Chapter V

TYPES OF FARMING

Some farming types seem to have developed in the course of time in various parts of the district in response to the varied physical and cultural conditions. But almost all of them belong to the major category of 'Arable Farming'*. Almost the whole of the farmed land is arable. Moreover, most of the farming in this area is 'mixed farming'**. The arable farmers keep livestock for draught purposes and breeding. They have to distribute their resources and activities according to the needs of their families and livestock both. Since majority of them are small farmers trying to eke out their living from a few acres of land, they must necessarily produce a large number of articles to meet the varied needs.

The mixed farming owes also to the variety of local topography, soil and moisture conditions in the district. Most farmers having scattered land holdings find a varied micro-physiographical setting in which to work. Naturally, each one of them would grow various crops. The monsoonal climate is also responsible for mixed farming activity. By providing a division of the agricultural year into three harvest seasons, having differing temperature and moisture conditions, it has in a way forced mixed farming on the peasants, since for an all year round farming activity they

* Distinct from the pasture types, intermediate types and various types as classified for the Types of Farming Map of England and Wales. Stamp, L.W., Land of Britain: Its Use and Misuse. O.P. cit., pp. 296-314.
** Ibid, p. 302.
must arrange their crop-production according to the seasonal rhythm. They can hardly be 'specialized' except when they have very large farms organized on a commercial basis, though some of the small farms are more or less specialized, in the vicinity of larger settlements, where the urban markets seem to influence particular enterprises. A major distinction has, however, to be made between the 'wet' and 'dry' farming. But, in the 'wet' types difference must be brought out between the irrigated and unirrigated types, since in the khadars, Uda and Farnmar tract and the north-eastern tracts the cultivation is wet enough even without irrigation.

Thus, we may distinguish the under mentioned types of farming in this district:

**Type A. - Mixed Farming Based on Foodgrains & Feed Crops:**

The areas of this type are most extensive in this district. More than 70 percent of their land is devoted to foodgrains and fodder crops. Cash crops are few. A little sugarcane or oilseeds may be grown. A few oxen and breeding cattle and buffaloes are kept by most farmers. This type may be subdivided as under:

1. **Dry Farming Based on Foodgrains & Feed Crops:**
The areas of this sub-type comprise most of the bhurlands and areas of light soils where the porous sandy soils are water-thirsty but, irrigation facilities are not available.
They are too light and dry for unirrigated wheat. Hence millets, mostly bajra, in the kharif or barley in the rabi are the chief products. Normally, single cropping is the rule, kharif in one year and rabi in the next (cf. Bagarhpur Chhoiya Fig. 34). Efforts have to be made to conserve the moisture in the soil. The chief tract is a very large one embracing the southern half of Hasanpur tahsil, excluding the Ganga khadar tract, and the south-western section of Sambhal tahsil. The Central Amroha bhur and various extensions of bhur ridges in other parts of the Amroha tahsil are also included in this class. The soils of the western parts of Moradabad, northern part of Bilari and north-eastern and southern parts of Sambhal are also fairly light so that barley and bajra are of quite substantial importance. But, in these sections the provision of irrigational facilities has made it possible to devote more land to better crops. Mixed cropping is, however, the universal practice in such areas so that some oilseeds like groundnut are also produced.

(ii) Wet but Unirrigated Farming Based on Foodgrains and Feed Crops: The areas in this sub-type comprise most of the khadar areas, where silt is naturally wet and irrigation is unnecessary. Annual flooding in their lower levels, however, renders the production of kharif foodgrains impracticable so that in the kharif mostly fodder is raised. In the rabi, single wheat becomes the most important crop. Baranasi Fig. 47 and Bhagwanpur khadar in the Ganga khadar).
Comparatively large number of livestock are kept by the farmers in these tracts and a part-time or spare time cattle rearing is their additional occupation. Some natural grass is available in the khadars throughout the year so that it costs less to rear animals there. This is also partly true about the scarp villages lying on the sides of the river valleys e.g., Chaki Khera. In the khadars a little sugarcane and rice are also grown everywhere.

In the Udla and Tajmar tract, owing to the annual flooding from water coming down the neighbouring bhurlands and due to the Udla phenomenon, the soil remains almost wet throughout the kharif and rabi seasons. Very little irrigation is needed and that, too, only in the higher portions of the area. Rather insufficient drainage becomes problem, sometimes, wheat is the most important crop there, too. Mixed cropping of various grains, pulses and groundnuts is carried on in the kharif season in order to ward off against a total loss of the harvest. Double-cropping is also of quite substantial importance. A little sugarcane and oilseeds such as groundnut are also grown. Sugarcane is crushed locally. In the northeastern sections of the district, where the receipt of rainfall is 40 inches or more per annum, the farming is also of this very type. Wheat alone or mixed with gram is the predominant crop but rice also acquires a high position owing to the wide clayey depressions in both the uplands and the lowlands. Mixed cropping and double cropping are common. Some
land is devoted to feed crops and each farmer keeps a few livestock. Some sugarcane is also grown for local crushing, mostly.

Type B. - Irrigated Mixed Farming based on Foodcrops & Feed:

(i) This type of farming is found extensively throughout the Central uplands and locally in the bhurlands and northeastern tracts. Its main distinguishing feature is the role of irrigation, without which most of these areas would have dry farming. Irrigation is available from tube-wells, masonry wells and canals. Wheat alone is the chief irrigated foodgrain crop. Feed crops are unirrigated as a rule, excepting a little berseem and lucerne. A little irrigated sugarcane is also grown while in the mixed crops, oilseeds also have a share. But, these crops hold a minor position.

