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PATTERNS OF CROP DIVERSIFICATION
A case study to District Mahendergarh (Haryana) (1966-2012)

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ABSTRACT

Crop diversification patterns have great relevance in the agricultural land use planning. The diversification of cropping patterns means a variety of crops for arable land. The keener the competition the higher the magnitude of diversification. The main advantage of the study of crop diversification regions lies in the fact that it enables us to understand the impact of Physio-socio-economic conditions on the agricultural landscape. In the present study Bhatia's method in a modified form as used by Jasbir Singh in his study of Haryana has been used by the researcher. The primary as well as secondary data have been used to calculate the crop diversification in all the 372 villages of the study area.

KEYWORDS: *Diversification, cropping pattern, physio-socio-economic conditions, competition, landscape.*

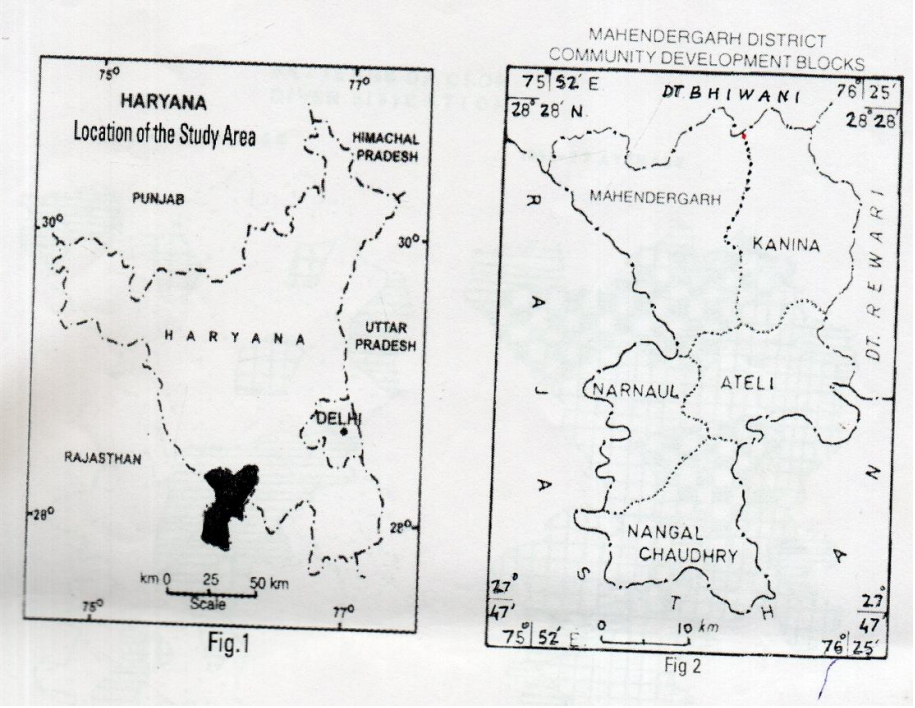
INTRODUCTION

The diversification of cropping patterns means a variety of crops grown in an agricultural year by the farmers. The level of crop diversification largely depends on the physio-socio-economic conditions prevailing in the region. Technological development and use of new innovative methods used by the farmer also effects the degree of diversification. Rich farmers with new technology prefer to specialize in selective crops while the poor and subsistent farmers using the traditional technology are interested in diversification of crops. Pattern of crop diversification is closely associated with the intensity of irrigation and technological advancement. It is observed in the present study that intensity of irrigation affects the diversification **of** crops when the intensity of irrigation increases the crops become more diversified and when the intensity of Irrigation decreases the cropping pattern becomes less diversified. So there is a positive correlation between the pattern of crop diversification and intensity of Irrigation.

