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RNI MAHMUL/2011/38595

ISSN No.2231-5063

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Golden Research Thoughts

ISSN 2231-5063

Impact Factor :3.4052(UIF)

Volume - 4 | Issue - 12 | June - 2015

Available online at www.aygrt.isrj.org

THE SPATIO-TEMPORAL ANALYSIS OF CROPPING PATTERN IN HARYANA



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Short Profile

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ABSTRACT:

Cropping pattern is the proportion of area under different crops at a point of time. Indian agricultural history is witness of the new agriculture arrangement which took place in India has changed the overall traditional cropping pattern in India as well as in Haryana. There are many agriculture reforms such as land reforms, green revolution, minimum support price, and new economic reforms have adopted in Haryana agriculture. These reforms have directly affected the cropping pattern in overall Haryana. The present paper emphasis on

studying the cropping pattern in Haryana and answer to many questions relating to cropping pattern of the Haryana. The study will tell us what is the existing cropping pattern in the Haryana and the changes in cropping pattern between the period 1966-69, 1990 -1993 and 2009-2012. The changes and controlling factors which will help in improving cropping pattern of the Haryana. It helps in how cropping pattern and decision making process has influenced by environmental factors, how the total sown area in wheat and rice is continuously increasing whereas the area under gram, sugar cane and barley has been continuously decreasing and Southern and western Haryana continuously maintain their dominant position in term of cotton crop during this time period.

KEYWORDS

Cropping Pattern, GIS, Cropped Area, agriculture reforms, economic reforms.

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1. INTRODUCTION

The cropping pattern can be defined as the change in proportion of area under different crops at two different points of time. The cropping patterns of a region are closely influenced by the geo-climatic, socio-economic, historical and political factors (Hussain, M. 1996). Patterns of crop land use of a region are the manifestation of the combined influence of physical and human environment. Cropping pattern is also depending on terrain, topography, slope, soils and availability of water for irrigation use of pesticides, fertilizers and mechanization.

Cropping pattern is a dynamic concept because no cropping pattern can be said to be ideal for all times to a particular region because it changes in space and time with a view to meet requirements and is governed largely by the physical as well as cultural and technological factors. The change in cropping pattern in a particular span of time clearly indicates the changes that have taken place in the agricultural development. These changes are brought about by socio-economic influence. "In most of the situations, the physical environment reduces the choice of certain crops altogether or by reducing their level (Morgan, W.B. and Munton R.J.C. 1971). Cropping pattern must ensure the greatest efficiency of man, fertilizers, irrigation and other inputs. A successful cropping pattern implies the most efficient use of arable land, consequent upon application of water resources, bio-chemical inputs. In addition, it must offer the cultivators the possibility to maximize agricultural productivity per unit area per unit of time. A cropping pattern is determined by the interaction of physical and socio-economic factors over a period of time. No cropping pattern can be good for all times to come. But there is often a tendency for the cropping pattern to stabilize over a period of time in different agro-climatic homogeneous farming area (Singh and Sharma, 1985). Krishna (1972) in his studies has also stressed that the cropping pattern of the country should logically being with the study of its climatic and soil conditions which constitute the regional and the sub-terranean environment of crop plants. The major objective is to analyse the spatial and temporal change in cropping patterns in Haryana between these three periods (1966-69, 1990-93 and 2009-12) and understand the factor affecting and controlling cropping pattern of the village.

2. STUDY AREA:

The present study relates to the state of Haryana, which lies between 27°39' to 30°55' N latitudes and 74°28' to 77°36' E longitudes. The state has natural geographical boundaries of the Shivalik hills in the north, the river Yamuna in the east and the river Ghaggar in the west. The southwest boundary is provided by a range of Aravalli hills which runs through southern Delhi and Gurgaon district upto Alwar in Rajasthan. The State of Haryana has an area of 44212 sq. km which forms 1.4 percent of the total area of the country. The State landscape and soil fertility are remarkably diverse. The national capital Delhi is surrounded on three sides by Haryana. Haryana state is bordered in a clock-wise direction by Himachal Pradesh in the north, Uttrakhand, Uttar Pradesh and Delhi in the east, Rajasthan in south and south west and Punjab in the north-west.

