CHAPTER IV

AGRICULTURE
LAND USE PATTERN

In agricultural geography land use is one of the important aspects for the study. The study of land utilisation is helpful to a Geographer, to an Economist, and to a Sociologist. Among the uses of land, its use for production of agricultural produces is most wide and very significant for the sustenance of humanity. One of the important problems, which India faces today is the increasing pressure of population on land resources. Land is limited, while population is continuously increasing.

The situation demands an immediate attention towards the conservation of our lands, particularly the best agricultural lands. There are millions of hectares of uncultivated and wastelands which needs to be brought under the plough to provide food to the people. Wherever, technological developments have taken place in agricultural operation, the productivity of land has increased but the country has still to go a long way ahead in raising the productivity of land (Tiwari, P.D., 1988).

CLASSIFICATION OF LAND USE

The land use at any given place and time results from the decisions based on the interaction of five groups of factors, i.e. environmental, technological, economic, social and political (A. Young, 1975).

Upto the year 1949-50 the land area was classified into five categories known as the five-fold land utilization classification:
1. Forest
2. Areas not available for cultivation
3. Other uncultivated land excluding the current fallows
4. Fallow land and
5. The net sown area.

This five fold classification was however, a very broad outline of land-use in the country and was not found adequate enough to meet the needs of agricultural planning in the country.

During the year 1948 the technical committee on coordination of agricultural statistics of the ministry of food and agriculture recommended an 11 fold land use classification replacing the old five-fold classification (ICAR, 1980).

1. Forests
2. Land put to non-agricultural uses
3. Barren and uncultivable land
4. Permanent pastures and others
5. Grazing lands
6. Miscellaneous trees crops and groves lands
7. Cultivable waste lands
8. Fallow land other than current fallows
9. Current fallows
10. Net sown area
11. Area sown more than once.

Sources of data

A tahsil is the smallest administrative unit in the area for all purposes. This unit-wise data has been taken for the present investigation. Averages of three years agricultural data for 1983, 1984, 1985 have been accounted for. The data is not always fully reliable.
But in the absence of any other statistical information the data supplied by the Agriculture Extension Officers of different tahsilas has been extensively used for present study.

GENERAL LAND USE

An attempt has been made here to work out the area and percentage of various uses of land which is divided into following major classes viz. the forest area, land not available for cultivation. Other uncultivated land, cultivable wasteland, fallow land, net sown area and double cropped area. The analysis and resulting figures of each category of land is given below enclosing different tables and plates to support the notes.

FOREST AREA

The total geographical area of the western Satpura range is hectare out of which 2,26,203.0 hectare or 11.72 per cent is the forest area.

Forests are very important in Indian agriculture because the limit of grain depends of forests as they force the clouds to drop rain. Indian agriculture mainly depends on monsoon rain only. Indian agriculture is called a gamble of monsoon. Ordinarily that area is called forest area where agriculture is not possible on account of thick growth of trees. Sometimes small patches of land are available in such areas. Forest area has mutual relation with geographical area. In 1983-85 it was 11.72 per cent of the total geographical land but as compared with the state average it is only 31.7 per cent it is very little.

In Bhaisdehi and Sendhwa tahsilas of the study
area there is the largest forest area which is respectively 25.81 and 19.50 per cent. Leaving Bhainsdehi and Sendhwa tahsils aside in the study area, other tahsils have a very small forest area. It is about from 3.56 to 11.04 per cent. Khargon tahsil has the lowest percentage which is about 3.56 per cent of forest area. It varies from tahsil to tahsil (Table-4.1).

**TABLE - 4.1**

**TAHSIL WISE DISTRIBUTION OF FORESTED AREA(AVERAGE 1983-85)**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Tahsil</th>
<th>Area under forest in hectare</th>
<th>Percentage of the total geographical area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Betul</td>
<td>52,080.77</td>
<td>9.30</td>
</tr>
<tr>
<td>2.</td>
<td>Bhikangaon</td>
<td>21,825.98</td>
<td>13.59</td>
</tr>
<tr>
<td>3.</td>
<td>Bhainsdehi</td>
<td>61,870.46</td>
<td>25.81</td>
</tr>
<tr>
<td>4.</td>
<td>Burhanpur</td>
<td>7,474.40</td>
<td>4.78</td>
</tr>
<tr>
<td>5.</td>
<td>Harsud</td>
<td>23,512.00</td>
<td>11.04</td>
</tr>
<tr>
<td>6.</td>
<td>Khandwa</td>
<td>13,318.96</td>
<td>4.33</td>
</tr>
<tr>
<td>7.</td>
<td>Khargon</td>
<td>5,473.33</td>
<td>3.56</td>
</tr>
<tr>
<td>8.</td>
<td>Multai</td>
<td>10,989.09</td>
<td>4.53</td>
</tr>
<tr>
<td>9.</td>
<td>Sendhwa</td>
<td>29,689.79</td>
<td>19.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,26,203.00</strong></td>
<td></td>
<td><strong>11.72</strong></td>
</tr>
</tbody>
</table>