THE STUDY AREA:

The study area belongs to district Mahendergarh of Haryana state. The district takes its name from the town of Mahendergarh which was founded by Malik Mahdud Khan. a servant of Babar Mughal emprorer There is a fort at Mahendergarh, which was built by Maratha ruler, Tantia tope during 17th. Century the above fort was named as Mahendergarh in 1861 by Narinder Singh, the then ruler of the princely State of Patiala. In Honour of his son. Mohinder Singh and consequently the town came to be known as Mahendergarh. The study area lies between 27°97'50" to 28°28'00" north latitudes and 75°52'00" to 76°25'11" east longitudes. It is bounded by Bhiwani district in the north, by Rewari district in the east and by the state of Rajasthan in the southeast, south and southwest. Tehsil Narnaul of Mahendergarh district penetrates deep into Rajasthan, therefore a meeting ground of two different cultures (fig 1) It covers an area of 1897 square kilometers where 921680 people live in 372 villages according to 2011 census. The study area shows a crow

flight length of 75 kilometers from north to south and 44 kilometers from west to east. It has five community development blocks and two Tehsil (fig.2) All the 372 villages of the study area are connected by approach mettaled roads. The topography of the area is a mixture of sand dunes, flat plains and high lands of the Aravalli ranges. The climatic conditions or the study area are semi arid and the natural vegetation is xerophytes.



APPROACH:

A Statistical-ecological-physiognomic approach is adopted in this investigation. Agricultural statistics is used to determine the distribution of land use and crops, not in absolute terms, but as percentage to discover the significant concentrations and dislodgements. Statistical methods, yielding direct illuminative and quantitative information on factor analysis and testing of pattern boundaries are adopted for deep insight into agriculture of the region. Emphasis is placed on applied ecology because the objective is to study the different ways in which the groundwater depletion affects the agricultural development. Physionomic approach is employed because it is not only an attempt at an agriculturally conditioned landscape, it also attempts therewith to understand and determine the spatial distribution and pattern of the various agricultural manifestations.

METHODOLOGY:

The study is based on village level published and unpublished data. It is therefore a micro level study of all the 372 villages of Mahendergarh district. Out of these 366 villages are inhabited and 6 are uninhabited. The data were first of all processed and subsequently were represented by suitable maps and diagrams. Several choropleth maps and graphs have been drawn.

The method of the present study is both (i) deductive and (ii) inductive. Changing spatial patterns of agricultural characteristics have been evaluated periodically with the help of secondary as well as primary data.

The results derived from the analysis of the secondary data have been verified through intensive field studies. Nearly one thousand farmers were interrogated and schedules were filled up from thirty five representative villages selected on the basis of random sampling from the study area.

SOURCES OF DATA:

The data collected from various sources includes both published and unpublished maps, census data from census records, unpublished data from Government sources and personal field investigation. The district settlement reports provided minute statistical details. The continuous 'Girdawari' provided every detail regarding the landuse, irrigation pattern :in the villages where as 'Khasara' provided the data of land use on yearly basis and holding wise crop statement of different seasons like Rabi' and 'Kharif.

The published and unpublished census data were collected from the census office and the published district census Handbook of Mahendergarh district of theyears 1961, 1971,1981,1991,2001 and20l2 The village level land use data and agricultural statistics of crops of Mahendergarh district were obtained from the office of the Kanungo. The data about the consumption of fertilizers and high yielding varieties of seeds were obtained from the office of the Deputy Director of Agriculture Narnaul The data about the soil types and the underground water were collected from the 'Assistant Soil Conservator's Office and from the underground water cell Department at Narnaul respectively.

During the study period the investigator visited the area several times, especially at the time of different agricultural seasons for the collection of relevant data and personal observations.

PATTERNS OF CROP DIVERSIFICATION:

Crop diversification patterns have great relevance in the agricultural land-use planning. The diversification of cropping patterns means a variety of crops for arable land, the keener the competition the higher the magnitude of diversification. In fact, it is obvious that greater the number of crops in a combination the greater the degree of diversification. In the case of monoculture or crop specialization the competition for cropped land occupance is weak. The main advantage of the study of crop diversification regions lies in the fact that it enables us to understand the impact of physical and socio-economic conditicns on the agricultural land-scape. Moreover, it helps in knowing the contemporary competition amongst crops for area; scope for rotation and effect on double cropping: total production and per hectare productivity.