(ii) In the vicinity of sugar mills or in belts served by roads and railways along which sugarcane can be transported to the mills, while wheat alone is the main foodgrain, sugarcane becomes quite important. It is rotated with wheat usually. Fertilizers and manures are freely used in the sugarcane fields. Medium land holders are usually devoted to this type of farming in the situations mentioned above. They keep a few livestock too so that some feedcrops are also raised though mostly without irrigation. This type of farming is becoming quite popular since the establishment of some lower Cane Crushers, which are just miniature sugar
mills. They serve as local nuclei fostering the cultivation of sugarcane near their sites so that the medium and small farmers also feel tempted to make some cash by devoting a part of their land holdings to sugarcane.

Type C. - Mainly Cash Cropping based on Sugarcane:

(i) The larger land owners in the district are devoted to sugarcane cultivation for cash earning. They may be supplying the cane to the sugar mills or they may be consuming it in their own lower Cane Crushers. Each one of them usually possesses or manages about a hundred acres of land, owns or contracts a power crusher and maintains a tractor, a trolley, a tubewell and a motor bike or a car. He is a business-minded farmer. He uses the latest techniques and much fertilizers to increase the yields (both per acre and per capita) of his farm. Further, he purchases the products of other farmers, to whom he gives loans, in most cases. He keeps abreast of the market trends and organises his output accordingly. But, such farmers are not many. They can be counted on fingers. Fig. 41 shows one such farm in Bahadurpur. Wheat is usually rotated with sugarcane in such farms and that is also meant mostly for the markets.

(ii) The sugar mills themselves own many acres of land where they carry on the monoculture of sugarcane for supply to the mills. This arrangement seems to be necessary
to regulate the supplies of cane should other farmers fail to maintain the same as desired. Irrigation is done by tube-wells and the production of sugarcane is conducted along scientific lines.

Type D. - Mainly Cash Crop Farming based on Potatoes, Fruit and Vegetables:

(i) This type of farming is localised in the vicinity of larger settlements. The main areas are around Sambhal, Amroha, Chandausi, Moradabad, Kundarkhi, Ilari and Hasanpur. In the tiny holdings of these areas highly intensive cultivation is carried on. Foodgrains and sugarcane have little place therein. Potatoes and other root vegetables, green vegetables, fresh fruit, chillies, condiments, tobacco and, sometimes, flowers are the features of such areas. Almost all land is remarkably fertilized in this type. Irrigation from kacha wells, masonry wells and tube-wells is commonly done. Usually more than one and sometimes more than two harvests are raised annually from each piece of land. Most of the work is done by small implements in hand. Wheat and other farm crops may form part of the rotations. But, the main interest of the farmer is the cultivation of potatoes, vegetables and fruit. The land values and rents are extremely high and the value of output per acre is also high. In many of these localities, extension of settlement is progressing (see Figs. 45 & 46).
This type of farming may be termed as 'Market Gardening'.

(ii) *Falez* Farming: This is a special type of farming found in the khadars particularly in those of the Hamganga and the Ganga rivers. After the flood waters have receded, i.e., in the dry winter season, the silts left above the low water channels are cultivated by the Falez farmers. They produce melons and vegetables which are ready for harvest in the early summer season. The most important area lies in the Hamganga valley adjacent to Moradabad town. It caters to the town market so that cheap and fresh vegetables are abundantly available there throughout the winter and early summer seasons. Ganga khadar specializes in water melons owing to its distance from larger towns. The large sized water melons get ripe in the summer season and are transported to distant markets.

(iii) Orchard Farming: Fruit orchards and nursery gardens are found adjacent to all the larger towns, i.e., Moradabad, Amroha, Sambhal, Chandausi and Hasanpur (Fig. 45 and 46). Suburban Amroha, in particular, concentrates on mangoes, although near every large settlement there are considerable mango and other mixed orchards. Other large settlements such as Naugawan Sadat, Dhanaura, Lachhraon, Gaipura, Bilari, Kundarkhi, Bhojpur, Thakurdwara etc., also have some orchards where fruit production seems to be one of the chief aim of the market gardeners. But, very few of the orchards are scientifically maintained. The farmers are only traditional gardeners.
In the Hamganga valley to the south of Moradabad town the farmers seem to be responsive to the town demand. They grow a variety of crops in ratios of considerable substance. In sample villages Birpur Baryar and Machharya, for example, some farmers produce much jowar. In Birpur Baryar like Daulat Bagh some produce much tender maize. The fodders go to feed the cattle which are kept by milk-suppliers living near the town. These milk vendors are not farmers. They purchase the feed crops for their livestock. The same practice is followed by some milk vendors living in the rural areas but supplying milk to the towns. Some private persons also keep cattle at their residence and purchase the feed crops from the market. Thus, fodders are grown near the larger settlements for the 'urban' cattle. But, other farmers grow other foodgrains, sugarcane, etc. Some more are devoted to vegetables, fruit and potatoes. This diversity of farming and the development of specialities have been encouraged by the influences of the urban demand, of soil diversity, etc.

In addition to the above-noted types of farming some land is also devoted to the following activities, though they do not belong to the arable land.

(a) Singhara Farming: 'Singhara' or water-chestnut is grown in the rainy season in ponds near all large
settled. There are extensive singhara ponds in the
south-west of Moradabad, where it is regularly cultivated.
Similarly, near Bilari and Sambhal large ponds are maintained
for singhara farming. Huge quantities of singhara are
produced and exported to distant towns, besides consuming
some of it locally.

(b) wastelands and marshes: Wastelands are everywhere utilised for grazing livestock on seasonal pasture.
Some areas of marsh occur along the margin of the Hasanpur
bhum and in the east of the Ganga khadar. Seasonal marshes
are also formed after the recession of the floods in parts
of the Ramganga khadar. In such areas cattle are reared,
the farmers living in the settlements on the adjoining
higher levels. The adhek villages, usually, have a part of
their land in these marshes. On their margins sugarcane,
rice and, sometimes, jowar may be cultivated in favourable
seasons.