**Land Not Available for Cultivation**

The high percentage of the total area lying as uncultivable waste is a significant aspect of the existing land use situation of the area under study. In this category, two types of land are included: (i) land put to non-agricultural uses, and (ii) barren and uncultivable waste land occupied by buildings, roads,
railways etc. About 11.52 per cent of the total land of the region is of this type, which is higher than the State average of 10.13 per cent.

The proportion of land not available for cultivation varies from 20 to 32 per cent in Burhanpur tahsil in the district of Khandwa. Khargon tahsil stands second in this respect and the land not cultivated there is 16.00 per cent. In the remaining tahsils, except Bhikangaon and Harsud, its per centage is 11.00. In Bhikangaon and Harsud tahsils its percentage is 4.56 and 7.45 respectively.

In these sections strong nature of land's bold relief and Barra soil exist in the Khandwa, Betul, Khargone districts where a sizeable part of the land is put to urban uses has high per cent (Table-4.2).

**Table - 4.2**

**Tahsil Wise Distribution of Land Not Available for Cultivation (Average 1983-85)**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Tahsil</th>
<th>Area in hectares</th>
<th>Percentage of the total geographical area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Betul</td>
<td>16,121.13</td>
<td>11.64</td>
</tr>
<tr>
<td>2.</td>
<td>Bhikangaon</td>
<td>7,274.16</td>
<td>4.56</td>
</tr>
<tr>
<td>3.</td>
<td>Bhainsdehi</td>
<td>25,504.54</td>
<td>10.64</td>
</tr>
<tr>
<td>4.</td>
<td>Burhanpur</td>
<td>31,764.72</td>
<td>20.32</td>
</tr>
<tr>
<td>5.</td>
<td>Harsud</td>
<td>15,864.00</td>
<td>7.45</td>
</tr>
<tr>
<td>6.</td>
<td>Khandwa</td>
<td>36,737.19</td>
<td>11.96</td>
</tr>
<tr>
<td>7.</td>
<td>Khargon</td>
<td>30,955.71</td>
<td>16.00</td>
</tr>
<tr>
<td>8.</td>
<td>Multai</td>
<td>27,199.68</td>
<td>11.22</td>
</tr>
<tr>
<td>9.</td>
<td>Sendhwa</td>
<td>16,121.13</td>
<td>10.58</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2,22,785.00</td>
<td>11.52</td>
</tr>
</tbody>
</table>
OTHER UNCULTIVABLE LAND

This sort of land includes permanent pastures, cultivable wastelands and other scrub jungles, excluding cultivated lands. All grazing lands are common land under trees, land which are cultivable but are not cultivated etc. come under this category. Net sown area can be soil conservation. Total area under cultivated lands of the study region is 10.28 per cent. The proportion of other uncultivated land varies markedly in different parts of the region.

The per cent of this type of land is the highest in Khargon tahsil, being 17.94 per cent. In Harsud tahsil it is 16.59 per cent. In the remaining tahsils the per cent of this type of land varies from 2.00 to 10.50 per cent (Table-4.3).

NET SOWN AREA

From social and economic point of view Net Sown Area is of utmost importance. High percent of net sown area indicates now the people are expert in cultivation and how much they are attached to agricultural activities. Their skill in agriculture is also expressed by it.

