CHAPTER XIV

CROP COMBINATION REGIONS

Fundamental to a comprehensive understanding of patterns of agricultural landscape is an analysis and description of the combinational association of the crops. It is also essential in the understanding of the geography of a single crop. Further, the identity of the crop-combination regions has not only a significance of its own but it is important for establishing the integrated and more comprehensive agricultural regions. The pioneering, but very definitive work has been done by John Weaver, who established crop-combination regions of the Middle West of the U.S.A. The formula, he evolved, has been applied to the Halwa region and except in two cases, the crop-combination regions have been established successfully. The formula has not worked well in areas where the first ranking crop far exceeds the second ranking crop in acreage. Secondly, it also fails in those areas where the acreage of several crops is very close to each other.

Because of a great similarity of crops in the combinations and a little range in the number of crops two modifications in the original map have been made in order to better recognize the broad combinations. At the first instance various crop-combination regions have been grouped taking into account the four leading crops of the Halwa. The crops are wheat, wheat-gram, gram, and cotton, 1. Weaver, John C., "Crop Combination Regions in the Middle West", Geographical Review, 44 No.2, 1954, 179-180.
and together they occupy 60 per cent of the annually cropped area while the acreage of these crops varies by a small range. Areas where above mentioned crops occupy the first four ranks are separated from those areas where either of the four is missing from those very ranks. These two broad divisions are the regions of first order (Region I and II). Second order regions are demarcated on a similar basis and are identified from the particular positions of the same crops up to a particular limit. At the third stage are the crop-combination regions based upon Weaver's formula.

REGION I.

This primary region covers Barnala, Moga, Faridkot, Bhatinda, Muktsar and Fazilka tahsils except the flood plain of the Sutlej. The soils throughout are fertile sandy loams but are dotted with sand-dunes. The major drawback in the area is the meagre amount of rainfall which for the year does not exceed 15 inches. Irrigation from the wells is also not possible because the water-table is very deep and the underground saline water is injurious to the plants. But the area has excellent canal irrigational facilities, having a network of minors, majors, distributaries, and branches of Sirhind Canal. Another important characteristic of the region is the bigger size of land-holdings. Because of the fertile soils, adequate canal irrigational facilities and more land at the command of the farmers, cotton, a highly rewarding cash crop, is most important. It ranks at the top in certain areas but nowhere below the second rank. Wheat,
wheat-gram and gram are the other three crops which occupy any of the first four places. Most commonly, where water is available in an adequate amount, wheat closely follows cotton and gram is at a lower place; but where the soils are comparatively less fertile and the amount of water is not adequate, gram and wheat-gram are more important than wheat alone. In years of less rainfall and small amount of water in the canals there is a reversal in the ranks of the crops. Whereas cotton and wheat will tend to come down, there is an upward shift in the gram acreage. These are the only four crops which are dominant; others, guara, barley-gram and bajra, have no comparison with any of the above four. The latter occupy mainly two types of areas. First, where the soils are too light for cotton and wheat, and second, which have no irrigation provision.

The first order region falls in two regions of the second order. I(a) is a small tract in the east while the second I(b) covers the southwestern parts of Ferozepur and Bhatinda districts.

I(a): Moga - Barnala Tract: This comprises of the Rohi circle of Moga and Barnala tahsil having a transitional character in the agricultural landscape. Because of a little more rainfall and irrigation from the wells, and further because of lesser number of sand-dunes many more crops can be grown here as compared to the areas towards the west. Thus crops which are practically absent in the Bhatinda - Ferozepur tract are grown here and a fine example is that of maize crop. Similarly chari, which requires more rainfall and less
sand dunes also falls in the combination. The other crops in the combination are wheat, wheat-gram, guara, cotton, bajra, and barley-gram. The dominance is of course of the rain crops because of their greater suitability.

I(b). Matinda—Nuktar-Philt: Covers Matinda, Faridkot, Sahraj, Nuktsar and Farilka tehsils except the flood plain. The physical characteristics of the region have already been discussed. More specific, this is a tract of light soils, of meagre rainfall and of canal irrigation. During the Kharif season, the canal water is utilized to the maximum for cotton cultivation and the remaining area is devoted to the inferior crops supported by meagre rainfall. The other crops in the combination are guara and bajra having a restricted acreage. Wheat, wheat-gram, and gram are the rabi crops with prominent positions in the combinations. The acreage under the various crops varies a good deal and three different combinations are established.