Factors Affecting the Localization of Farming Types:

In the first instance, the precipitation effectiveness and the availability of irrigational facilities are
the basic factors determining the possibility of farming
types. Thus, we find dry farming of foodgrains and feed
crops in the bhur lands. Unirrigated but wet farming of
these things is found in the khadar areas, in the Udla
and Panmar tract and in the humid northeastern parts of
In all these areas the moisture content of the soil remains always higher than that found in the first type. The difference is evident in the nature of crops and in the possibility of double cropping. Where the light soils remain water-thirsty but irrigation is available the farming activity is geared round the nature of the facility of irrigation which affects the nature of crops as well as that of the cropping practices. Where the soils remain over-saturated always and marshes occur, arable farming becomes impracticable so that marshland is devoted to livestock rearing. Where rainwater stands in ponds for some months after the monsoons singhara farming is carried on. Locally the soils and topographical differences also create variation in farm types. Thus, light soils and a sloping ground, are suitable for only dry farming of foodgrains and feed crops. But a level piece of land with finer or heavier soils permitting irrigation may be better devoted to other types of farming. Of quite a great significance in determining the types of farming in this area, however, seem to be the cultural factors such as the closeness of a sugar mill, a settlement site, facility of transport, urban demand, size of holding, capacity of the farmer to invest and his know-how, etc. The skill of the farmer is a great factor since in the same locality one farmer might use his farm in a particular way and another in a different way, if equal resources are provided to both of them. The regional aspects of farming types may
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1. Wheat alone
2. Wheat mixed with Barley, Gram
3. Barley alone & mixed with Gram & Peas
4. Gram
5. Peas
6. Bajra alone & mixed
7. Jowar
8. Rice
9. Maize
10. Urd
11. Sugar cane
12. Vegetables
13. Fruits
14. Masur
15. Moth
16. Chillies
17. Groundnut
18. Cotton alone & mixed

EACH CROP AS PERCENTAGE OF TOTAL CROPPED AREA IN SAMPLE VILLAGES

FIG. 48
further be clear from the crop associations, which are discussed in the following pages.

**Crop Associations:**

Fig. 48 shows the crop associations found in the sample villages*. Even a cursory glance at this map brings out the great difference found in the crop associations of various tracts. Evidently, there must be a good deal of variety in the crop associations found in various parts of the district, owing to the influence of various physical and cultural factors. Similarly, the relative order or the positions of the various crops in the crop associations must vary in different cases. The relative importance of each crop, as shown by the percentage of the total cropped area (of each village) owned by the crop, must also vary considerably. Moreover, the extent of irrigation used in various crops also differs much. But, the villages situated in similar situations do not show much difference in their crop associations. Thus, there seems to be a regional basis of the distribution of crop associations and the following account aims at making this basis clear to some extent.

**Crop Associations of the Ganga khadar**

In the Ganga khadar, represented by Matena old, Metena new (Fig. 47) and Bhagwanpur khadar, wheat is the

*The foremost six crops of each village have been taken into account for the preparation of this map. These crop associations, are however, derived from a long list of eighteen crops as shown by the index of the map.*
most important and the foremost crop. It is all unirrigated. Sugarcane (predominantly unirrigated), maize, rice and bajra occupy the next three places in the crop associations* with a degree of variation as regards their order in different villages. The remaining two places in the crop associations are filled by rice, barley, peas or wheat mixed, all unirrigated. But the combined acreage of all other crops seldom equals the area under wheat alone. Evidently this condition owes to the precariousness of the kharif harvest, since the tract is flooded then. The fertile and moist silts left by the floods are suitable for the cultivation of single wheat on a large scale. The floods subside and the khadar becomes sufficiently dry by the end of October, when wheat is sown.

The possibility of bajra and maize in certain parts is due to the fact that the khadar is not all flat. There are some undulations owing to the uneven deposition of sand and silts and it is on the higher levels that some kharif is possible in the khadar. The choice of bajra or maize differs mainly with the local soil and moisture conditions, but, it also differs with the distance from the basti. Maize is invariably grown near the basti and if the village is unpopulated no maize will be grown. Thus, bhagwanpur khadar, which is an unpopulated village, has no maize. Instead it has bajra in the second place of its

* The percentage of the total cropped area, in the village, shared by each crop determines its respective position in the crop association of the village. The irrigated and unirrigated parts of each crop have also been shown on the map.
crop associations. But, both Matena old and Matena new which have small settlements, have some maize in their crop associations.

Some of the higher portions of the khadar are also devoted to barley alone or mixed with wheat in the rabi, since porous soil at these levels soon becomes dry after the rains and floods and are not suitable for single wheat. In the depressed parts, where the moisture stays longer than is required for the sowing of wheat, peas are sown late in the rabi season.

Sugarcane and rice are grown to some extent along the streams where they get abundant natural water supply but, they stand a risk of being washed away by the floods. Hence, their condition is precarious.

Remoteness from the larger settlements and lack of the means of communication preclude the cultivation of any crops which have a low storage value. The dry hot season cultivation is limited to water melons which like the sand of the khadar. But, they do not cover much area.