Along with it, this also expresses the level of economic development of that area. It also makes clear the pressure of population on net sown area. It is made clear how many people solely depend on the resources of land. The low percentage of net sown area indicates pressure of the population on natural resources. Generally by limits of net sown area of any region depends on and is decided by three factors. They are as follows:
TABLE - 4.3
TAHSIL WISE DISTRIBUTION OF OTHER UNCULTIVABLE LAND
(AVERAGE 1983-85)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Tahsil</th>
<th>Area in hectare</th>
<th>Percentage of the total geographical area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Betul</td>
<td>28313.49</td>
<td>10.50</td>
</tr>
<tr>
<td>2.</td>
<td>Bhainsdehi</td>
<td>19844.09</td>
<td>8.27</td>
</tr>
<tr>
<td>3.</td>
<td>Bhikangaon</td>
<td>28605.52</td>
<td>17.94</td>
</tr>
<tr>
<td>4.</td>
<td>Burhanpur</td>
<td>4342.04</td>
<td>2.77</td>
</tr>
<tr>
<td>5.</td>
<td>Harsud</td>
<td>35324.00</td>
<td>16.59</td>
</tr>
<tr>
<td>6.</td>
<td>Khandwa</td>
<td>26980.23</td>
<td>8.78</td>
</tr>
<tr>
<td>7.</td>
<td>Khargon</td>
<td>14657.79</td>
<td>5.57</td>
</tr>
<tr>
<td>8.</td>
<td>Multai</td>
<td>31748.02</td>
<td>13.10</td>
</tr>
<tr>
<td>9.</td>
<td>Sendhwa</td>
<td>9087.83</td>
<td>5.96</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>198900.00</td>
<td>10.28</td>
</tr>
</tbody>
</table>

In the study region, the nature of land, characteristics of soils, availability of water for agriculture, socio-economic status of farmers and population pressure on land resources are the main factors which have influenced the proportion of net sown area. Among these various factors the characteristics of soils and availability of water for agriculture have prime importance in the study region (Siddiqui, 1973). About half of the geographical area is net sown which is higher than that of the State average of 41.8 per cent and slightly higher than that of the national average of 45.78 per cent. The proportion of net area sown varies markedly in different parts of the region. It ranges between 70 and 60 per cent in Khandwa tahsil. The lowest percentages is of Bhainsdehi tahsil. In other tahsils
TABLE - 4.4
TAHSIL WISE DISTRIBUTION OF NET SOWN AREA
(AVERAGE 1983-85)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Tahsil</th>
<th>Area in hectares</th>
<th>Percentage of the total geographical area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Betul</td>
<td>169639.00</td>
<td>62.94</td>
</tr>
<tr>
<td>2</td>
<td>Bhensdehi</td>
<td>127741.94</td>
<td>53.29</td>
</tr>
<tr>
<td>3</td>
<td>Bhikangaon</td>
<td>95832.53</td>
<td>60.11</td>
</tr>
<tr>
<td>4</td>
<td>Burhanpur</td>
<td>109757.69</td>
<td>70.21</td>
</tr>
<tr>
<td>5</td>
<td>Harsud</td>
<td>132785.00</td>
<td>62.37</td>
</tr>
<tr>
<td>6</td>
<td>Khandwa</td>
<td>216870.04</td>
<td>70.60</td>
</tr>
<tr>
<td>7</td>
<td>Khargon</td>
<td>125152.20</td>
<td>64.69</td>
</tr>
<tr>
<td>8</td>
<td>Mulai</td>
<td>163247.10</td>
<td>67.36</td>
</tr>
<tr>
<td>9</td>
<td>Sendhwa</td>
<td>95150.40</td>
<td>62.49</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1236173.00</td>
<td>63.94</td>
</tr>
</tbody>
</table>

FALLOW LAND

The term fallow is apply to land not under cultivation at the time of reporting but which had been sown in the past. The duration of the period (for which a land is said to remain in fallow) is different for different states. Fallows are divided into two categories. (i) Fallow land which has not been cultivated for 2 to 5 years, (ii) current fallow which was not cultivated for one year only, i.e. the current years keeping land fallow is the consequence of the characteristics of soil viz. its productivity, moisture retentive capacity, intensity of irrigation, pressure of population, size of holding and the financial position of the cultivators. The reason for keeping such lands fallow may be one of the following: (a) poverty of cultivator,
(b) inadequate supply of water, (c) malarious climate, (d) drying of canals and rivers and (e) un-remunerative nature of farming.

**TABLE - 4.5**

**DISTRICT WISE DISTRIBUTION OF FALLOW LANDS (1984-85) UNIT THOUSAND HECTARE**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>District</th>
<th>Current</th>
<th>Old</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Betul</td>
<td>35.4</td>
<td>28.2</td>
<td>63.6</td>
</tr>
<tr>
<td>2.</td>
<td>Khandwa</td>
<td>9.7</td>
<td>7.2</td>
<td>16.9</td>
</tr>
<tr>
<td>3.</td>
<td>Khargun</td>
<td>9.0</td>
<td>5.3</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>54.1</strong></td>
<td><strong>40.7</strong></td>
<td><strong>94.8</strong></td>
</tr>
</tbody>
</table>

Source: Commissioner of Land Records

Total area under fallow lands of the study region is 9.48 per cent which is higher than the average of State (4.21 per cent) and slightly higher than the national average of 7.80 per cent. Out of the total fallows 3.15 per cent are current fallow lands which are not under crops for one year (Plate-11).