The climate of the state is subtropical, semi-arid to sub-humid, continental and monsoon type. The average rainfall in the state is 560 mm which varies from less than 300 mm in south-western parts to over 1000 mm in the hilly tracks of the Shivalik hills. The soils of Haryana have been divided into 10 distinct units, namely soils of Shivalik hills, soils of piedment plains soils of Aravalli hills, soils of old

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alluvial plains, soils of active flood plains, soils of aeofluvial plains, soils of aeolian plain. Haryana, an intensively cultivated State, is deficient in natural forests. Forests are mainly distributed in the north-eastern and south-eastern districts of State. There are three forest types, the Tropical Dry Deciduous in the eastern part, Tropical Moist Deciduous in the Shivalik region and Tropical Thorn Forests in the western part of the State.

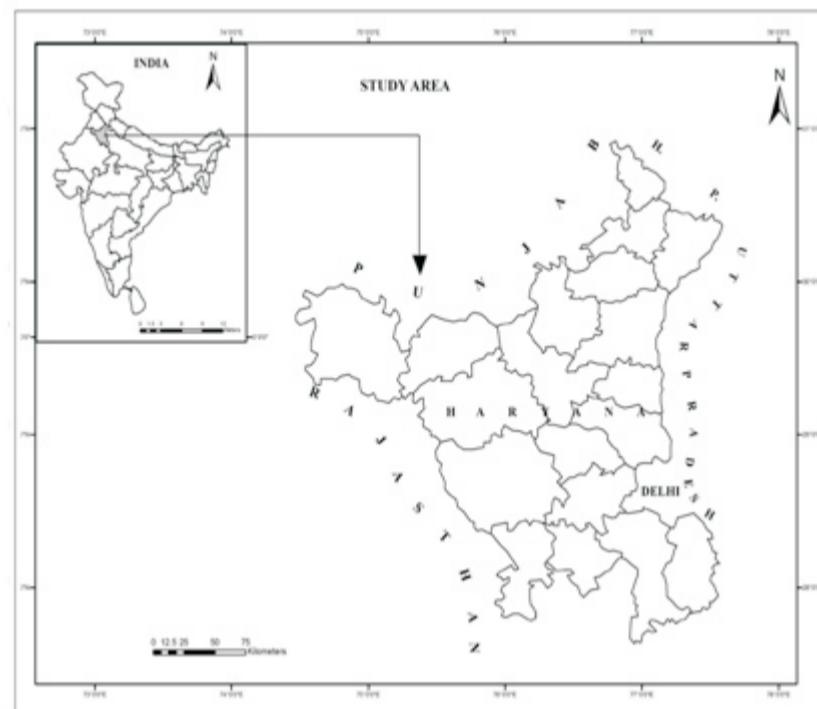


Figure 1: Study Area

3. DATA BASE AND METHODOLOGY:

The present study of cropping pattern is based on the Haryana. It involves basically secondary data. The secondary data concerning cropping pattern have been collected from Statistical Abstract of Haryana, Economic and Statistical Organization, Chandigarh. To study change in cropping pattern in Haryana state three time periods have been chosen and data collected on district level. To see the change in cropping pattern average have been calculated for years 1966-69, 1990-93 and 2009-12. The percentage area under different crops is evaluated from the total cropped area.

The map is the main tool for geographical analysis, synthesis and interpretation. The maps are prepared with the help of the GIS tool (Arc- GIS 9.3). District-wise spatial variation in cropping pattern have been shown in pie-diagrams method for three periods of time.