Crop Associations of the Harsganga-Gangan Khadars

The crop associations of the Harsganga-Gangan khadars are not characterised by the predominance of any one crop as we have seen in the Ganga khadar. But, either
jowar or wheat alone leads and is followed by the other crop with not much difference in importance. This feature owes to the fact that kharif has got equal possibilities in these khadars, particularly in the higher portions. It also shows that the higher levels of these khadars are quite suitable for wheat and jowar owing to their finer silts and moisture-retentiveness. In the third place, either maize or rice appears quite significant. Maize is possible at higher level and rice in the depressed parts, particularly where an oxbow lake has been reclaimed, e.g., in Machharya (Fig. 38). The fourth position goes to mixed wheat. Sugarcane occupies either the fifth or sixth position and the other position goes to the late sown rabi crops like peas and masur which are grown in some of the low level situations where dampness stays longer than the time for wheat sowing. Thus, in the Ramganga khadar, represented by Birpur Larya, the crop association is as noted below:

<table>
<thead>
<tr>
<th>Crop</th>
<th>% of the total cropped area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Jowar alone and mixed</td>
<td>28.08</td>
</tr>
<tr>
<td>2. Wheat alone</td>
<td>21.94</td>
</tr>
<tr>
<td>3. Maize</td>
<td>14.68</td>
</tr>
<tr>
<td>4. wheat mixed</td>
<td>12.46</td>
</tr>
<tr>
<td>5. Masur</td>
<td>4.79</td>
</tr>
<tr>
<td>6. Sugarcane</td>
<td>4.75</td>
</tr>
</tbody>
</table>

All crops are unirrigated, here, too. The predominance of jowar, and the high positions held by wheat mixed and masur make the whole difference from the crop associations of the Ganga khadar. But, the absence of rice
and gram, the predominance of jowar over all other crops and the cultivation of some sugarcane and masur give it an identity distinct from the crop association of the Thakurdwara uplands.

In the lower Gangan valley, represented by Machharya, the crop association is as under:

<table>
<thead>
<tr>
<th>Crop</th>
<th>% of total cropped area*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Irrigated</td>
</tr>
<tr>
<td>1. Wheat alone</td>
<td>0.72</td>
</tr>
<tr>
<td>2. Jowar</td>
<td>-</td>
</tr>
<tr>
<td>3. Rice</td>
<td>-</td>
</tr>
<tr>
<td>4. Wheat mixed</td>
<td>0.55</td>
</tr>
<tr>
<td>6. Peas</td>
<td>-</td>
</tr>
</tbody>
</table>

This crop association combines the features of the crop associations of the Ganga Khadar, Ramganga khadar and Thakurdwara uplands. In it, the first two positions are occupied by the same crops as in the Ramganga valley but in the reverse order. The fourth position is occupied by the same crop in each case. The relative importance of these crops in the two cases is almost identical. The main difference lies in the positions and importance of the crops in the third, fifth and sixth places viz., rice, maize, sugarcane, masur and peas. The proximity of the two situations seems to explain the closeness of the crop associations in the Ramganga and the Gangan khadars. But, the curious combination in Machharya of the main crops found in such contrasting areas as the Ganga khadar and the

*Figures belong to the year 1955-56.
Thakurawara uplands shows that there is a variety of topography, soil and moisture conditions found in this locality. The cultivation of jowar and maize here is mostly for fodder and fresh cobs of corn. During the dry hot season the cultivation of vegetables and melons is also carried on considerably, in this tract. It owes to the proximity of the large town of Moradabad, which needs much dairy produce and a variety in diet. Means of communication are well-developed here. A number of railway lines and roads pass through the Ramganga valley with some halts and stations even in the khadars. Railway station Kachharya serves the southern section of the khadars, where the two sample villages have been selected.

Although there is a lot of difference between the crop associations of the Ganga khadar and those of the Ramganga-Gangan khadars, yet, one thing is conspicuously common. It is that in both tracts all crops are almost wholly unirrigated. And this fact is true about all the khadars. It owes to the natural wetness of the khadar soils.

**Crop Associations of the Trans-Ramganga Tract**

In the trans-Ramganga tract, the crop associations are also characterised by the absence of irrigation. But, there it owes to the higher rainfall of the area (above 40" per annum). There, the first position in the crop associations is held by unirrigated rice. In the second position
wheat alone or mixed cores with not much less importance. The third and fourth positions are shared by gram and jowar; gram becomes more important in Thakurdwar uplands, where rice, too, is relatively more predominant than in the low-lands, where jowar and single wheat acquire greater importance. There is much double cropping of rice-gram and of jowar-wheat in this part of the district (cf. Bamnawala). Where wheat alone is in the second position, mixed wheat is in the fifth position and vice versa (cf. Tikhunti Fig. 39). The mixture of wheat in this tract is, usually, with gram. The sixth position is occupied by maize.

Thus, the crop associations of this tract are composed of foodgrains and fodder crops, which are moisture loving ones. Bajra is conspicuous by its absence. There are no peas or masure as the area is mostly well-drained excepting the clayey depressions, which are solely devoted to rice cultivation. The pull of the Auradabad town is no longer felt. The two sample villages have been taken from Tahsil Thakurdwara. The absence of sugar-cane in this crop association may also be correlated to the fact that the tahsil has been suffering from relative inaccessibility owing to the absence of any railway line and even of a pucca road and of a bridge over the Dhela nadi, which provided the great hurdle for communication and transport.

The crop associations of this tract are distinct from those of the khadars in that the kharif crops predominate, here, particularly rice, whose possibility is always doubtful in the
Khadars, where, therefore, the rabi crops predominate, the difference is most marked in the crop association of the Thakurdwara uplands (represented by Ramnawala). It is like this:

1. Rice, 32.50%
2. Wheat mixed, 16.49%
3. Gram, 14.21%
4. Jowar, 13.94%
5. Wheat single, 11.80%
6. Maize, 5.53%

All these crops are unirrigated. The difference from the crop associations of the Ganga and Kaviganga khadars is evident and points to a great contrast in the regional characteristics of the various tracts.