II(d). This covers the Rabi circles of Farilka and Nuktser tehsils together with Matinda and Sahraj. In this combination in addition to the four majors, barley-gram, guara and bajra are the other important crops. In the western half of this region there is a slight difference in the positions occupied by the various crops. The four major crops occupy the first four places. Because of greater amount of water available in the canals, cotton occupies the first rank and is followed by wheat and wheat-gram. But in Matinda tehsil because of lesser amount of water in the canals and more frequency of sand-dunes superior crops are somewhat restricted and gram has more prominence.
Beyond the fourth rank, the crops constituting or forming the combinations are the same because already most of the land is covered by the superior crops. Barley-grain in rabi, and wheat and bajra in Kharif are the crops in dry and less fertile areas and are the substitutes for wheat-grain of rabi and maize and churi of Kharif respectively.

1(h ii): Farkhot tehsil constitutes a separate crop-combination region with only four major crops which cover 75 per cent of the annually cropped area. Restricted supply of water from the seasonal canals has made wheat and cotton subordinate to wheat-grain and gram. Though most of the crops present in the surrounding areas are grown in Farkhot also, their importance is too small to be placed in the crop-combination.

1(h iii): Harler Kot revenue circle of Muktsar tehsil is the only unit where two crops, wheat-grain and gram, constitute a combination region. This is the area where crop diversification is the least. Cotton and wheat cannot be grown on a larger area without irrigation. As a result of restricted availability of water, Kharif acreage is very small and more than 50 per cent of the cropped area is sown in rabi season, that is, under crops which can do well with little moisture. The dominance of wheat-grain and gram can be judged from the fact that out of the annually cropped area 77 per cent is held by these two crops only.

REGION II.

Ambala, Patiala, and Ludhiana districts, Farsa, Sangrur and Malerkotla tehsils and the flood plain of
Fersepur District constitute the Region II of the first order. As mentioned earlier whole of this is united under a single head to differentiate it from the region I. Coming to the internal variations there are many tracts which differ in various respects from each other. In the northern and eastern sides because of fertile soils free from sand-dunes, more rainfall and irrigation, gram crop, which is the inferior-most among the four majors of the region, is replaced by some superior crop. In the southwest because of the clayey nature of the soils and absence of irrigation from the wells, one of the superior crops is replaced by an inferior one. In the extreme northeast and southeast because of better rainfall there is a greater emphasis upon the kharif crops and at least there are two kharif crops among the first four major crops. So considering the first four major crops this broad region is divided into seven sub-regions.

II(a): Kharar-Rupar Tract: This is the eastern-most area of Malwa and has an identity of its own. The rainfall is about 30 inches in a year which is the maximum in whole of Malwa. But the irrigation facilities are minimum in whole of Malwa. But the irrigation facilities are minimum and leaving aside the northwestern corner, agriculture is overwhelmingly without irrigation. The soils though loamy are somewhat inferior particularly along the Siwalik hills where soil erosion is a problem during the rainy season. Due to the greater rainfall but poor irrigation, crop-pattern is a bit different from other areas. Wheat can be grown without
irrigation. However, in order to avoid risk of failure, it is sown mixed with gram. Pure wheat is sown in fields where the maximum possible moisture is conserved. Gram is the other important rabi crop grown in fields which had a kharif crop. The rainfall during the monsoon period is such that a variety of the crops can be grown without irrigation. The principal among them are sugarcane and groundnut. Chari and other kharif fodder crops are important everywhere. Again some rice is also grown by flooding the low-lying fields with rain water. Because of better moisture conditions during the kharif season, inferior crops are ignored in favour of superior.

Kharar-Rupar tract is divisible into five crop-combination regions.

(i) This comprises of Ghar circles of Kharar and Rupar tahsils. Though the crops coming in the combination are similar to those of the adjoining areas, there is a lot of difference in the positions they occupy. Because of inferior soils and complete lack of irrigation, pure wheat is not important and is the last crop to fall in the combination. On the other hand, chari occupies the first rank. Because of the suitability of rainfall and soil, sugarcane and groundnut are the important crops in the combination.

(ii) This is the flood plain of the Sutlej. Due to the excessive moisture in the soil, gram is not an important crop in the combination while wheat, like the other parts of flood plain, far exceeds the other crops. Another addition in the combination is that of rice sown in fields
flooded with river water and partially with irrigation. On the other hand, high water-table is responsible for the elimination of groundnut from the combination.

(iii) This is the Dhaia circle of Rupar and is quite similar to Combination (i). The only difference is in the positions occupied by the various crops. Due to better soils and some irrigation facilities, wheat is only next to wheat-gram. The region differs from the adjoining areas in two respects. First, because of the presence of porous soils and the absence of flood water, rice does not fall in the combination. Secondly, groundnut which is insignificant in the adjoining combinations, is quite important in this combination.