**Cropping Pattern**

The cropping pattern of the region is different from that in other parts of Madhya Pradesh. A major portion of the population is engaged in subsistence type of agriculture and their primary purpose is to satisfy their hunger rather than to produce crops for other purposes. Major portion of the total cropped area of the region under study is devoted to food crops and the commercial crops occupy a small area.
The environmental conditions in the region vary from place to place and they gradually influence the cropping pattern and the yield of the crops, particularly the monsoon soil characteristics and relief features determine the intensity of cropping. The influence of the monsoon on the cropping pattern in vary dominant with the result that the total cropped area about 62.0 percent is under kharif or rainy season crops. In the region, whatever may be the type of soil or the amount of rainfall, the domain of foodgrains in the cropping pattern is everywhere obvious.

As already indicated Jowar is the most important crop in the area. It alone covers 30.22 percent of the total cropped area. Wheat is the second important cereal occupying nearly 10.31 percent of the total cropped area (TCA). Other cereals cultivated in the region are maize, bajra, barley and kodo-kutki, but these together occupy only 16.8 percent of the total cropped area.

As a group, pulses account for 9.37 percent of the total cropped area. Among pulses Gram occupies 8.67 percent and is the most important while masur and urd are the second important pulses crop. And Teora, urd, gram and tuar pulses crops are also grown in only few percent in the area.

Oilseeds are the only cash crops of the region. These occupy 6.21 percent of the TCA. Rape seed and mustard are the most important cash crops and account for 3.3 percent of the total area under oilseeds. Other oilseeds cultivated in the region are linseed, soyabean, niger and groundnut. These together account for 0.59 percent of the TCA (Total cropped area).
DISTRIBUTION OF CROPS

CEREALS

JOWAR

Jowar is the first ranking crop in the western Satpura region. It occupies the largest proportion (30.22 per cent) 373650 hectares of the total cropped area in western Satpura region.

It is mostly taken as a kharif crop. It is a foodgrain of poor class of people and its availability to withstand even low rainfall and considerable drought has made it an important crop in such areas of the region. It is preferably grown on higher and poorer soils where other food crops like wheat and gram cannot be grown. Apart from its use as food crop its plants form a very good food stuff for the cattle. The largest area under jowar crops in Khargon district. It covers 13.79 per cent of the total cropped area and its production is near about 15000 tons per year.

Jowar is rarely sown as a single crop. It is mostly sown as a mixed crop either with Tuar or mung or sometimes with urd also. They are sown in July and harvested in November. The most critical period in their life span in from August to September when they require about 15 to 20 cms of rainfall. Scanty but regular rains during this period are very necessary for their proper growth and good yield. Average yield of Jowar is from 342 kg to 976 kg per hectare.

WHEAT

Wheat is one of the important cereals of cold weather crops in the region. As far as nutritional value
is concerned what occupies an important position. Wheat is the second rating crop in the region. It is a winter crop occupies the largest proportion (10.31 per cent) 127500 hectares of the total cropped area in the western Satpura range. What is one of the chief cereals of cold weather crop in the region. As far as nutritional value is concerned it attains an important position. Wheat requires winter temperature from 50°F to 60°F and summer temperature from 70°F to 80°F. In other words it grows best in a cool, moist climate and ripens best in a warm dry climate. Any comparison of these conditions with those found the western Satpura range already brings out the fact that they are far from being ideal of one can say the optimum conditions are available.

In the study area Betul district has the largest area under its cultivation. This area under what cultivation is 5.3 per cent of the total cropped area and its production is 75200 tons. Low proportion under what 4 to 5 per cent of total cropped area is in only the Khandwa district. The reasons for low proportion of wheat area may be low moisture retentive capacity of soils and high temperature, short winter and lastly but most important the suitability of these factors for cultivation of other crops.

RICE

For livelihood, more than 50 per cent population of the world is dependent on rice. In some aspects rice is more important than other cereals. It occupies the highest capability to satisfy the hunger of the people. All the densely populated areas are found in rice grown areas. Rice is one of the chief cereals.