Crop Associations of the Central Uplands.

The crop associations in the Central bangar are conspicuous in three ways: First, irrigation plays a greater role in them than elsewhere. Secondly, wheat alone occupies the first or second position, mostly the first, in them and it is mostly irrigated. Only the suburban situations and dry or sandy situations show an exception to this rule. Thirdly, sugarcane (predominantly irrigated) generally occupies the second or third position in them. The diversity in physiographic conditions in various parts of these uplands is, however, reflected in the variety of crop associations found here.

(a) Crop Associations of the Katreh bazar: In the Katreh upland of Bilari (represented by Bahadurpur and Khabri Gandu) wheat and sugarcane, both mostly or wholly irrigated, predominate and occupy the first and the second positions in the crop associations respectively. The remaining four positions are held with much less importance by four

* Figures belong to the years 1957-58.
out of five crops: rice, jowar, gram, bajra and mixed wheat. Khabri Gandu has mixed wheat in the fourth position while Bahadurpur has gram in the fifth position. This is the main difference in the two crop associations. But the order and importance of other crops is also different in the two situations and reflects upon the micro-regional differences in the geographical conditions of the two situations. The katehr upland in the south of Sambhal represented by Aglia Kathair (Fig. 35), however, shows a marked difference in its crop association from those of the Bilari Katehr. Wheat alone, mostly irrigated, predominates and holds the first position, here also, but, the second position goes to bajra (unirrigated) and the third to maize (unirrigated). The fourth position is occupied by mixed wheat as in Khabri Gandu, but here it is mostly irrigated. Sugarcane holds the fifth position and with a much reduced importance in respect of the percentage of total cropped area in this village. In the sixth position peas appear. Thus, as compared to those of the Katehr Bilari, there are three new crops in the crop association of the Southern Katehr. The order and importance of crops other than wheat is also changed. It is, however, as one should have expected, since there is a sufficient distance between the two areas resulting in a difference in the rainfall and a difference in the distance from the sugar mill at Haja-ka-Sahaspur k.u., besides the differences of soil and moisture conditions.

In Fahladpur (Fig. 43) on the Sot nadi and characterised by the three hars: irrigated upland, slope and unirrigated khadar, sugarcane (mostly unirrigated) leads, wheat alone (mostly irrigated) occupies the
second position and bajra (all unirrigated) holds the third position. The remaining three positions are held by barley, peas and maize, respectively, but even their combined acreage does not equal the acreage of bajra, the third in the order. Irrigated wheat alone and irrigated sugarcane are mostly grown in the upland har, unirrigated sugarcane is grown in the khadar har while unirrigated bajra is grown in the slope har. The difference in crops owes to the physiographic controls, mainly the soil and moisture conditions, which differ in the three hars.

On the whole the crop Associations of the Katehr Bangar are characterised by

(i) a predominance of irrigated crops.

(ii) a predominance of irrigated wheat alone which invariably leads. The apparent exception in the case of Kahladpur is, infact, due to the presence of the khadar of the Jot Badi along which this village is situated. Owing to its khadar har, this village is able to add much unirrigated sugarcane to the irrigated sugarcane which is grown on its upland har and is normal to all parts of the Katehr Bangar.

(iii) The great importance of irrigated sugarcane, which owes mostly to the situation of the Sugar Mill at Haja-ka-Sahaspur which lies at the junction of two railway lines viz., the Moradabad-Chancausi railway line and the Haja-ka-Sahaspur - Sambhal railway line. Through a net-work of railways and roads this sugar mill commands almost the whole of the Katehr Bangar, excepting, some areas in the south of the Sambhal Tahsil. The crop association of Baglia Kathair represents
the remote areas where sugarcane is relegated to a minor (fifth in this sample) position and amarif foodgrains such as bajra and maize become quite as important as single wheat and mixed wheat. In the low lying parts, where dampness persists longer than the time for wheat sowing, peas are sown in such situations.

(iv) an unimportant position of rice, which is grown only where there are local depressions, which are double-cropped and devoted to grain in the rabi season as is the case at Bahadurpur.

(v) an insignificance of jowar which is grown for fodder but remains quite unimportant in the crop associations. Actually bajra, maize, leaves and refuse of sugarcane, etc. provide sufficient fodder in this tract. The animals are well fed, as some grains are also fed to them. Moreover, there is no large town like Moradabad which should exert any great pull for the dairy produce and for that sake on jowar fodder.

Thus irrigated wheat and irrigated sugarcane, acting as the leading crops make the whole difference in the crop associations of the Katel Rangar as compared to those of the khadars or the trans-Ranganga tract. The appearance of bajra and the absence or insignificance of rice and gram in its crop associations reminds one that he is moving south-westward into a relatively drier tract, where not only the soil moisture is lesser but also the soil texture is slightly coarser than in the north-eastern parts so that drought-resisting crops are necessary where irrigation is not carried on.
Crop association of the Udla and Panwar tracts:

Semli (Fig. 49) in the Udla tract shows the following crop associations:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Irrigated</th>
<th>Unirrigated</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Wheat alone</td>
<td>33.76</td>
<td>-</td>
<td>33.76</td>
</tr>
<tr>
<td>(2) Bajra alone &amp; mixed with Arhar</td>
<td>-</td>
<td>32.39</td>
<td>32.39</td>
</tr>
<tr>
<td>(3) Jowar alone &amp; mixed with Arhar</td>
<td>-</td>
<td>16.19</td>
<td>16.19</td>
</tr>
<tr>
<td>(4) Sugarcane</td>
<td>0.65</td>
<td>10.19</td>
<td>10.84</td>
</tr>
<tr>
<td>(5) Urd</td>
<td>-</td>
<td>2.66</td>
<td>2.66</td>
</tr>
<tr>
<td>(6) Cotton alone &amp; mixed with Arhar</td>
<td>-</td>
<td>1.31</td>
<td>1.31</td>
</tr>
</tbody>
</table>

Khaliqpur Kalan in the same tract also has the same two crops in the first and second positions respectively, though there is some difference in their importance and irrigated parts. There wheat alone is not wholly irrigated while bajra is comparatively much less important. The remaining four positions are held by sugarcane (all irrigated), mixed wheat, peas and jowar, respectively. Thus, mixed wheat and peas in this village and urd and cotton in Semli comprise the only conspicuous difference in the crop associations of the two situations.