4. RESULTS AND DISCUSSION:

The Comparative bar diagram clearly shows the cropping pattern in Haryana of major crops in temporal periods (1966-69, 1990-93 and 2009-12). If we see the cropping pattern of major crops bar diagram clearly shows the changing cropping pattern in Haryana.

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Crops types	Year		
	1966-69	1990-93	2009-12
Wheat	17.98	32.14	38.89
Rice	4.62	11.57	19.04
Bajra	19.21	10.38	9.41
Gram	20.28	7.75	1.42
Cotton	4.61	8.81	8.27
Mustard	3.70	9.63	8.05
Jawar	5.59	2.01	1.10
Sugercane	3.12	2.58	1.34
Barle	4.70	0.92	0.62
Other crops	16.19	13.89	11.86

Source: Economic and Statistical Department, Chandigarh.

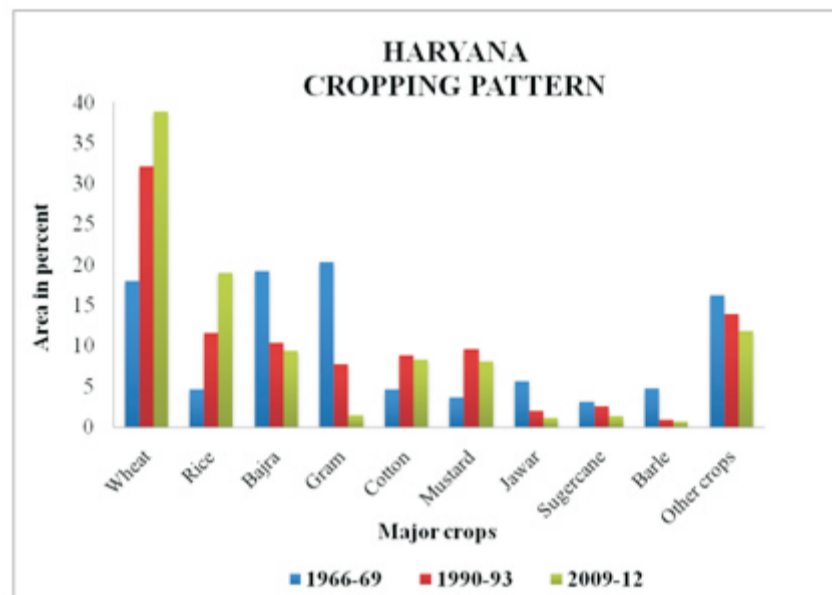


Figure 2: Cropping Pattern in Haryana

In case of wheat the diagram shows very clearly that all three time periods there is continuously increasing area under cultivation. In base time period (1966-69) Wheat crop area cover 18 percent and present time period(2009-12) it is on peak with 39 percent. Rice cultivation area is also increasing time to time. In1966-69 year rice was only 5 percent whereas in the present time (2009-12) is second ranking

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crop with 19 percent area under its cultivation. In case of Bajra, Jowar, Sugercane and Barley there is declining area under cultivation but in case of Cotton and Mustard area increase in 1990-93 whereas area decline in 1990-93.

In case of gram diagram clearly shows that Gram cultivation is near about totally washed out from Haryana. During the period (1966-69) Gram was the dominant crop with 20 percent, whereas in the present time (2009-12) it is only one percent. In overall the diagram clearly shows that there is dominance of Wheat and Rice cropping pattern in Haryana.

Cropping Pattern (1966-69), During the base year (1966-69) Table: 2 shows, Haryana plains had a diversified overall cropping pattern which was having 15 crops namely Gram, Bajra, Wheat, Jowar, Barley, Rice, Cotton, Mustard, Sugarcane, Maize, other Pulses etc. Among these crops, Gram was dominant crop with 20.28 percent area under its cultivation.

