

# CROP DIVERSIFICATION PATTERN: A SPATIO– TEMPORAL ANALYSIS IN HARYANA : 1990-93 & 2009-12

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## Abstract

*Agriculture being a basic activity plays a vital role in Indian economy. Crop diversification means competition among various grown crops for space in a given region. The studies of crop diversification pattern constitute an important aspect of agricultural geography as it provides a good basis for agricultural region. The aims and objectives is to find out study the principal crops and crop diversification pattern of Haryana, as there is variation in the temperature and rainfall in different regions. The present study is mainly based on secondary data collection and the data has been collected from Statistical Abstract of Haryana. After collecting the data, processed and tabulated to make the result clear and simple.*

*For the delineation of crop diversification pattern in Study area Gibbs & Martin technique of crop diversification has been adopted. Were applied and crop combination regions of Haryana is brought out through using MapInfo, GIS software modules. The analysis shows that there is no diversification of cropping pattern in most if the districts of Haryana except the northern and eastern part of the state. The crop like paddy and Wheat constituted as two crop region in northern and eastern Haryana. Wheat is the major crops of Haryana and rice is second crops. Cotton is high percent of area in sirsa district and second is hissar district and the cotton and wheat combination in western Haryana Bajra and mustard combination found out in southern Haryana.*

**Keywords :** crop specialization, Concentration, Index values, Crop Diversification

## INTRODUCTION

Crop diversification means growing large number of crops in a region in an agricultural year. It means the raising a variety of crops. This is an indicator of multiplication of agricultural activities. Crop diversification also provides relationship between the relative areal strength of the crops grown in a region. The magnitude of crop diversification shows the impact of physical, socio-economic and technological influence on cropping pattern of area. The farmers all over the world, especially in the developing countries; try to grow several crops in their holdings in an agricultural year. The level of crop diversification largely depends on the geo-climatic/socio-economic conditions and technological development in a region. It is generally considered that higher the level of agricultural technology, the lesser the degree of diversification. Moreover, rich farmers prefer to specialize in agricultural enterprise while the poor and subsistent farmers are generally more interested in diversification of crops.

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Crop diversification refers to the competition among the growing crops in a region. The keener the competition, the higher the magnitude of crop diversification, and the lesser the competition, the greater will be the trend towards crop specialization or monoculture farming, where emphasis is on one or two crops. Thus crop diversification is a concept which is opposite to crop specialization (Singh, 1976).

“Crop diversification has emerged an important alternative to attain the objectives of output growth, employment generation and natural resources sustainability in the developing countries. The recent experience in Asia, particularly southeast Asia, Middle East and North Africa indicates that policy makers and planners are increasingly focusing on crop diversification to promote agricultural development”

**Petit and Barghouti (1972)**

### **AIMS AND OBJECTIVE**

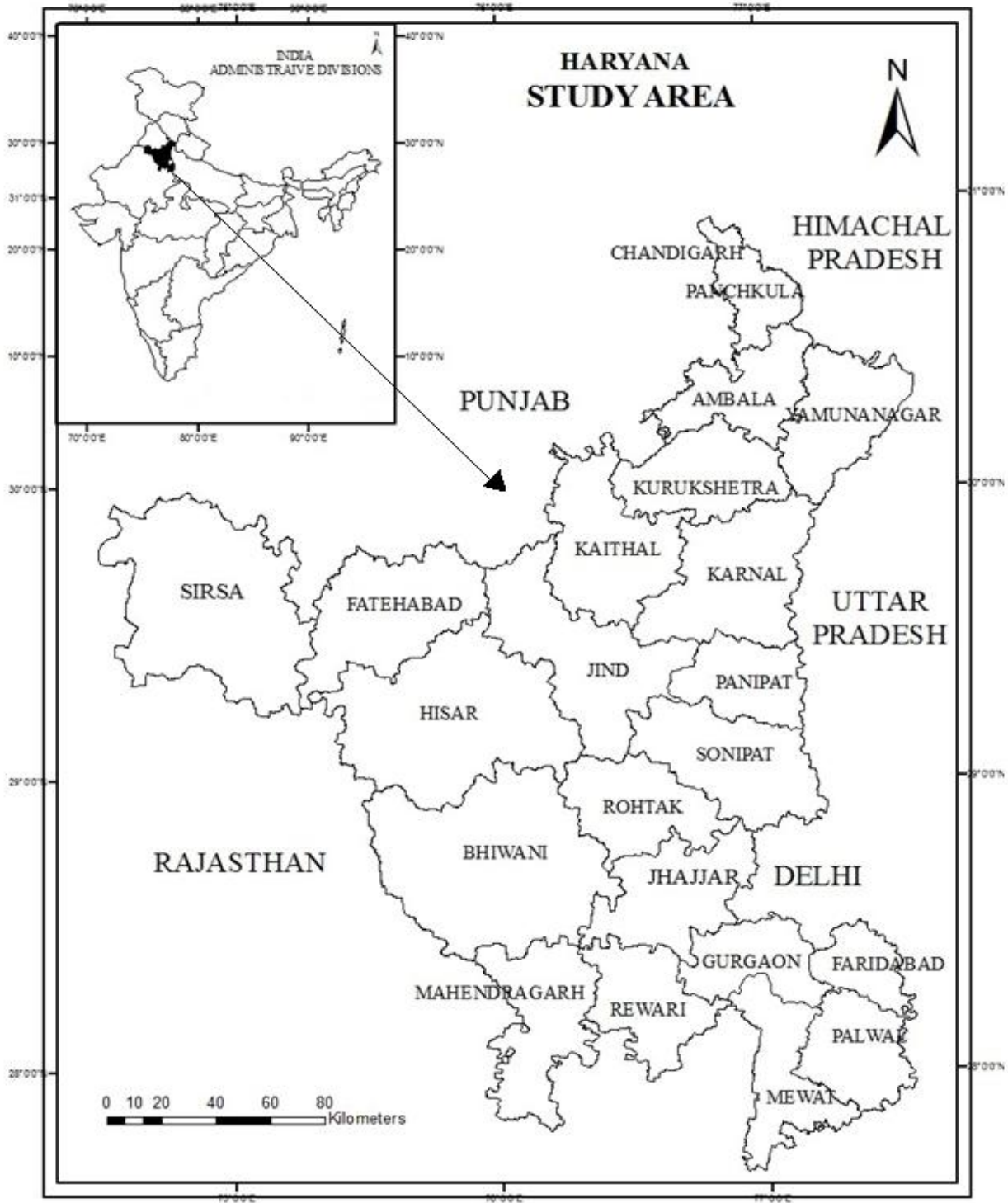
The study in hand has the following objectives:

