 6 to 9 percent. These villages located at north and central part of the study region. Less than three percent area under pulses are observed at hundred villages in widely spread out in study area. There is absence of this crop in south part in study area as sugarcane and wheat have larger acreage (Fig. 4.8).

4.3.8 Distribution of Fruits

Fruits include banana, grapes, chiku, guava, orange and mango are cultivated as a fruit crops in study area. Fruits cover 1.98 percent to net sown area in study region. The highest land occupied under fruit crop is registered at Dorlewadi in southeast (7.23 percent) and lowest of 0.42 percent at Morgaon in northwest. Eight villages having 4 to 6 percent land under fruit are in south part of the study area (Fig. 4.8). These fruit crops are taken by progressive farmers. Thirty-five villages have 2 to 4 percent area under fruit crop and these villages are all spread all over the region. Less than two percent land under fruits seventy-three villages are wide spread out in study area.
Fig. 4.8 Distribution of Pulses & Fruits
Fig. 4.9 Distribution of Vegetables
4.3.9 Distribution of Vegetables

Vegetable account for 1.02 percent of net sown area (1067 hectares) in study area. Brinjal, bhendi, (Lady’s Finger), radish, cabbage, cauliflower, methi, spinach, onion and bitter-gourd capsicum, chilly, rich-gourd, peas, ghewada, tomato and cucumber etc. are grown in study region. The distributional pattern of vegetable cultivation in study region is influenced by market, irrigation and road accessibility in Baramati tahsil. Vegetables being perishable commodity is cultivated near market in study area (Fig. 4.9) accounting for 1.02 percent to net sown area. Khandobachiwadi village has highest percentage under vegetable is in southwest (4.08 percent). Sawal has observed lowest percent under this crop in eastern part (0.02 percent). Twenty-seven in Baramati tahsil cultivating vegetables 1.6 to 3 percent to net sown area, lie in south part (Fig. 4.9) Eighty-six villages less than 1.5 percent area under vegetables show patchy distribution in study area. These villages have been identified into seven patches in widespread out of study area. Vegetable cultivation is mainly influenced by proximity of Baramati urban centres.

4.4 Conclusion

The spatio-temporal analysis of nine selected crops have been studied in this chapter. The study region, being the semiarid and drought prone, it does not show considerable fluctuation as far as the aerial extent of these crops are concerned. Among these crops, jowar shows during the study period (1990-91 to 2010-11) has steadily declined. The maximum hectarage of jowar declined in 2010-11 by 7.91 percent to total aerial extent of the study region. Towards north and central parts sugarcane percentage increases. Sugarcane wheat, fruits and vegetable crops shown increasing trend during study period. Increasing irrigation facility is the main cause of this change in the study region. Crops like Bajara, fodder crops, oilseeds and pulses are slightly decreasing in Baramati tahsil. The total reduced of bajra in Baramati tahsil is 3.12 percent from 1990-91 to 2010-11.

The variation in landuse relates with the extent of these nine crops with soil characteristics, irrigation, relief, proximity to the market places and accessibility. The relationship among these factors are well established through agricultural landuse analysis of the region. Jowar is identified as first ranking crop occupying 22.44 percent to net sown area. This crop is mainly concentrated in north and central part due to
inadequacy of irrigation, undulating topography and soil retentivity. Jowar acreage have been found decreasing trends towards north as sugarcane percentage increases. Sugarcane occupies second position after jowar is on 21.25 percent area. Wheat also has concentration in north on fertile, black and deep soil which favours the cultivation. Bajra is sown on 19984 hectares accounting for 19.2 percent to net sown area in study region. The distribution of this crop is influenced by rainfall amount, terrain characteristics and soil types. Fodder crop occupies 12.71 percent and its cultivation is found in areas of dairy farming and livestock raising activity developed in northwest, southwest and central parts in study region. Oilseed covers 2.85 percent. Fruits and vegetable contributes 1.98 and 1.02 percent in study region. It is grown close to Baramati urban market places both local as well as surrounding market centres. Crops like pulses occupy 3.08 percent in the study region. It has been noted that among all the factors, soil, irrigation facilities and proximity to the market centres, control the spatio-temporal distribution of crops in the study region.