In Nizam Nagla, another village of the Udla tract, three crops are common with Semli and three differ, viz. unirrigated groundnut, which holds the fourth position, peas which holds the fifth position and rice that occupies the sixth position.

Thus, like Katehr Bangar the Udla tract also has mostly irrigated wheat alone as the first crop in its crop associations. But, the second position is not occupied by sugarcane. It is held by either bajra or urd, both unirrigated, sugarcane comes in the third or fourth position. It is mostly irrigated as in the Katehr, but its importance is much reduced inspite of the fact that the Sugar Mills
at Amroha are not very far off. The reason for the reduced importance of sugarcane in this tract is found in the phenomena of water-logging and udla which characterise this tract and render it unsuitable for the production of good quality sugarcane. The same phenomena are responsible for the lack of the development of the means of communication, since water stands, for many days during the rainy season. The remaining three positions in the crop associations are held by three of the five crops, namely mixed wheat, peas, jowar, groundnut, rice and cotton. The choice depends upon the local topography, soil and moisture conditions. Groundnut is grown on the bhur, rice in the clayey depressions, mixed wheat on the light qumat soil and peas where dampness persists longer after the rains than is necessary for the sowing of wheat. Some cotton is raised on qumat soils close to the settlements.

In this crop association and that of the Katehr bangar two things are common, namely, the foremost position held by wheat alone and the importance of irrigation. Otherwise, there is much difference in the details viz. the positions of various crops and their relative importance. This difference owes mostly to the differences in physiography, i.e., the defective drainage of the udla tract and the consequent phenomena of water-logging and udla.

(c) The crop association of the inferior bangars:
This tract consists of areas of light and sandy soils. A distinction must, however, be made between the dry parts and such parts as have some irrigational
facilities. To the north of the Nather there is a wide tract of light dunet soils, but, there, facilities of irrigation from tube wells and from the western Ganges canal are available. To the north of the Udla tract also tube well irrigation has been extended considerably. But, the central marsha thar lacks the means of irrigation.

In these uplands the crop associations differ considerably in various parts depending upon the availability of irrigation or otherwise. Latifpur (fig.50) in the Ban-Gangan doab shows one variety. There, unirrigated bajra predominates and is followed by unirrigated barley. Wheat alone (partly irrigated) goes to the third position. The remaining three positions are held by wheat mixed, rice and urd, respectively. This crop association reflects the influence of the undulating topography of the tract, where a thar ridge protrudes from Bijnor side. The groundwater is also deep-seated (about 25 feet below ground level). A little irrigation has been possible from the western Ganges canal, which passes through its level portions.

The influence of the canal irrigation is, however, more clearly visible in the crop association of village Ahidmatpur (fig.51), a neighbour of Latifpur. Unirrigated bajra holds the first position, there as c, but it loses the predominance found at Latifpur. Mostly irrigated single wheat holds the second position and is almost as important as bajra, in respect of acreage. The third position is
held by all irrigated sugarcane. The remaining three positions are occupied by the insignificant crops of barley, urd and mixed wheat.

Thus where irrigation is available in these areas of light soils, although we find unirrigated bajra as the leading crop, yet it is usually followed by irrigated single wheat and the third position is held by irrigated sugarcane. But, where irrigation is less supplied, barley occupies the second position and wheat alone is relegated to the third position. In the remaining three positions are mixed wheat, urd, barley or rice, variedly. But, their combined acreage is not equal even to the third crop in the crop association of the different villages.

(d) Crop Associations of the Bhurlands: As regards the crop association of the dry bhurlands (represented by Lagarhpur Chholya Fig. 34), the most conspicuous thing is that all crops are unirrigated. In this feature, it compares well with the crop associations of the Khadars and Thakurdwara uplands. But, the difference lies in the crops. The foremost crop here, is barley and the second in order is bajra both of which are predominant. The remaining crops maize, moth, wheat and sugarcane are insignificant. Maize, wheat and sugarcane have been possible owing to the moisture in the bed of the Chholya nullah retained by the finer silts there. The actual bhurland is wholly covered by barley, bajra and moth. This crop association is typical by itself and reflects the adversity of both physical and cultural factors, in this tract. It lacks
both irrigation and means of communication. It has a very small settlement having a population of 112 persons (census 1951) only.

In the irrigated bhurlands and in the adhek villages (represented by Chaki Khera Fig. 52), which include a part of the bhurland and a part of the jhil or khadar tract lying at the foot of the bhur scarp, better conditions of moisture are reflected in the prevalence of sugarcane which occupies the first position in their crop association. It is partly irrigated and partly unirrigated. It is, however, closely followed by bajra and mixed wheat (both unirrigated) in the second and third positions, respectively. The remaining three positions are held respectively by wheat alone (partly irrigated) jowar and paddy (both unirrigated). The irrigational facilities are available here from tube wells. But, the possibility of unirrigated sugarcane is due to the khadar of the Bagad nadi lying at the foot of the bhurland. That various crops from bajra up to rice are found here owes to the variety of soil and moisture conditions found here.