Bhatia advocated a technique for measuring the crop diversification. He assumed in his study that the maximum number ot crops grown in a component areal unit are 10. Bhatia's study, however, does not make it clear as to what was the lowest percentage considered. Ayyer modified Bhatia's method and took into account only those crops which occupy at least one percent ot the gross cropped area. Singh adopted the crop diversification technique of Bhatia with the following modifications for determination of spatial patters of crop diversification in Haryana.

$$\text{Index of crop diversification} = \frac{\text{Percentage of Total harvested area under 'n' crops}}{\text{Number of 'n' crops}}$$

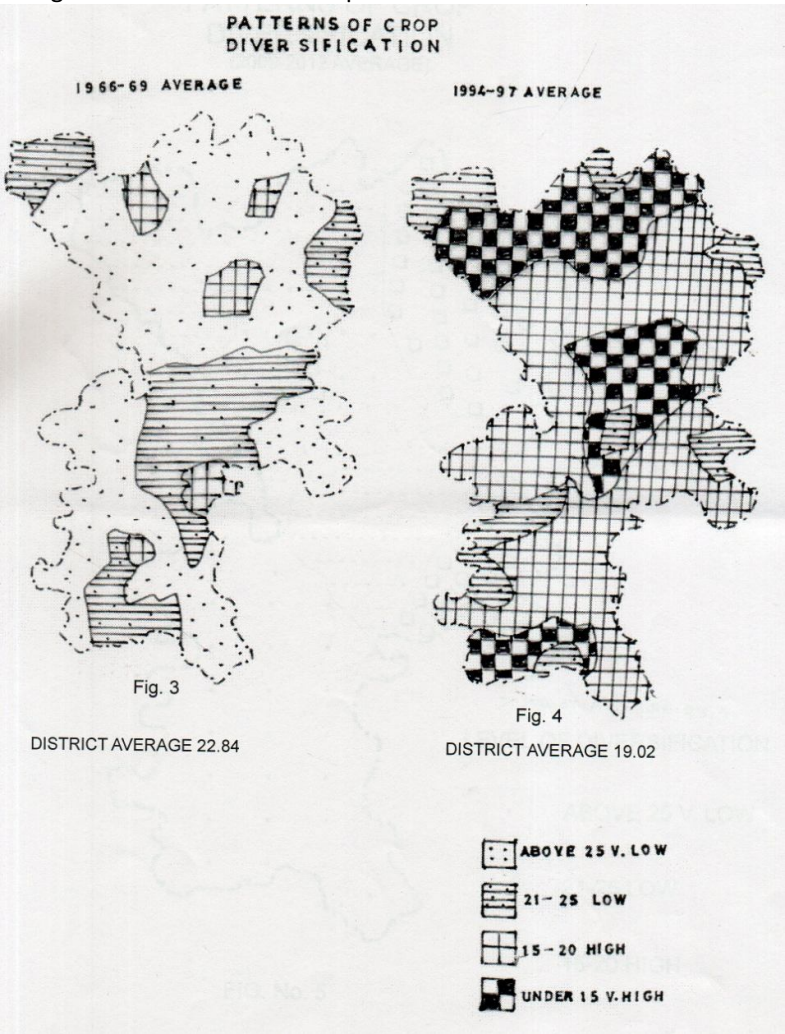
When n' crops are those which occupy individually 5 percent or more of the total harvested area in the component areal unit.

For investigation to spatial patterns of crop diversification and specialization in the study area, Bhatia's formula in a modified form as used by Jasbir Singh in his study of Haryana has been used by the investigator. When small areas growing a variety of crops are studied minutely. Bhatia's formula stands in need of modification to fit in the scale of work. Because in the study area the crops occupying 5 to 10 percent of the total harvested area are so significant in hectareage strength that they cannot be ignored. Therefore, it will not be appropriate to exclude these crops from the calculation of the crop diversification index. The indices of crop diversification of all the 372 villages of the study area have been calculated with the help of this modified formula and mapped thereafter for 1966-69, 1975-78 and 1994-97 and 20009-2012 (Figs. 3 to 5).