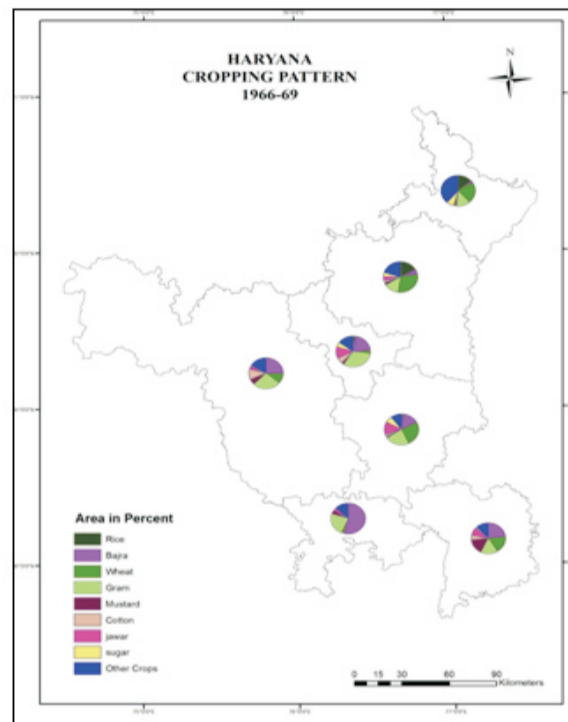
Districts	Wheat	Rice	Bajra	Jowar	Gram	Mustard	Cotton	Sugercane	Other Crops
Hisar	10.6	0.9	24.2	3.1	25.5	5.5	10.7	1.1	18.4
Rohtak	25.4	1.9	14.6	13.0	21.1	1.6	2.4	6.6	13.4
Gurgaon	19.0	0.1	23.5	8.3	16.7	5.4	0.3	1.6	25.0
Karnal	29.3	16.3	4.6	3.6	13.5	2.5	2.4	4.2	23.7
Ambala	22.4	13.6	1.8	0.4	12.2	1.8	1.0	6.7	40.1
Jind	17.7	2.1	17.3	9.8	26.4	2.1	5.2	4.2	15.3
M. garh	2.7	0.0	49.6	2.8	21.3	3.5	0.1	0.6	19.4
Total	18.0	4.6	19.2	5.6	20.3	3.7	4.6	3.1	20.9

Source: Economic and Statistical Department, Chandigarh (1966-1969).

In 1966-69 year northern and eastern Haryana wheat is dominant crop followed by Rice, Gram, Sugercane and other crops. In this area wheat and rice was good combination because of the development of irrigation facilities and fertile soil. In western and central part of Haryana due to climatic condition (high temperature and low rainfall), lack of irrigational facilities, soft loam soil, gram (above 25 percent) was an important place in cropping pattern and other major crops are there Bajra, Wheat, Cotton, Mustard, Barley etc. it reveals that southern Haryana Bajra was dominant crop. A considerable proportion of area devoted to Wheat, Gram, Jowar and Cotton cultivation

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4.1 CROPPING PATTERN (1990-93)

Table: 2 shows that during 1990-93, a very high proportion of cropped area is devoted to fine-foodgrains (Wheat-Rice) combination in northeastern and central part of Haryana. During this period wheat was the first ranking crop in all over Haryana except Bhiwani, Mahendergarh and Rewari. It was cultivated almost in all the districts of the study region. But its distribution was not uniform. The highest area under wheat cultivation was found in Sonipat district with 49 percent of total cropped area. Whereas the minimum share was found in Bhiwani district with 11 percent of total cropped area.