Whole rice is a good source of some of the B
group vitamins particularly thiamine and pyridoxine. The riboflavin content in rice is low but the vitamin E content is quite considerable. This adds to its nutritional value to a great extent.

Rice is the third most important crop in the western Satpura range. It occupied 81200 hectares, about 6.56 per cent of total cultivated area in the western Satpura range in 1984-85.

Rice plant requires uniform temperature (30.1° to 32.2°C) and uniform wet (180- to 200 cm) climate throughout crop duration. These optimum conditions are available in the region under study.

The most dangerous pest of the rice plant is a kind of fungue called "Gandhi". It saps away the milk or juice of the fresh grain. It is most active from the second week of September to first week of October. The best way to save the crop from its harmful effects is to regulate the sowing period in such a manner as to avoid the period of coincidence of its infection and the period of the grain formation. The disease is generally caused by excessive moisture and temperature conditions. Most of the rice in the basin is grown by transplantation.

BARLEY

Barley is a grain crop which resembles wheat in many respects. Barley is another drought resistant rabi crop and also food crop for poor people. It occupies about 15866 hectares (7.79 per cent) of total cultivated land and ranks fourth in order of acreage under cereal crops. It is grown under the same physical conditions as are required for wheat. But it is much harder crop than wheat and can be successfully grown even in a more dry
climate and less fertile soils. Barley is usually sown mixed with wheat or gram. The distribution shows that in spite of its small percentage it is widely grown throughout the region. It is specially an important crop in the Khargon district.

MAIZE

So far as India is concerned, maize is generally used as food by poor people. As for its nutritional value is concerned it also supplies sufficient nutrition. Maize is grown in slightly less area than that of jowar and bajra. It is an important food grain of the people of the hilly area at least for a few months of the year.

Maize is sown generally after the first shower of the monsoon in early or middle of June. The crop matures in September. A long break in the rainfall or excessive fall and floods damage the crop on the other land waterlogging is equally harmful and thus the crop is never sown in low lying fields. Well drained and generally light soils are best suited to maize in preference to heavy clay or clayey loam.

Maize ranks fifth among cereals and millets and covers 332934.6 hectares or 5.08 per cent of the total cropped area. Maize is essentially a rich land crop but it can be grown even in poor soil. It is admirably grown on sandy loams which do not permit water to collect near its roots. Water logged conditions are quite harmful for this crop. In the region maize is a rainfed crop. It is generally sown with the outbreak of monsoon. Plants need plenty of moisture and high temperature of 60 to 70°F in their early stages of growth. The rainfall of 75 cm is supposed to be sufficient for its successful cultivation.
PULSES

Pulses are not only an integral part of Indian dietary but also they stand as excellent crop mixtures and forage and green manure crops in the fields. They are a cheap but a very good source of protein to the majority of the vegetarian population. In diets in which flesh foods are present only in small quantity, pulses are important as a source of protein, puse proteins, however, are of relatively low biological values because of the deficiency of the essential amino acid. However, pulse proteins are rich in lysine and they are, therefore, of good supplementary value to general diets. In the amounts consumed, pulses cannot be considered rich sources of minerals but they are rich in vitamin B, especially thiamine and folic acid.

**TABLE - 4.6**

<table>
<thead>
<tr>
<th>Pulses</th>
<th>Area in hectares</th>
<th>Percentage of the</th>
<th>Total area under pulses</th>
<th>Total cropped area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gram</td>
<td>45700</td>
<td>62.65</td>
<td>9.67</td>
<td></td>
</tr>
<tr>
<td>Tuar</td>
<td>67433.00</td>
<td>5.34</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>Urd</td>
<td>115866.00</td>
<td>9.37</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>Teora &amp; other</td>
<td>2321.62</td>
<td>22.64</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>231370.62</strong></td>
<td><strong>100.00</strong></td>
<td><strong>12.21</strong></td>
<td></td>
</tr>
</tbody>
</table>

In another way these are sown as building crops because they increase the soil fertility with their nitrogen contents left out in the soil as roots after harvesting.
URD

Urd is the first important pulse crop of the region. It is mainly a kharif crop also grown in rabi season. This crop occupies 115866 hectares (9.37) percent of the total cultivated area. It is mostly grown for human consumption and it is a very good source of protein. But sometimes it is also cultivated as fodder crop or a green manure crop.

