

CHAPTER XIII

CROP DIVERSIFICATION

Crop diversification essentially implies multiplicity of cropping which involves intensity of competition among crops for space. The keener the competition the greater is crop diversification. It is thus the reverse of crop specialization or monocultural farming. The degree of crop diversification reflects the interactions of physical, economic, and cultural phenomena. Its study is of vital importance in the understanding of the agricultural geography of a region. This chapter is an evaluation of the phenomenon of crop diversification in the Halwa Tract.

Diversification Index:— In a study of the regional patterns of agricultural landuse in India, Bhatia has evolved a formula for determining crop diversification as follows:—

\[ \text{Index of crop Diversification} = \frac{\text{Per cent of cultivated area under X crops}}{\text{Number of X crops}} \]

where X crops are those which individually occupy 10 per cent or more of the cropped area in a district. The lower the value of the index the higher the degree of crop diversification. However, when small areas are studied minutely this formula stands in need of modification to suit the scale of work. For example in the Halwa, the crops, which occupy more than 10 per cent of cropped area are few in number. Consequently the limit is extended so as to cover some more crops.

MALWA TRACT (PUNJAB)
CROP DIVERSIFICATION
AVERAGE 1952-57

CROPS WITH 5% OF THE TOTAL CROPPED AREA ARE TAKEN AS THE LOWER LIMIT

DATA BY ASSESSMENT CIRCLES

Fig. 60
Diversification Index for the Halwa Tract has been worked out in a modified form though the principal remains the same. In this case it is the mean* of the differences in the percentages of acreage under crops. Such crops are taken into consideration the acreage under each of which is more than five per cent of the total cropped area. With this modified formula the indices of crop diversification for all the assessment circles of the Halwa Tract have been calculated and mapped. The map thus prepared reveals very significant regional patterns of crop diversification.

**CROP DIVERSIFICATION.**

In the Halwa Tract those areas have maximum diversification of crops where the soils are fertile, rainfall more than 20" and irrigational facilities adequately developed. By contrast, diversification is minimum where rainfall is meagre, irrigation inadequate and soils not very fertile.

Figure 60 reveals four groups of areas with differing degrees of diversification of crops: (i) areas of maximum diversification with a diversification index lower than 2.5; (ii) areas with diversification index between 2.5 and 5; (iii) areas with diversification index between 5 and 10; and (iv) areas of diversification index higher than 10. The last type of areas are those of the lowest diversification.

**Areas of Maximum Crop Diversification:** This group includes the upland plain assessment circles of Ludhiana.

*The mean is worked out by the formula A+B+C+D divided by 4, where A is the difference of percentages of the first and second crops, B is the difference of percentages of the second and the third crops, similarly C and D are the differences of the third and fourth and fourth and fifth crops respectively.*
District and tahsils of Halerkotla, Sirhind, Nabha, Sangrur, and Patiala, all of which have fertile loamy soils. These areas receive more than 20" of rainfall during the monsoon months of July to September. For many of the kharif crops this amount of rainfall is sufficient for successful growth provided it is well distributed over the period. The winter season also receives meagre but very useful rainfall of about 4". In addition, for some of the crops like sugarcane and rice, whose water requirements are much greater than what is available from the rainfall and also for other crops during periods of drought or delayed occurrence of rainfall, excellent irrigational facilities exist in these areas. In the Ludhiana district, irrigation is done mainly from wells whereas in other parts of this regional type canals are more important.

Compelled by the small size of land-holdings but encouraged by the favourable conditions of soils and water supply farmers of these areas tend to grow the most remunerative as well as the maximum number of crops. In view of the limited amount of net cultivated land at the disposal of the farmers there is keen competition among the crops. There is very little of fallowing. Both rabi and kharif harvests occupy equal acreage and cover nearly all the cultivated land with only a few exceptions. The first major crop seldom occupies more than 20 per cent of the cropped area and the number of crops, each covering more than 5 per cent of the total cropped area, is as large as 9. This shows a high degree of crop diversification.
Areas of Moderate Degree of Crop Diversification: These areas with diversification index ranging between 2.5 to 5, lie in two separate blocks. The first covers the extreme eastern side of the Malwa Tract and the second the south-western portions of the Malwa. The eastern Malwa region includes the Rupar, Bharur and Rajpura tahsils. Large parts of these areas have clayey loams which are a little too hard to be worked with ploughs under moderate rainfall conditions. This area receives about 20" of rainfall during the monsoons and nearly 4" during the winter. Because of the inadequacy of irrigational facilities, agriculture is practically dependent upon rainfall. A slight decrease or a delay in the advent of rainfall adversely affects the workability of the soils. In the face of inadequate irrigational facilities the possibilities of growing too many crops are considerably reduced. As a result, crop diversification becomes less than that of the areas of the first type. During the kharif season the cultivated land is largely occupied with chari which is by far the most important crop in terms of acreage. The next important crop is generally far behind in areal coverage. During the rabi season, wheat-gram dominates the agricultural landscape. Thus in both the season put together, the number of crops grown is much smaller than that of the earlier type.