1. To demarcate the crop diversification regions and changes therein.
2. To highlight the factors responsible for changes in crop diversification regions.

### **STUDY AREA**

Haryana state has been taken as study area which is situated in the north western part of India. It has been carved out from the former Punjab state on 1<sup>st</sup> November 1966 on linguistic criterion. The state is lying between 27°39' N to 30°55' N latitude and 74°28' E to 77°36' E longitudes. The total area of the state is 44212sq.km. It forms 1.3 percent of total area of the country and occupies the seventeenth position in area as compared with other states and union territories. Starting from north it is bordered in a clockwise direction by Himachal Pradesh in the north. Uttar Pradesh and Delhi in the east, Rajasthan in south and southwest and Punjab in the North. The state imperceptibly slopes from north to south with height ranging from 200 to 900 meters above mean sea level. The slopes become reverse in south and south west due to presence of Aravalli Hills in that. The starting originally with seven districts and one division the state as per 1966-97 is dividing into seventeen districts and four divisions. Originally it consists of Hisar, Rohtak, Gurgaon, Karnal, Ambala, Jind and Mahendragarh districts two new districts of Bhiwani and Sonipat were created on 22-12 -1972 and district Kurukshetra was carved on 23-1-1973 two more new districts of Sirsa and Faridabad emerged on 26-8-1975 and 2-8-1979 respectively. Four new districts of the year 1989 district of Panchkula was carved on 15-8-1995. and two more districts Mewat (Nuh) and Palwal were carved on 4-4-2005 and 30-3-2008 respectively. At present there are four divisions namely Ambala, Yamunanagar, Kaithal, Panipat and Rewari were created on Haryana day Rohtak, Gurgaon and Hisar and 21 districts. Ambala division comprises the district of Ambala, Panchkula, Yamunanagar, Kurukshetra and Kaithal, Rohtak district consists of Rohtak, Sonipat, Panipat, Karnal and Gurgaon division is made of up Gurgaon, Faridabad, Rewari and Mahendragarh districts. And Hisar district consists of all left

Districts of Haryana.



## REVIEW OF LITERATURE

A number of scholars in the field of agricultural geography and allied fields have done work on cropping crop diversification in India and other countries in the world. Thus, an attempt has been made in the present study to review some of the important works in the following paragraphs:

Ayyar, (1969) in his study "Crop Regions of Madhya Pradesh: A Study in Methodology" has evolved a new technique for measuring crop diversification regions. He has taken all the crops which were having 1 per cent or more than 1 per cent of the total cropped area. Then he divided the sum of crops by the number of crops which are having 1 per cent or more than 1 per cent of the total cropped area. His method is an improvement over Bhatia's and Singh's methods for measuring crop diversification.

Bhatia, (1965) in his study on "Patterns of Crop Concentration and Diversification in India" has observed that physical, socio-economic and technological factors have affected the magnitude of crop diversification. Variations in above mentioned factors are responsible for variations in patterns of crop diversification in India. He has also evolved a new technique for measuring crop diversification in India. He has taken all the crops which are having 10 per cent or more than 10 per cent of the cropped area. He summed up the total area under these crops and divided the sum by the number of crops. According to his method, higher the index, lower is the magnitude of crop diversification and vice-versa.