When Urd is cultivated as a kharif crop it is sown in June and July and if taken as a rabi crop it is sown in October and November. Utera system of cultivation is followed if urd is taken as a rabi crop. In this system as has already been stated the seeds are scattered amidst the standing paddy when there is still one of or two inches of water in the fields usually 15 to 20 days before the paddy crop is harvested. Sometimes, it is also sown as a mixed crop with linseed when urd is taken as a sale crop. They yield is between 250 to 350 kg per hectare. But under the Utera system the yield is quite low only 150 to 200 kg per hectare.

TUAR

Among the pulses of the region tuar occupies the second position. It is an essential part of daily food of the majority of the well-to-do people. On an average it is cultivated in 67433 hectares or 5.45 percent of the total cropped area. It is usually grown mixed with other Kharif crops. Per hectare yield of tuar various from 700 to 800 kg in the study region.

GRAM

Gram is the third important pulse crop of the region. It is an important pulse crop of the region. It
is an important source of nutritive livestock food, especially, for drought force which takes a fair proportion of the produce. Its consumption as a human food is also significant alongwith food cereals and millets. Gram is a leguminous pulse used by all classes of people as a vegetable in green form and as a pulse in dry from. It is an important and cheap source of protein and being a legume it is also of considerable utility in enriching the soil productivity through the fixation of atmospheric nitrogen.

It occupies 45700 hectares (3.69 per cent) of the total cropped area when Gram is cultivated as a Rabi crop.

**TEORA**

It is also known as chickling vetch or "Khesari". It is the important pulse crop of the eastern part of the study region. On an average it is cultivated in an area of nearly 2371 hectares or 0.23 per cent of total area under pulses.

Teora is a Rabi crop requiring cool climate, comparatively it is a hard nature crop rarely affected by the excessive or deficient moisture conditions during its growing period. It is usually grown on dorsa and Kanhar soils which can retain moisture for a long time. Its special distribution therefore is similar to that of rice.

It is a good fodder crop and a common substitute for tuar and gram to the poor as a dal (pulse). The Government is discouraging its production as food because it cripples the legs of the eaters. However the landlords grow it to the labour in lieu of their wages. It
is harmful to human beings but it gives a good food stuff to the pet animals.

**OIL SEEDS**

A wide variety of oil seeds are grown in the western Satpura range as Kharif and Rabi crops. Traditionally oilseeds are classed as cash crops. Of course farmer sells oilseeds as he does other commodities also, but it is hard to accept that trade is the sole motive behind the production of oilseeds. Oil is an important ingredient of food in this country for which farmers produce some oilseeds. Important oilseeds are linseed, rapeseed, mustard, saesmum and groundnut crops. Total area under them is about 76865 hectares which forms only 6.21 per cent of the total cropped area.

**LINSEED**

Linseed is themost widely grown oilseed in the area. It is generally sown mixed with wheat and gram crops. it is used for lubricating the machines and for manufacturing of several articles, specially soap, hence exported to Kanpur, Nagpur, Jabalpur and sometimes to Botany. Linseed does best on both alluvial and clayey black soils. It requires about 50 cm of rain.

On an average it is cultivated in an area of nearly 4266 hectares or 0.34 per cent of total area under oil seeds.

**RAPESEED AND MUSTARD**

Rapeseed and mustard which require alluvial soils and comparatively cool and dry winters are chiefly grown in the western satpura range.
Rapeseed and mustard were separately sown an single crop in the near past, but now both are sown as mixed crops. Oil extracted is locally consumed by the villagers and its cakes are given to the milking cattle. Rapeseed and mustard are winter crops.

**SESAMUM (TILL)**

Sesamum is the third important crop of the region. It is generally sown mixed with jowar, bajra or other Kharif crops. It is grown throughout the region because of its wonderful adaptability to wide range and conditions as regards soils and climate. It occupies 0.59 per cent of the area under oil seeds.

Its produce out-turn varies from 270 kg to 380 kg per hectare depending on well drained fertile soils and is cosndiered to be a soil exhausting crop. It requires a warm and semi-arid climate (50 to 75 cm of rain and about 70°F temperature).