(iv) Seoti circles of Kharar tahsil form a separate crop-combination region where in addition to sugarcane and groundnut, rice is also cultivated to the extent that it falls in the combination. Most of this rice is in low lying fields having clayey soils in which the rain water is controlled.

(v): This combination is in the Keli and Dakar assessment circles of Kharar tahsil. The outstanding differentiating factor is the clayey nature of the soil which is least suited to the groundnut crop. However, due to this type of soil together with the flood water in Dakar, and irrigation in Keli rice is an important crop. So due to the elimination of groundnut from the combination and the stronger position of rice, this combination has assumed a separate identity.

II(b) Tract Bet Ludhiana: The flood plain of Ludhiana district has the characteristics similar to those of the other parts of the flood plain of the Satlej. Here, two things are
outstanding. As compared with the flood plain of Rupar the rainfall is less and unlike that of Ferozepur, irrigation is not so developed. Even after the retreat of the monsoons, there is an excess of moisture in the soil, most unsuitable for the gram crop. So most of the land sown in rabi season is devoted to wheat which alone accounts for one-third to one-half of the annually sown acreage. All other rabi crops are overshadowed and none falls in the combination. Maize and cotton, even with quite a small acreage are the noteworthy crops in the kharif season. But contrary to the expectations and unlike the flood plain of Rupar, rice is out of the combination. The prominence of wheat, maize and cotton has made this a distinctive three crops combination region.

II(c) Tract Dhaia Ludhiana: The Dhaia of Ludhiana district and Malerkotla tahsil have a separate identity. The distinctiveness of the tract is derived from maize and gram, the former being one of the four majors and the latter holding a very inferior position. This area has about 20 inches of annual rainfall, very fertile loamy soils and excellent irrigation facilities both from the wells and canals. These favourable factors have made a tough competition for the space among the superior crops. Further, land-holdings being small people are forced to grow such crops which can give the maximum return either in cash or in food. Consequently, the inferior crops are at the lowest ebb. During the rabi season most of the land is devoted to wheat and wheat-gram leaving a very little scope for the other crops. The importance of the kharif acreage is more or less same to that of rabi. So most of the places in the combination are held by the superior
Kharif crops. Two crop-combination regions are there. The first comprises of Dhaia circles of Ludhiana and Samrala tahsils and the second of Kalerkotla and Jagraon tahsils. The major crops are same in both the cases. But there is one differentiating factor. It is the cultivation of groundnut which is so suited in some assessment circles of II(c)(i) that it ranks at the top. Cotton, though in the combination, is not an important crop because of keen competition from the other superior crops. On the other hand, groundnut does not fall in the combination in region II(c)(ii) because of lesser amount of rainfall and less suitability of soil. The elimination of groundnut has made the position of cotton very strong in this area because no other cash crop can compete with the latter.

II(d): Tract Patiala: Patiala district itself is a separate unit where rainfall is about 25 inches and the soils are free from the sand-dunes. The soils are loamy in the north and west but clay loams to stiff clay in the south and southwest. Whereas the rainfall is considerable, the southwestern side is very poor as far as irrigation is concerned. Similar to the adjoining northern areas, kharif acreage is almost equal to that of rabi. The lack of irrigation, especially in the eastern and southern sides, has resulted in a greater emphasis on the fodder crops. Thus, chari which is an important kharif fodder and which can do well without irrigation is among the first four ranks.

There are three crop-combination regions in this area. The first comprises of Sirhind and Kabha tahsils. The
outstanding crops are sugarcane, groundnut and maize. These three crops are of the kharif season and are equally important in the adjoining northern tahsils. Cotton is also present in the combination but its importance is less because of competition with sugarcane. Region II, covering Rajpura tahsil, differs from the first in two respects. Because of the harder nature of the soil, groundnut is absent from the combination. Secondly, in the flood plain of the Ghaggar rice is an important crop and occupies a strong position in the combination. Taramira is the new entrant in the combination while similar to the groundnut, cotton is also missing from the combination. The third region coincides with Patiala tahsil. The characteristics of both the first and the second region are present here. Maize and cotton are grown with irrigation and are members of the combination. But groundnut is missing because of unsuitable soil. Rice also comes in the combination and is grown in the Neli circles. This region differs from the second because of the absence of sugarcane and the presence of cotton in the combination.