Singh, (2006) in his study "Crop diversification in Bari-Doab Region of Punjab" has concluded that the patterns of crop diversification and variations in relief are positively correlated. He further observed that areas with unfriendly physiography have high magnitude of crop diversification as compared to featureless central uplands of the study region. He has also found that due to diffusion of agricultural innovations, the magnitude of crop diversification has declined, where as the cropping pattern has become specialised.

## RESEARCH METHODOLOGY AND DATA COLLECTION

The present study is based on the secondary data collected from the Statistical Abstract of Haryana. After collecting the data, processed and tabulated to make the result clear and simple. The map is the main tool in geographical analysis, synthesis and interpretation. The maps are prepared with the help of Arc GIS 9.3. By using simple and effective cartographic methodology, the results are explained in sharp focus throughout a set of maps. It is hoped such maps of distribution will help in production of more adequate explanations and interpretations. The level of agricultural performance can be measured by using the collected data with the following technique-

### 1. Gibbs and Martin's technique:

Index of Crop Diversification =

$$1 - \frac{\sum X^2}{(\sum X)^2}$$

Here x is the percentage of total cropped area occupies by an individual crop.

According to this method crop diversification varies between 0.1 to 0.9. Higher the index value high crop diversification and lower the index value low crop diversification and high Concentration several studies have been made in detail about the crop diversification .Many scholars from geography, economics and allied disciplines have developed techniques for measurement of crop diversification. Among them Gibbs and Martin, Bhatia and Singh are prominent. In 1962 Gibbs & Martin's the formula for calculation the index of diversification Thus for calculating the index of crop diversification in the study region method has been applied with the following heads-

(A) Patterns of crop diversification in 1990-93

(B) Patterns of crop diversification in 2009-12

## RESULT AND DISCUSSION

Below the table is shows the percent of area diffrents crops in Haryana during the year 1990-93 in this table the shows rice crops area in karnal districts high compare to other districts. and wheat crops percent of area sonipat district first and the maize crop is high percent of area compare to other districts ambala district. Wheat is the major crops of Haryana and rice is second crops. Cotton is high percent of area in sirsa distric and second is hissar district. In this table other crops include potato and chilly these crops percent of area under 0.13.

**Percent share of area under different crops in Haryana: (1990-1993)**

Districts	Rice	Jawar	Bajra	Maize	Wheat	Barley	Other cereals	Total cereals	Gram	Mash	Moong
Ambala	10.34	0	0.26	3.00	15.79	0.11	0	29.51	0.53	0.27	0
Yamunanagar	11.20	0.03	0.40	1.35	14.35	0.05	0	27.38	0.22	0.19	0
Kurukshetra	14.87	0	0.03	0.24	15.78	0.02	0	30.93	0.06	0.05	0.02
Kaithal	11.65	0.11	0.95	0.09	18.21	0.05	0	31.06	0.20	0	0
Karnal	14.90	0.02	0.10	0.18	16.81	0.03	0	32.04	0.09	0.02	0.01
Panipat	12.20	0.12	0.22	0.12	18.49	0.05	0	31.20	0.10	0	0
Sonipat	4.48	2.16	0.99	0.10	20.04	0.21	0.03	28.02	0.21	0	0
Rohtak	0.17	4.77	3.47	0.02	14.56	0.54	0	23.53	1.52	0.01	0
Faridabad	1.23	2.80	3.03	0.24	19.42	0.88	0	27.60	0.09	0.02	0.02
Gurgaon	0.16	2.45	7.78	0.02	11.87	1.62	0.00	23.89	1.39	0.00	0.02
Rewari	0	0.67	11.41	0	9.13	1.50	0.02	22.72	1.12	0	0
Mahendergarh	0	0.02	16.28	0	5.61	0.50	0	22.41	1.99	0	0.017
Bhiwani	0	0.31	13.32	0.01	5.07	0.40	0	19.09	7.52	0	0.16
Jind	4.51	0.51	4.32	0.01	17.39	0.33	0.02	27.09	1.12	0	0
Hissar	1.93	0.05	4.07	0.03	13.44	0.41	0	19.92	5.00	0.01	0.18
Sirsa	2.39	0	0.33	0.01	14.93	0.66	0	18.32	5.12	0	0.03
Haryana	4.97	0.80	4.34	0.23	14.08	0.44	0.00	24.85	2.39	0.02	0.05

Cont...