Figure 3 highlights three categories of variable magnitude of diversification in cropping pattern in 1966-69. viz. (a) areas of high diversification, (b) areas of low diversification. (c) areas of very low

diversification. In most of the villages of the study area crop diversification was of very low and low magnitudes in contrast to 9 villages where high magnitude of cop diversification was found. In the 1966-69 triennial the distrnct index value of crop diversification was 22.84 which lies in the second category of low magnitude of crop diversification. It may be inferred that lower the value of the index, the higher the degree of crop diversification and vice-versa.

Figures 4 highlights different categories of variable magnitude of diversification in cropping pattern in 1994-97 triennials. First category has the villages of very high diversification, second category has the villages of high diversification and third category has the villages of low diversification. In most of the villages of the study area crop diversification was of high and very high There were very few villages in the third category where the crop diversification was of low magnitude. In the 1994-97 triennial the district index value of crop diversification was 19.02 as against 22.84 index value of the 1966-69 triennial So in the 1994-97 triennial the degree of crop diversification increased in comparison to 1966-69 triennial. In 1966—69 period the cropping pattern was less diversified than that in 1994-97. In the 1994-97 period the cropping pattern became more diversified due to the development of tube-well and canal irrigation facilities and the farmers have started to grow more varieties of crops.



In 2009 -12 period again the cropping pattern became less diversified as shown in fig. 5. Figure 5 highlights three different categories of various magnitude of diversification in cropping pattern. First category has the villages of very low diversification while the second and third category villages are low and

high diversification respectively. In 2009-12 triennial the district average of crop diversification was 23.4 which is lower than the previous two triennials i.e. 1966-69 and 1994-97. The reason of low diversification was due to the depletion of ground water and decrease in the intensity of irrigation. when the intensity of irrigation decreases the cropping pattern becomes less diversified because the farmers have no more options to grow a variety of crops on the arable land.

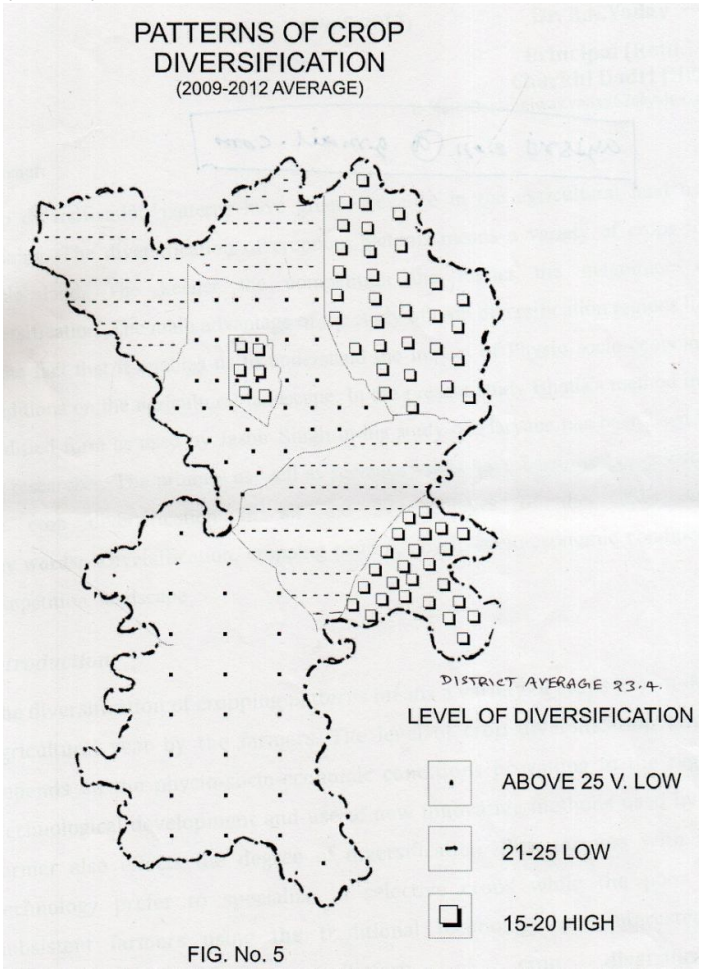


FIG. No. 5

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