II(e) Tract Hansa-Sabgrup: In Region II this is the only area of numerous sand-dunes and vast stretches of light sandy soils. Further, irrigation both from canals and wells is much short of the requirements. The inferior crops, well adapted to these conditions, are prominent. Whereas gram dominates among the rabi crops, bajra and guara are important during the kharif season. Bajra and guara are the typical unirrigated crops which occupy strong positions in the combination. Whatever water is available during the rabi
season, is utilized for the wheat crop. Overwhelming acreage of the rabi season is under the gram crop which is grown unirrigated. Crop-combination regions are different for Mansa and Sangrur tahsils. Comparatively more rainfall, greater amount of irrigation and better soils in Sangrur (i) are responsible for the presence of maize crop in the combination. Taramira also falls in the combination and is grown in fields not suited for wheat and wheat-gram. In Mansa, (ii), tahsil because of complete absence of irrigation from the wells and sandy character of the soil, maize is unimportant and does not fall in the combination. The acreage under taramira is also not much. The absence of maize and taramira from the combination has separated Mansa from Sangrur tahsil.

II(f) Tract Zira-Ferozepur Rohi: This area has the distinction of being the only area outside the flood plain irrigated by the Grey Canals. The soils are mostly light but are free from sand-dunes. Because of a bit late arrival of water in the seasonal canals, cotton cultivation is greatly restricted but later on water is quite sufficient for growing rice in less porous soils and to give pre-sowing irrigation for wheat and wheat-gram. Still much of the land without irrigation facilities are having light soils is sown with gram. In the eastern side maize is grown while towards the west bajra is important. This is the only region where the three Kharif crops, maize, bajra, and rice, with contrasting water and soil requirements, are present in the combination.

II(g) Tract Bet Ferozepur: In the flood plain of Ferozepur district soils vary from clay loams to sandy loams.
Though the rainfall is less than 20 inches, there is always an abundance of moisture in the soil due to the proximity of river. Water from the Grey and Eastern Canals is available in adequate amount during the kharif crops. Thus due to less porous soils and abundance of water during the summer months, rice is an important crop of the flood plain and occupies a position among the four major crops. Wheat and wheat-gram are commonly sown in fields left fallow during the previous harvest, wheat-gram partially follows the rice crop. Because of many stretches of poor soils without adequate irrigational facilities, inferior crops are also present. Notable among these are guara, bajra and barley-gram.

As a result of difference in soil character and variation in the amount of water supply, the composition of the crops, and consequently the crop-combinations vary in the different sides and four combinations have been established. (i). It covers the flood plain of Farozepur and Zira tahsils and owes its distinctiveness to maize and cotton crops. First, because of irregular and unassured water supply from the Grey Canals, the acreage under cotton is very small and it hardly falls in the combination. Secondly, because of a bit more rainfall and somewhat greater number of wells maize is cultivated successfully so as to come in the combination. (ii). Comprises of Dora assessment circles and is situated at the mouth of Eastern Canal. The abundance of water from this canal during the kharif season has made the importance of rice and cotton crops and both of these are among the first...
four. The only other crop which falls in the combination is
the kharif fodder.

(iii). Rohi Jalalabad and Guru Harshahai assessment circles
have a separate combination differing from the other circles
mainly because of the light character of the soil. In addition
to rice which exclusively depends upon the Eastern Canal, bajra,
guara and barley-gram are other crops in the combination.

(iv). This combination covers the flood plain of Kamdot,
Jalalabad and Fazilka. Wheat, wheat-gram, cotton and rice are
the major crops. This is the only part of the flood plain of
the Sutlej where gram is also present in the combination. The
latter is because of the fact that rainfall is small and
because of limited water in the river channel there is little
excess of moisture in the soil so as to retard the growth of
gram. Bajra and guara are also suited in tracts of light
soils.

CONCLUSION

Based upon Weaver's formula, Malwa tract falls into
twenty-two crop combination regions. These are grouped into
nine units called the regions of the second order and are
based upon the specific ranks of the crops in the combinations.
The regions of the second order constitute two first order
regions on the basis of the presence of the four major crops
of the region. In one of the two primary regions, wheat,
wheat-gram, gram and cotton, the leading crops of the Malwa,
occupy the first four places while in the other any one of the
four major crops is missing from the first four places. The
number of crops in the combination regions varies from two to ten. The lowest is in those areas where crop diversification is minimum while maximum is in those areas where crop diversification is maximum. Because of greater demand, food crops occupy most of the places in the crop-combination regions, the structure, however, differs from one combination to the other. In each combination any two of wheat, wheat-gram and gram are present, the first two where the availability of moisture is more and the latter two where there is a little deficiency. Bajra and barley-gram are the other food crops of the combinations in western Kalwa while maize is their counterpart towards the east. Cotton is the important cash crop in the west, but eastern Kalwa has two more - sugarcane and groundnut. Among the fodder crops which come in the combinations chori is dominant in eastern half while guera is its substitute in the western side.