Districts	Massar	Other pulses	Total pulses	Total foodgrain	Mustard	Other oilseed	Total oilseed	Cotton	sugarcane	Other
Ambala	0.55	0.46	1.81	31.32	0.84	0.95	1.79	0.09	1.92	0.48
Yamunanagar	0.62	0.05	1.08	28.46	0.24	0.70	0.94	0.08	12.25	0.41
Kurukshetra	0.00	0.06	0.35	31.27	0.53	1.04	1.57	0.02	2.08	0.94
Kaithal	0.14	0.29	0.58	31.70	1.35	0.45	1.80	0.6	0.73	0.03
Karnal	0.15	0.15	0.43	32.47	0.11	0.60	0.71	0.07	0.97	0.13
Panipat	0.07	0.61	0.78	31.98	0.27	0.61	0.88	0.10	2.02	0.20
Sonipat	0.02	2.08	2.31	30.32	1.49	1.52	3.01	0.29	2.55	0.18
Rohtak	0.01	1.60	3.15	26.68	8.39	0.05	8.44	0.86	2.20	0.02
Faridabad	0.11	1.46	1.70	29.23	4.80	0.17	4.97	0.04	2.09	0.11
Gurgaon	0	0.25	1.66	25.55	10.48	0.25	10.73	0.00	1.80	0.11

Rewari	0	0	1.12	23.84	14.14	0.09	14.23	0	0	0.02
Mahendergarh	0	0	2.01	24.41	13.37	0	13.37	0.02	0	0
Bhiwani	0.01	0.00	8.05	27.14	8.18	0.03	8.21	2.05	0.09	0.02
Jind	0.14	0.83	2.10	29.19	2.80	0.31	3.11	4.64	1.50	0.05
Hissar	0.02	0.10	5.30	25.22	5.20	0.54	5.73	12.51	0.28	0.07
Sirsa	0.01	0.01	5.17	23.49	5.72	0.93	6.64	16.23	0.01	0.01
Haryana	0.09	0.48	3.03	27.88	4.97	0.49	5.47	3.94	1.35	0.13

Source: Statistical Abstracts of Haryana – (1991-1994)

### Index of Crop Diversification in Haryana (1990-93)

DISRICTS	Gibbs And Martin's(index value)
AMBALA	0.78
YAMUNANAGAR	0.79
KURUKSHETRA	0.75
KAITHAL	0.75
KARNAL	0.74
PANIPAT	0.75
SONIPAT	0.78
ROHTAK	0.83
FARIDABAD	0.79
GURGAON	0.83
REWARI	0.82
MAHENDERGARH	0.82
BHIWANI	0.84
JIND	0.80
HISSAR	0.84
SIRSA	0.84

HARYANA	0.79
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Source: Statistical Abstracts of Haryana – 1991-1994

### Patterns of Crop Diversification: 1990-93

To find out the degree of crop diversification in the study region, the methods of Gibbs & Martin's taken into account. The results obtained from this methods are mapped individually which are discussed in detail. These are as follow:

#### I. Spatial Distribution of Crop Diversification (1990-93)

According to Gibbs and Martin's formula, the overall index value of crop diversification of the study region was 0.79 in 1990-93 It varied from 0.74 in Karnal district to 0.84 in Bhiwani, sirsa and Hisar districts of the study area. To show the spatial variations study region is divided into Following three categories. These categories are discussed following.

##### (a) Areas with high crop diversification (>0.80)

This category covered the districts of Rohtak , Gurgaon, Bhiwani, Rewari, Mahendergarh ,Hissar and Sirsa, The districts of Hissar, Sirsa, Bhiwani, Rewari and Mhendergarh, have sandy soil, less developed agricultural infrastructure, low rainfall etc, were responsible for high crop diversification. But in case of Rohtak and Gurgaon districts fertile soil which enthuse the farmers to grow more crops during Rabi and Kharif season.