**LEVEL OF AGRICULTURAL DEVELOPMENT**

Agricultural development is an integral part of the rural development. The concept of rural development incorporates the provision of self sufficiency, self-esteem and socio-economic freedom of the rural people. It was realized that the economic base of the rural people must be strengthened. Majority of the rural elites are engaged in farming and therefore development of agriculture was given priority in the rural development planning. In the first five year plan it was sought to extend supplies of inputs services, finance and technical know-how to the rural elites through the National Extension Services under the community Development Programmes. To achieve the same goal target sector approach was adopted in the Third Plan
and emphasized the adoption of package programmes, relating to high yielding seeds, fertilizers, pesticides and credit in the selected areas with assured rainfall and irrigation. This package programmes brought the so-called 'Green Revolution'. This revolution once thought to be effective remedy raised productivity but for rural elites some special programmes, such as Small Farmers Development Agency (SFDA), Marginal Farmers and Agricultural Labourer Scheme (MFAL), Tribal Development Plan etc. to facilitate depressed people and depressed areas to increase their productivity.

The objective of these programmes and schemes was to make necessary inputs available to the farmers. Consequently provisions of inputs required to increase productivity have expanded enormously. As a result, output of crops has also increased. Though there are criticisms that these measures benefitted only certain areas and certain people; it can also not be denied that they have not only increased production to a great extent but have stabilized it. Therefore use of selected inputs rate of increase of output and present level of productivity have been used to assess the level of development spacial pattern of the use of these inputs are discussed below (Tiwari, P.D., 1988).

IRRIGATION

Water supply is a basic necessity for human life as well as for agricultural development. It has been accepted that among the inputs, essential for agricultural development, irrigation is indispensable. Its use is conditioned by several variables, while low rainfall and its vagaries necessitate the development of artificial means of water supply. It is also essential
to take maximum benefits out of the chemical fertilizers and to some extent high yielding variety of seeds on the other hand, the supply of water is conditioned by the nature of the rain, availability of water resources and above all socio-politico-economic situations.

The importance of irrigation to the pre-dominantly agricultural economy of the western Satpura, needs no emphasis. When irrigation is provided both land and labour are put to a profitable use throughout the year. It is a well established fact that agriculture which is the basic activity of the people continues to be a gamble with the monsoon. Western Satpura is no exception though the average total rainfall in the region is 700 ml which is quite sufficient for raising various crops, its uncertainty and the distribution results in poor harvests. Besides the rainfall from the monsoon winds is concentrated only in five summer months of the year and the remaining months are almost dry and therefore for successful cultivation supply of moisture through artificial means becomes a necessity.

Natural conditions certainly play a vital role in the performance of agriculture. Such human factors as a use of inputs also determine the agricultural productivity. It is presumed that basic among the development measures necessary for the transformation of the face of agriculture in this region is irrigation. Others are very closely associated with it. Further analysis intends to see the relationship between temporal and special aspects of irrigation and other developmental measures carried out in this region.
MEAN OF IRRIGATION

The main source of irrigation are wells, canals and tanks. But all these irrigation facilities are protective in nature. They have been mainly planned for the protection of Rabi crops from drought. In the years when rainfall is sufficient the farmers may not require irrigation water at all. Therefore, the total acreage under irrigation decreases during the years of normal rainfall. Well organised irrigation would not only lead to steady and high production but would also help in the increase of the area under cultivation. Irrigation is done with the help of canals or by lifting sub-soil water of the total irrigated area. More than 80.12 per cent is irrigated by wells and 7.88 per cent by canals, 6.04 per cent by tanks and remaining 6.04 per cent irrigated by other source. The well are major source of irrigation about 80.12 per cent.

Well

Well is the major source of irrigation nearly 163200 hectare are 80.12 per cent of total irrigated area. It is large scale adventure and is out of the reach of the individuals in all. In 9 Tahsils well is the first ranking source. Alongwith 124515 dug wells for irrigation purposes, 131 tube-wells have been commissioned up to 1984-85. Though there are still traditional methods of water lifting in remote rural areas, diesel and electric pump-sets have penetrated into interior areas. There were 23192 electric pumps and 13270 diesel pump-sets in operation in 1984-85. In recent years wherever electricity has been provided irrigation from wells and seasonal nullahs is becoming popular.
Canal

Next to well is canal irrigation inundating 7.80 per cent of the irrigated area nearly 15900 hectare or 7.80 per cent of total irrigated area. Further it cannot reach every point. The percentage of canal irrigation is the highest in the western part of the region. In Khargon irrigated area is more than 20.65 per cent of the total irrigated area which is served by canals.

Tanks

Tanks are utilised not only for irrigation but also for various needs of the village community. Tanks are permanent features of rural landscape particularly. Every village has one or more tanks of different sizes. In many parts of the region tanks are the only source of drinking water.