**Crop Associations of the Suburban Areas**

In the suburban areas we find an altogether different type of crop association. It is characterised by an over predominance of vegetables and maize which occupy the first and second positions respectively. Vegetables are wholly or mostly irrigated but maize is unirrigated. Other crops included in the crop associations are jowar, wheat alone, barley, chillies, etc., but they are insignificant.
The basic soil and moisture conditions in these localities are identical with those found in the upland areas wherein they are situated, but the difference in the crop associations of the rural and suburban situations has arisen from the cultural factors, mainly the demands of the urban markets for vegetables and fresh cobs of corn, while maize fodder is relished by the dairy cattle, which supply fresh milk to the town dwellers. It also owes to the industry of the *bachbans* who are always busy with their hoes and have succeeded in turning the ordinary dumat and bhur soils into high class *bachhiana* and *gauban* soils, which yield more than one harvest in the year. The suburban situations (represented by Hauz Badesra and Dauat Bagh Mustehkam Figs. 45 & 46) have typical crop associations, in which neither wheat nor sugar-cane holds any importance. That these suburban areas situated at considerable distances from each other present almost similar crop associations, suggests that they form a group distinct from their neighbouring rural areas.

From the foregoing, it is clear that the various crops seem to have been doing well in different tracts owing to certain geographical advantages found for their cultivation. Physical factors such as soil texture and soil moisture, aridity or abundance of water supply from rain or rivers, microregional differences of drainage resulting in a well-drained bangar or an *udla* and *panmar* tract and
Topographical details like the upland, slope and depression, all influence the cultivation of crops. Similarly, the cultural setting has its influence on crop production. The cultural setting comprises the facilities of irrigation from canals, wells, tube-wells, etc., means of communication and transport, population structure and likings of the people, situation and nature of the industries, particularly those connected with the agricultural products, characteristics of the farming community, the economic and social conditions in which the tillers of the land are working, etc. Within various tracts, then, the cultivated crops show certain mutual associations, wherein certain crops have a relative predominance over the others. The groups of crops thus noticed are significant enough to identify the mutually differing tracts, since they reflect the collective effect of the physical and cultural factors working together and influencing crop production. Hence, we may divide the area into crop regions basing the division on the crop associations and the predominant crops found therein.

In the discussion of the crop associations of the district, these regions have already been clearly brought out, with a view to avoiding unnecessary repetition of the arguments the tentative crop regions of the district are, therefore, just named below. The names of the tracts have been based on the one or more leading crops of various tracts. Fig. 52 shows these regions on the map.

* This figure is based on the sample studies. The main crops of the sample villages have been attributed to the regions represented by these villages.
Crop Region               Corresponding Physiographic Tract
1. The unirrigated single wheat tract    Ganga Khadar
2. The unirrigated single and jowar tract   Ramganga-Gangaii Khadar
3. The unirrigated rice, grain, mixed wheat and jowar tract    Thakurdwara uplands
4. The unirrigated rice, single wheat, jowar and gram tract    Trans-Ramganga lowlands
5. The irrigated wheat and irrigated sugarcane tract    Katehr bangar
6. The irrigated wheat, unirrigated bajra and urd and irrigated sugarcane tract    Uda and Panmar tract
7. The unirrigated bajra and barley, irrigated wheat and irrigated sugarcane tract    North Central Bangar tract
8. The partly irrigated sugarcane and unirrigated bajra and mixed wheat tract    Northern irrigated bhurland and the sdhek tract
9. The unirrigated barley and bajra tract    Southern dry bhurlands
10. The market-gardening areas    Suburban tracts

Changes in the Crop Pattern

Reference has already been made about the changing pattern of different crops in their individual accounts. Cotton groundnuts, sugarcane, maize, savar, kodum, mandie potatoes and some vegetables have experienced greater change in their acreage. Inferior varieties of wheat and rice e.g., sathi rice have also yielded place to the superior ones. Indigo and opium, which covered 410 acres and 16 acres, on an average in the years 1878-81, are little cultivated now. Figs. 35, 44, 46, 50, 51, 52 and 54 show the

KHABRI GANDU
MAIN CROPS
1954-55

INDEX

1871 - 73

FIG. 54

(Source: Land Settlement Volume 1871-73)
nature of change in crop patterns. That these changes owe to
the cultural advancement in the area, i.e., the extension of
the knowledge of agricultural improvement, the progress of
irrigational facilities and the demand for better products,
is quite evident from a comparative study of these village
maps. Most of the change is found in areas where these
improvements have occurred mostly, e.g., at Chaki Khera,
Ahidmatpur, etc., Better quality crops developed at various
research stations of the country are being adopted gradually
by the farmers. The government is also keen to popularize the
same. It is now the main aim of the national extension scheme
to carry the lessons of agricultural research to the fields.
The economic factors such as higher prices for sugar and
wheat, are also playing their role in favour of the change.
The pressure of population demands larger yields of various
crops, early crops permitting double cropping and more of cash
earning crops such as sugarcane. The expansion of education
and a change in the taste of the people, particularly in
the urban areas, demand more vegetable and dairy produce. The
establishment of sugar mills has promoted the cultivation of
better quality sugarcane near them. The extension of the means
of irrigation, communications and transport has rendered
possible the stability of cultivation and specialization in
more suitable tracts. Since the abolition of zamindari the
peasants are also keen on increasing the volume and variety of
their output with a view to increasing their incomes.