##### (b). Areas with moderate crop diversification (0.75 to 0.80 index value)

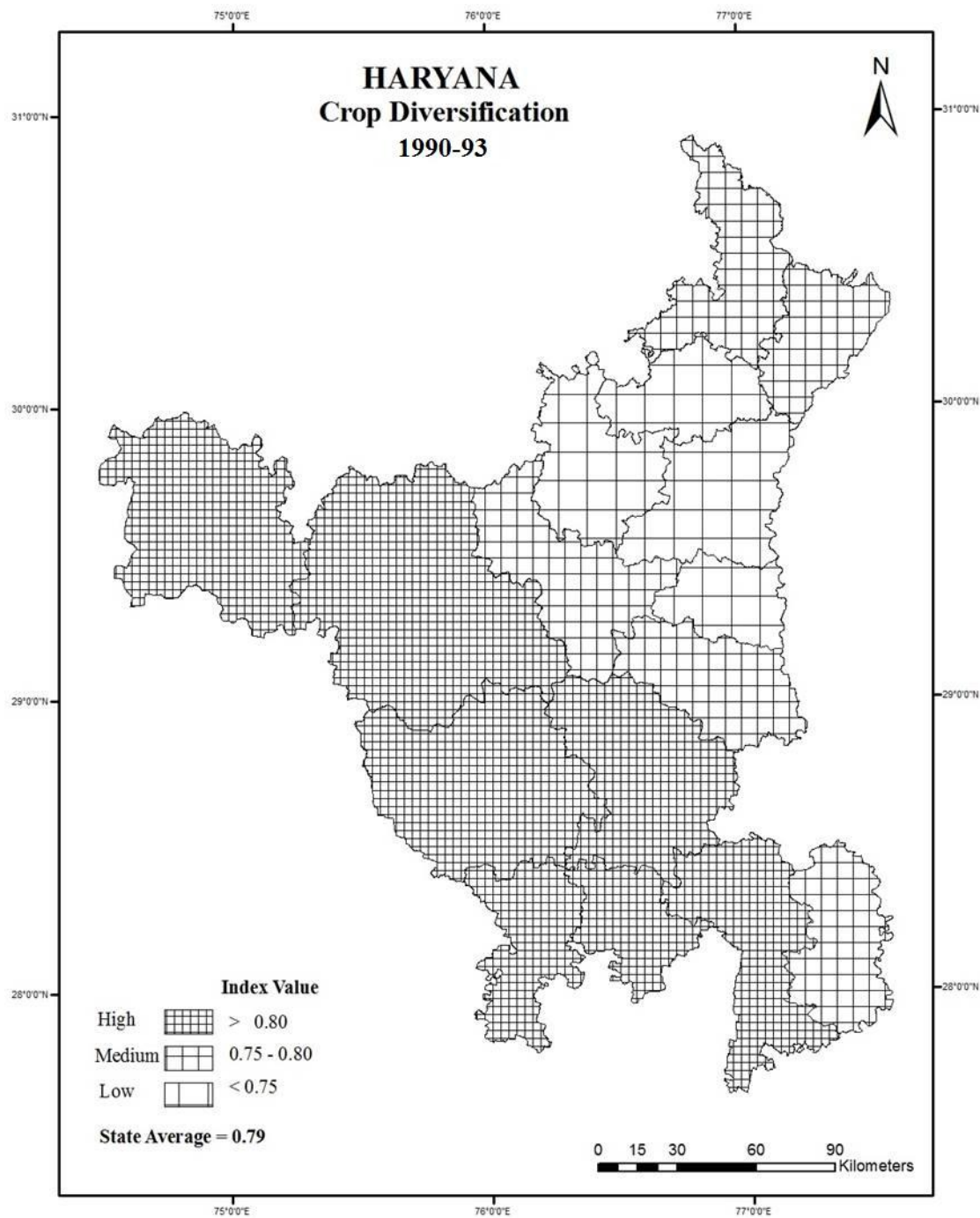
Ambala, Yamunanagar, Jind, Sonipat and Faridabad districts formed this category. In these districts the farmers preferred to grow only those crops which respond well in the prevailing physical conditions of these areas.

##### (c). Areas with low crop diversification (< 0.75 index value)

Karnal, Kurukshetra, Kaithal, Panipat districts include in this category. Here the index value of crop diversification below 0.75 index value in these districts. These districts well developed



network of transport, high extent of irrigation, high degree of mechanization, diffusion of agricultural innovations, fertile soils, availability of sub-soil water, high degree of crop commercialization etc compel the farmers to grow wheat during rabi and rice during kharif season which resulted in low crop diversification



Source: Statistical Abstracts of Haryana – 1991-1994

### Pattern of Area in different crops in Haryana: (2009-12)

Below the table is shows the percent of area of diffrents crops in Haryana during the year 2009-12 in this table the shows rice crops area in kurukshetra and karnal districts high compare to other districts. and wheat crops growing in overall Haryana. The maize crop is high percent of area compare to other districts Panchkula district. Wheat is the major crops of Haryana and rice is second crops. Cotton is high percent of area in sirsa distric and second is hissar district. In this table other crops include potato and chilly these crops percent of area under 0.08