The topography in the major parts of the area under study is quite suitable for the construction of storage tanks. In these tanks water is collected during the rainy season and is used for irrigation. Tanks account for about 6.04 per cent of the total irrigated area.

MANURES AND FERTILIZERS

In the opening years of this century manure was little used except for rice and garden crops. In the cultivation of crops manure has become an established practice. Its utility being fully realised by the rice growers. However cow-dung was turned into fuel cakes except for rainy season, when it was not possible to use it as fuel. But even during this wet period the fuel benefits of the dung could not be realised as large
proportion of the cattle was away in the forest for grazing. Fortunately that position now no longer exists and the cow-dung is now turned into farmyard manure or compost.

The crops which receive the heaviest doses of fertilizers are rice, wheat and vegetables. Treatment of jowar, gram and masur with fertilizers is also being gradually made by the cultivators. Among the plant foods nitrogen and phosphorus are by far the most important for the soil of the region. At present farmyard manure is most commonly used by an average farmer. But unfortunately most of the cowdung products is used as fuel due to lack of firewood supply.

Fertilizers are in use for more than last 30 years. Nitrogenous fertilizers in the form of ammonium nitro and phosphatic fertilizers in the shape of superphosphate are commonly applied.

On an average 21.65 kg of fertilizers (nitrogen, phosphate, potash) are applied per hectare of cropped area in the western Satpura range which was more than the State verage (19.51) in 1984-85.

Among the plant foods nitrogen and phosphorus are by far the most important for the soil of the region. The following table gives the amount of nitrogen, phosphorus and potash used in the districts.

At present farmyard manure (F.U.M.) is most commonly used by the average farmers, but unfortunately most of the cow dung produced is used as fuel due to the lack of firewood supplies.
TABLE - 4.7
DISTRICT-WISE DISTRIBUTION OF FERTILIZERS USED
(in thousand tonnes)

<table>
<thead>
<tr>
<th>Districts</th>
<th>Nitrogen</th>
<th>Phosphorus</th>
<th>Potash</th>
<th>Kg/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betul</td>
<td>8.77</td>
<td>3.48</td>
<td>1.05</td>
<td>13.31</td>
</tr>
<tr>
<td>Khandwa</td>
<td>12.03</td>
<td>4.89</td>
<td>4.56</td>
<td>21.48</td>
</tr>
<tr>
<td>Khargan</td>
<td>19.43</td>
<td>7.67</td>
<td>3.08</td>
<td>30.18</td>
</tr>
<tr>
<td>Total</td>
<td>40.23</td>
<td>16.04</td>
<td>8.69</td>
<td>21.65</td>
</tr>
</tbody>
</table>

IMPROVED AGRICULTURAL IMPLEMENTS

The development of high-yielding crop varieties, the improved method of crop fertilisation and discovery of the application of new means of diseases and pest-control are the progressive biological techniques that increase the production per hectare. Of the second, but of significant value, is the utilisation of new source of mechanical power such as tractor, electric pumps, diesel pumps, tube-wells, iron plough and other more efficient iron based farm implements. The primary effect of improved mechanical techniques is to save labour, but at the same time they do contribute to the enhancing of yield per hectare by making possible more intensive cultivation, and the application of advanced biological technique. Because of this fact some of these implements have been critically examined here. Along with these capital-intensive improved technologies use of some traditional implements such as iron plough and means of transportation cart have also been discussed.
Tractor

Tractor is comparatively much costlier affair for poor peasants of this region. Only those farmers can afford tractor who own big land holdings. Thus the use of tractor depends mostly on the size of holdings. The average density of tractors per lac ke\(^2\) of cropped area is 190.37.

Electric Pump set

The irrigation machinery is also not spread uniformly throughout the region. There were 23192 electric pumps working in the study region in 1984-85. Number of electric pumps per lac hectare ranges from 53.30 in the region.

Diesel Oil Pumps

Similarly the availability of oil engines is not uniform throughout the region. There were 1327\(^n\) diesel oil pumps working in the study region in 1984-85. Number of diesel oil pumps per lac hectare ranges from 93.15 pumps in the regions. The present level of mechanisation indicates that still there is a vast scope to increase the number of pumping sets to irrigate more area through the mechanised means.

Bullock cart

There were 262161 bullock carts working in the study area in 1984-85. The mean of density of carts per thousand hectares of gross cropped area is 66.36. 84299 bullock carts are in Khargon, 73075 in Khandwa and 104787 in Betul district.