But, there seem to be three main hurdles which
are hindering a greater change in the crop map. They are as
AVERAGE PER HEAD DAILY FOOD INTAKE

- Fish, Meat & Eggs
- Cheese, Veg. Oil, etc.
- Sugar & Jaggery
- Milk, Curd, Whey
- Vegetables, Fruit
- Pulses
- Foodgrains

ACTUAL

BALANCED

3000 Calories

Fig. 55
noted below:

(a) The smallness of the land holdings of the subsistence farmers who form an overwhelming majority in the district. They have to repeat the same pattern of foodgrains and fodder crops on their land to meet the basic needs of their families and livestock.

(b) Too much dependence on the foodgrains, particularly wheat and rice, by the rural population, whose diet is very much unbalanced as shown by Fig.55.

(c) The growing pressure of population, which demands a larger production of foodgrains first and anything else afterwards.

**Utilisation of Water**

The land under water, i.e., under rivers, streams, jhils, ponds, etc., has averaged 42,389 acres per annum in the years 1953-58. It is quite variable. In the year 1953-54, it amounted to 39,794 acres. Then, it gradually increased to 42,761 acres in 1956-57 but, heavier precipitation raised it to 46,139 acres in the next year. The amount of surface water and the extent of land under water is always greater during a cycle of wet years when more water is received from rainfall and floods for some years at a stretch. Conversely, towards the end of a dry cycle these must be lesser.

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* Cf. Balanced diet in the Appendix, and the account of the average daily food intake in the district in the Chapter on the carrying capacity of land. This figure is based on the same.

** Figures based on Sadar Qamungo's Milan Ahasras for the respective years.
XXI. Water Chestnut Blossoming in a pond near Moradabad
Owing to the pressure of population, the human encroachment on this type of land is not small. Every year a considerable part of it is brought under the plough. Thus, 8,697 acres or nearly one-fifth of the land under water was cultivated during 1954-55. Usually, such cultivation is limited to rabi and said when water has receded from some parts, but, in places, rice is sown in pools of ankle-deep water, e.g., the indi rice in the jhil tract of hasanpur. In other places, water-chest-nut (singhara) is grown in pools of deep water (Plate XXI) as already noted. Since the beginning of this century, when the land under water amounted to 47,952 acres, man has been quite successful in his efforts at snatching some of the area from water for cultivation e.g., at hauz ladesra (Fig.45) a large pond has been reclaimed mostly.

Moreover, these forty-two thousand acres of water surface provide sufficient scope for fish-culture in the district. On an average some three to four hundred persons depend on fishing for their livelihood, while the number of those who betake themselves to fishing as a secondary occupation is larger. For fishing people generally employ small meshed nets, wicker traps and baskets. The streams, jhils and the back-waters and pools left by the annual floods are regularly exploited. Rohu, gunch and many other fish are commonly found throughout the year. The mahseer is available during the winter months when it comes from the colder hill-streams. The Garga itself is not so much frequented but the Ramganga fisheries have a considerable value.
XXII. Livestock resting & Roaming in a Bhur waste

XXIII. Livestock Roaming in the Ramganga Khadar
The waste lands amount to very little in most cases particularly in the areas of stable cultivation. Thus of the sample villages, Bagla Kathair has 0.8%, Bhadupur 1.0%, Khadi Bagda 0.8%, Mungla Bagla 0.3%, Khaliqpur Kalan 0.4%, Latipur 1.6%, Radhupur 2.2%, Bemli 0.3%, and Badehra and Baulat Bagh Hamtekkas almost nil % of their total areas described as such. In such cases, the waste lands are insufficient for the better planning of villages in future.

The common needs of the peasants, such as, the threshing grounds and meeting places, even the weekly markets arranged in the rural side need the presence of certain open spaces in the vicinity of the village basti. Moreover, in the absence of any regular pastures and herding enclosures, they provide the most convenient places where livestock can stand and roam about (Plates XXII & XXIII). Hence, the waste lands have their own place in the economy of the rural life in this area, and they comprise a necessary item of land use. But in the precarious areas like the Khadar tracts and Khakurwara uplands they are considerable (cf. Figs. 11, 39, 47, 52) and may be reclaimed for cultivation.

**Trends of Waste Lands**

During the last one hundred years or so, the amount of waste lands has decreased considerably. Much of the old banjars have been reclaimed for cultivation. The following table gives some examples of

*In the older records 'wastes' included forests, grasslands and groves in addition to the unclassified 'banjar' known as other culturable waste. Now these things have been separated, but still proper classification needs to be done. The former zamindars also used to provide some banjar to the tenants.*
Reclamation of Waste Lands

<table>
<thead>
<tr>
<th>Sample village</th>
<th>Waste lands (acres)</th>
<th>Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1871-72</td>
<td>1940-41</td>
</tr>
<tr>
<td>Machharya</td>
<td>73.10*</td>
<td>30.43</td>
</tr>
<tr>
<td>Mateena low</td>
<td>113.60**</td>
<td>33.50</td>
</tr>
<tr>
<td>Mateena Old</td>
<td>112.90**</td>
<td>78.00</td>
</tr>
<tr>
<td>Pohladpur</td>
<td>72.08 /</td>
<td>7.27</td>
</tr>
<tr>
<td>Ramnawala</td>
<td>663.79 /</td>
<td>19.12</td>
</tr>
</tbody>
</table>

These figures show that people have reclaimed most of the waste-lands, in may places. Fig. 56 shows some samples of the recent reclamation of waste-land and extension of cultivation. But, on the contrary, waste land has increased in certain abadar villages owing to the evil effects of recent floods (Fig. 11). Thus Lirpur Baryar had 419.07 acres as banjar in 1871-72 reducing to 354.87 acres in 1940-41, but it was increased to 743.60 acres in 1956-56 / / owing to the devastation done by floods of the Banganga (Fig. 11).