### Percent share of area under different crops in Haryana: (2009-12)

Districts	Rice	Jawar	Bajra	Maize	Wheat	Barley	Other cereals	Total cereals	Gram	Mash	Moong
Ambala	15.52	0	0.08	0.21	16.34	0	0	32.14	0.02	0.15	0
Panchkula	8.91	0	1.06	5.71	15.49	0	0	31.17	0.19	0.29	0
Yamunanagar	14.11	0.00	0.12	0.29	16.46	0.00	0.00	30.98	0.02	0.10	0.00
Kurukshetra	16.63	0.00	0.00	0.11	15.37	0.00	0.00	32.13	0.01	0.03	0.10
Kaithal	15.47	0.00	0.56	0.00	16.86	0.00	0.00	32.90	0.01	0.00	0.00
Karnal	16.00	0.00	0.10	0.02	16.66	0.01	0.00	32.79	0.01	0.02	0.00
Panipat	15.2	0.0	0.1	0.0	17.3	0.0	0.0	32.6	0.0	0.0	0.0
Sonipat	11.14	0.88	1.34	0.07	19.09	0.02	0.00	32.54	0.00	0.00	0.00
Rohtak	6.41	3.20	3.31	0.11	16.73	0.26	0.00	30.03	0.15	0.00	0.02
Jhajhar	4.89	2.12	5.97	0.02	15.54	0.73	0.00	29.26	0.06	0.00	0.00
Faridabad	8.01	0.63	2.72	0.00	21.25	0.00	0.00	32.61	0.00	0.00	0.00
Palwal	7.06	1.79	1.74	0.00	21.70	0.20	0.00	32.49	0.00	0.00	0.07
Gurgaon	1.59	0.40	10.47	0.00	17.41	0.60	0.00	30.43	0.00	0.00	0.00
Mewat	1.49	3.13	6.14	0.00	17.47	0.24	0.00	28.49	0.10	0.00	0.00
Rewari	0.68	0.19	12.98	0.00	9.98	0.39	0.00	24.20	0.00	0.00	0.00
Mahendergarh	0	0	16.45	0	5.96	0.13	0	22.54	1.09	0	0.029
Bhiwani	1.08	0.00	10.53	0.00	9.33	0.79	0.00	21.73	2.89	0.00	0.20
Jind	9.91	0.00	2.44	0.00	18.71	0.05	0.00	31.13	0.01	0.00	0.04
Hissar	3.20	0.00	3.35	0.01	17.71	0.32	0.00	24.59	1.05	0.00	0.73
Fatehabad	9.02	0.00	0.51	0.00	19.59	0.32	0.00	29.44	0.04	0.00	0.07
Sirsa	4.40	0.01	0.27	0.00	20.86	0.51	0.00	26.05	0.52	0.00	0.09

Haryana	7.94	0.42	3.71	0.07	16.29	0.27	0.00	28.70	0.51	0.01	0.11
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Cont....

Districts	Massar	Other pulses	Total pulses	Total foodgrain	Mustard	Other oilseed	Total oilseed	Cotton	sugarcane	Other
Ambala	0.13	0	0.28	32.44	0.24	0	0.24	0.00	1.80	0.39
Panchkula	0.19	0.29	0.97	32.14	1.36	0	1.45	0	0.48	0.29
Yamunanagar	0.16	0.00	0.31	31.27	0.50	0.00	0.56	0.00	5.03	0.10
Kurukshetra	0.05	0.00	0.18	32.32	0.21	0.00	0.58	0.00	1.36	0.92
Kaithal	0.01	0.00	0.02	32.93	0.08	0.00	0.08	0.83	0.25	0
Karnal	0.04	0.04	0.11	32.88	0.10	0.00	0.10	0.00	1.04	0.10
Panipat	0.0	0.2	0.2	32.8	0.2	0.0	0.2	0.0	1.4	0
Sonipat	0.00	0.25	0.25	32.77	0.27	0.00	0.27	0.09	0.93	0.09
Rohtak	0.00	0.75	0.91	30.91	2.14	0.00	2.14	1.62	1.31	0
Jhajhar	0.00	0.74	0.81	30.05	4.59	0.00	4.63	0.16	0.44	0
Faridabad	0.00	0.21	0.21	32.82	0.49	0.00	0.56	0.07	0.42	0
Palwal	0.00	0.20	0.26	32.73	0.61	0.00	0.63	0.07	0.46	0
Gurgaon	0.00	0.10	0.10	30.53	4.15	0.00	4.22	0.00	0.00	0
Mewat	0.29	0.17	0.56	29.05	6.29	0.00	6.39	0.00	0.17	0
Rewari	0.00	0.17	0.17	24.36	13.29	0.00	13.37	0.23	0.00	0
Mahendergarh	0	0.04	1.16	23.71	14.29	0	14.32	0.28	0	0
Bhiwani	0.00	0.26	3.35	25.07	10.46	0.00	10.49	3.67	0.15	0
Jind	0.00	0.00	0.04	31.18	0.38	0.00	0.39	5.44	0.25	0.03
Hissar	0.00	0.24	1.81	26.40	4.46	0.00	4.53	11.46	0.09	0.03
Fatehabad	0.00	0.02	0.13	29.57	0.91	0.00	0.94	9.40	0.01	0.02
Sirsa	0.00	0.05	0.66	26.72	2.43	0.00	2.67	14.74	0.00	0.01
Haryana	0.02	0.14	0.79	29.49	3.45	0.00	3.51	3.87	0.61	0.08