Although in the south western parts of the Malwa degree of crop diversification is similar as that of the eastern region, but it is because of different reasons. Here sand-dunes are very extensive and the content of sand in the soil is much higher. As a result, the soils are highly porous and
require much more water for the success of a crop than is otherwise necessary in areas of fine loams. Apart from this the rainfall in the area is less than 15" and is highly variable. Irrigation from the wells is conspicuous by its absence, but facilities of canal irrigation do exist. The physical properties of the soils and the rainfall conditions are therefore just the opposite of the eastern part of the Malwa Tract discussed above. Because of the inadequacy of rainfall even during the monsoon period only such crops are commonly grown as can stand the drought conditions. Because of the porosity of the soils and relatively dry conditions water requirements of most of the crops are high. As the water supply from the canals is not sufficient, choice has to be made of the crops that can grow successfully. These conditions therefore limit the number of crops that can be grown and also the area that can be handled for farming purposes. In the rabi season when the effectiveness of precipitation is high, practically the whole area is devoted to one crop or the other but the same thing cannot be said about the kharif crops. Thus in both the seasons, put together, the number of crops grown is not large. There is always a wide difference between the first ranking crop and the second. During the rabi season wheat, wheat-gram, and gram are important crops. The first ranking crop in this case always occupies 20 to 30 per cent of the cropped area. In the kharif season on the other hand, cotton is the only important crop covering any appreciable amount of land. In sum, therefore, it is the physical factors relating to soil and water supply which reduce the number of crops
Areas of Relatively Low Degree of Crop Diversification:

Areas belonging to this category have an index ranging between five to ten. They include the western flood plain of the Sutlej river and a few adjoining assessment circles of Ferozepur district. In this tract although the soils which vary from sandy loams to clayey are fairly friable but the inadequacy of rainfall and the seasonal nature of canal irrigation stand in the way of maximum utilization of land and growing the maximum number of crops. The canals provide irrigation only during the kharif season when rice and cotton are grown. In the rabi season, on the other hand, conditions are precarious because of lack of irrigational facilities and meagre rainfall. As a result only such crops are grown as can stand these severe limitations. Thus in both the crop seasons together only four to six crops are grown. However, with the introduction of perennial canal irrigation things are likely to change.

Areas of Minimum Crop Diversification:

Areas included in this group are those having an index of more than 10. These are Hithar Kot Kapura circle of Muktsar tahsil and northeastern side of Ludhiana District.

Hithar Kot Kapura: With a high index value of 18 the Kot Kapura circle has the lowest diversification in the whole tract. Here it is the conditions of water supply which are a determinant to crop diversification. The annual amount of rainfall is less than 15 inches and irrigation is only inadequately developed with the result that the choice of...
crops which can be grown in both the kharif and rabi seasons is confined to a few. A fairly appreciable proportion of the land is left fallow. More than 80 per cent of the rabi sown area is devoted to gram and wheat-gram only. Pure wheat which has high water requirements is quite unimportant. Among the kharif crops no one qualifies for consideration in the study of diversification. Thus only three crops—gram, wheat-gram and wheat—come in the picture. This is the phenomenon which is completely the reverse of what has been mentioned in the first two regional types.

Samrala—Ludhiana Bet: In the Samrala-Ludhiana Bet, by contrast, it is the excessive moisture in the soil which renders the land unfit for cultivation. During the kharif season the rainfall is considerable and the entire land along the river is flooded. Very often the crops are completely damaged by the floods. Sometimes the crops are not even sown because of too much of water in the soils. Only upland fields grow maize and fodder crops. During the rabi season the land is still too wet for gram cultivation leaving wheat as the only profitable crop. The wheat crop covers as much as 50 per cent of the annually cropped area—by far the highest proportion of land devoted to any crop. In the Dhaia Keocha of Samrala where the soils are highly sandy groundnut cultivation covers more than 40 per cent of the total cropped area. However, if this percentage is calculated to the total kharif cropped area it works out to about 20 per cent which represents the lowest degree of diversification.
From the foregoing observations it can be concluded that crop diversification is intimately related to conditions of soil, distribution and total amount of rainfall and the extent to which irrigational facilities have been developed. In general, in areas of more or less ideal conditions - fine soils, adequate rainfall, adequate irrigational facilities and level land - diversification is the maximum. On the other hand, wherever there are handicaps with regard to these conditions, diversification declines correspondingly.