Source: Statistical Abstracts of Haryana – 2010-2013

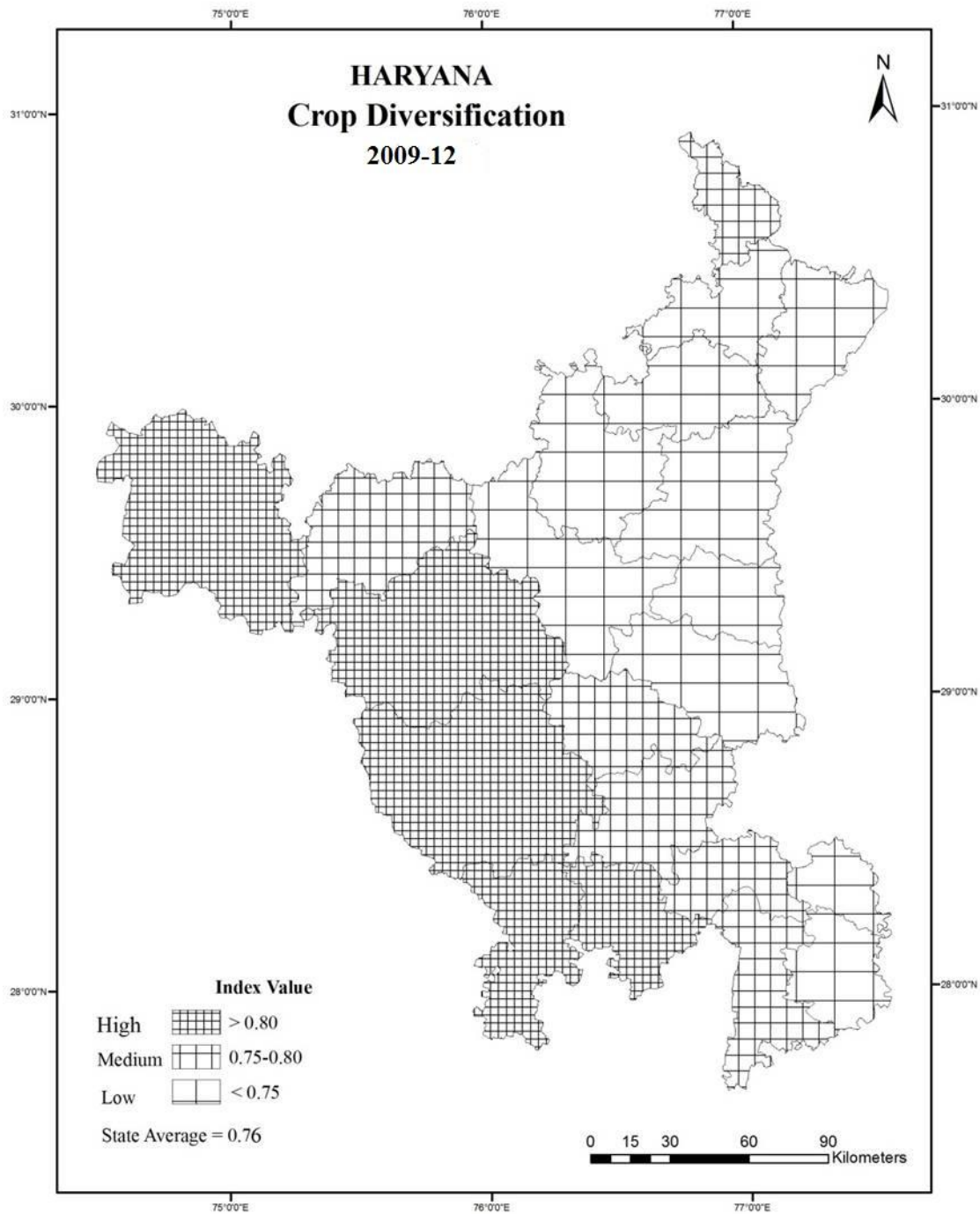
### Index of Crop Diversification in Haryana: 2009-012

Districts	Gibbs And Martin's(index value)
AMBALA	0.74
PANCHKULA	0.76
YAMUNANAGAR	0.75
KURUKSHETRA	0.74
KAITHAL	0.73
KARNAL	0.73
PANIPAT	0.73
SONIPAT	0.74
ROHTAK	0.77
JHAJHAR	0.78
FARIDABAD	0.73
PALWAL	0.73
GURGAON	0.76
MEWAT	0.79
REWARI	0.81
MAHENDERGARH	0.82
BHIWANI	0.84
JIND	0.75
HISSAR	0.82
FATEHABAD	0.77
SIRSA	0.80
HARYANA	0.76

Source: Statistical Abstracts of Haryana – 2010-2013

**Pattern of Crop Diversification in: 2009-12**

Spatial distribution of magnitude of crop diversification



Source: Statistical Abstracts of Haryana – 2010-2013

The index value for overall crop diversification according to Gibbs and Martin's formula was 0.76 in the study region. It ranged from 0.73 index values in district of Kaithal, Karnal, Panipat, Faridabad and Palwal to 0.84 index values in Bhiwani district.

The variations in magnitude of crop diversification are shown in which contain the following categories.

(a). Areas of high crop diversification ( $> 0.80$  index value)

High crop diversification was found in the districts of Hissar, Sirsa, Bhiwani, Rewari, and Mahendergarh. The districts of Hissar, Sirsa, Bhiwani, Rewari and Mahendergarh, have sandy soil, less developed agricultural infrastructure, low rainfall etc, were responsible for high crop diversification.

(b). Areas of Moderate crop diversification (0.75 to 0.80 index value)

This category was found in eight districts out of twenty one. Yamunanagar, Panchkula, Rohtak, Jhajhar, Gurgaon, Mewat, Fatehabad and Jind districts. Development of agricultural infrastructure, increase in irrigational facilities made these districts to do cultivation of vegetables, sugarcane, wheat, rice, fodder and pulses crops. All these reasons were responsible for moderate crop diversification

(c). Areas of low crop diversification ( $< 0.75$  index value)

Ambala, Kurukshetra, Kaithal, Karnal, Sonapat, Panipat, Faridabad, and Palwal. Firstly the favourable physical environment for crop farming. These districts well developed network of transport, high extent of irrigation, high degree of mechanization, diffusion of agricultural innovations, fertile soils, availability of sub-soil water, high degree of crop commercialization etc compel the farmers to grow wheat during rabi and rice during kharif season which resulted in low crop diversification.

## **CHANGES OF CROP DIVERSIFICATION**

Drastic changes in technological, infrastructural, organizational, social institutions, etc. have taken place during the period under present investigation. For instance extension in irrigational facilities, extent in net sown area, increase in area sown more than once, increase in intensity of cropping, increase in area under HYV of seeds particularly wheat and rice crops, increase in use of chemical fertilizers and plant protection measure, increase in density of tube wells and density of tractors, increase in wheat threshers and harvest combines, rural link roads, rural

electrification, market networks, remunerative prices, liberal credit facilities, government policies, agriculture search and extension services, farmers training programmers', etc.

This remarkable increase in the proceeding of factors have led to dramatic changes in the land use and cropping pattern. The cropping pattern of 1991-92 was of high diversified in nature. But, it had changed into miner change in high magnitude of crop diversification in 2011-12 and which lead to the cultivation of few crops by the farmers, for instance wheat, maize, rice, fodder crops along the North, wheat-cotton and wheat-cotton-rice along the western parts and Bajra, wheat, oil seeds, fodder in the southern parts. Thus, adoption of these crops by the farmers depends upon higher and assured economic returns from the crops and thus farmers have become choosy while selecting the cultivation of crops. And as a result those crops which were not remunerative were left by the farmers and consequently those crops have disappeared from the agricultural land scape. For instance grams have disappeared in West South parts and maize along the north. . Here the change in crop diversification which has taken place in the study region is to be discussed technique. Techniques for calculating the index of crop diversification

**Index of Crop Diversification in Haryana  
After Gibbs & Martin's Technique: 1990-93 to 2009-12**

DISTRICTS	1991 -92	2011-12	Change
AMBALA	0.78	0.74	-0.04
PANCHKULA	0.78	0.76	- 0.02
YAMUNANAGAR	0.79	0.75	-0.04
KURUKSHETRA	0.75	0.74	-0.01
KAITHAL	0.75	0.73	-0.02
KARNAL	0.74	0.73	-0.01
PANIPAT	0.75	0.73	-0.02
SONIPAT	0.78	0.74	-0.04
ROHTAK	0.83	0.77	-0.06
JHAJHAR	0.83	0.78	-0.05
FARIDABAD	0.79	0.73	0.06
PALWAL	0.79	0.73	-0.06
GURGAON	0.83	0.76	0.07
MEWAT	0.83	0.79	-0.04
REWARI	0.82	0.81	-0.01
MAHENDERGARH	0.82	0.82	0
BHIWANI	0.84	0.84	0
JIND	0.80	0.75	-0.05
HISSAR	0.84	0.82	-0.02
FATEHABAD	0.84	0.77	-0.07
SIRSA	0.84	0.80	-0.04

HARYANA	0.79	0.76	-0.03
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## CONCLUSION

Drastic changes in technological, infrastructural, organizational, social institutions, etc. have taken place during the period under present investigation. For instance extension in irrigational facilities, extent in net sown area, increase in area sown more than once, increase in intensity of cropping. For instance extension in irrigational facilities, extent in net sown area, increase in area sown more than once, increase in intensity of cropping. Increase in area under HYV of seeds particularly wheat and rice crops. Increase in use of chemical fertilizers and plant protection measure. Increase in density of tube wells and density of tractors. The cropping pattern of 1990-93 was of high diversified in nature. But, it had changed into minor change in high magnitude of crop diversification in 2009-12 and which lead to the cultivation of few crops by the farmers, for instance wheat, maize, rice, fodder crops along the North, wheat-cotton and wheat-cotton-rice along the western parts and Bajra, wheat, oil seeds, fodder in the southern parts. Thus, adoption of these crops by the farmers depends upon higher and assured economic returns from the crops and thus farmers have become choosy while selecting the cultivation of crops. And as a result those crops which were not remunerative were left by the farmers and consequently those crops have disappeared from the agricultural land scape. For instance grams have disappeared in West South parts and maize along the north.



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