Districts	Wheat	Bajra	Rice	Gram	Mustard	Cotton	Sugercane	Other Crops
Ambala	38.5	0.5	24.6	1.4	1.8	0.2	4.4	28.5
Yamunanagar	31.8	0.8	22.5	1.0	0.8	0.2	22.3	20.7
Kurukshetra	40.5	0.1	39.0	0.2	0.6	0.1	4.7	14.9
Kaithal	46.3	2.7	31.3	0.5	2.1	2.2	1.8	13.1
Karnal	43.4	0.3	39.7	0.2	0.2	0.2	2.5	13.5
Panipat	45.5	0.7	31.1	0.3	0.4	0.3	3.8	17.9
Sonipat	48.7	2.5	12.4	0.5	3.0	0.5	5.1	26.7
Rohatak	35.6	9.5	1.1	4.8	17.2	2.2	4.9	24.8
Faridabad	46.4	9.1	3.2	0.4	7.6	0.1	4.4	28.8
Gurgaon	31.7	19.7	0.5	3.9	21.8	0.0	0.2	22.1
Rewari	21.7	28.1	0.0	5.6	30.6	0.0	0.0	14.0
Mahendergarh	13.0	37.8	0.0	11.5	28.2	0.1	0.0	9.4
Bhiwani	11.1	30.3	0.0	26.7	15.1	4.6	0.2	11.8
Jind	34.9	10.2	10.8	4.2	4.6	10.9	2.7	18.1
Hisar	27.5	8.9	3.9	12.2	9.3	25.0	0.5	12.7
Sirsa	29.6	1.1	4.4	12.8	8.7	29.9	0.0	13.5
Total	32.1	10.4	11.6	7.7	9.6	8.8	2.6	16.8

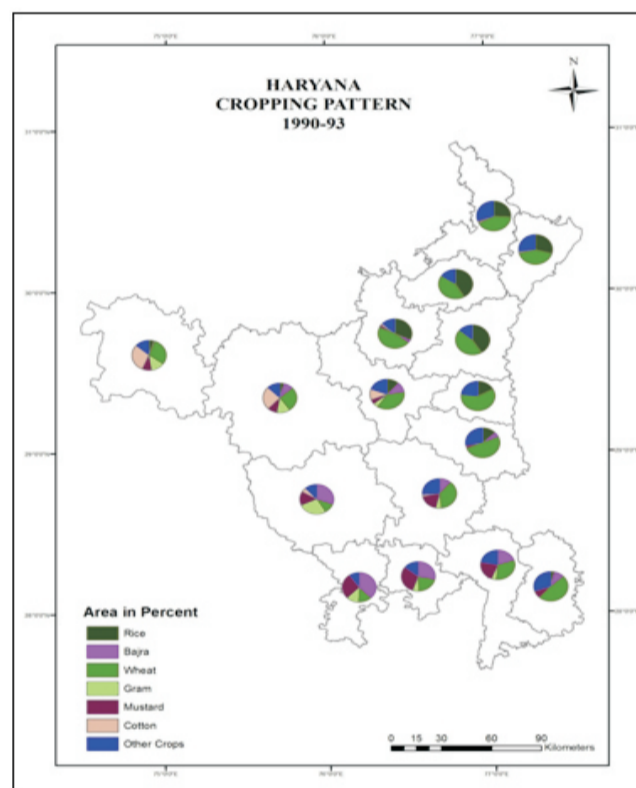
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Source: Economic and Statistical Department, Chandigarh(1990-1993).

In Hisar and Sirsa districts of Haryana, Wheat (above 27 percent) was first ranking crop followed by cotton as second ranking crop, which occupies above 20 percent of total cropped area because of favourable climatic condition, development of irrigation and soft loam soil. In case of Yamunanagar district because of level land, fertile alluvial soil, adequate rainfall and irrigation, a high proportion of total cropped area was devoted to sugercane cultivation. South-western part of Haryana major crops are Bajra, Mustard, Wheat, Gram and Cotton area under cultivation due to less development of irrigation, unreliable rainfall and undulating surface.



4.2 CROPPING PATTERN (2009-12)

During the period 2009-2012 (Table: 3) shows that most of the arable land was devoted to Wheat (39 percent) and Rice (19 percent) combination in northern, eastern and central part of Haryana district. It is due to availability of irrigation facilities, fertile soil and level land.

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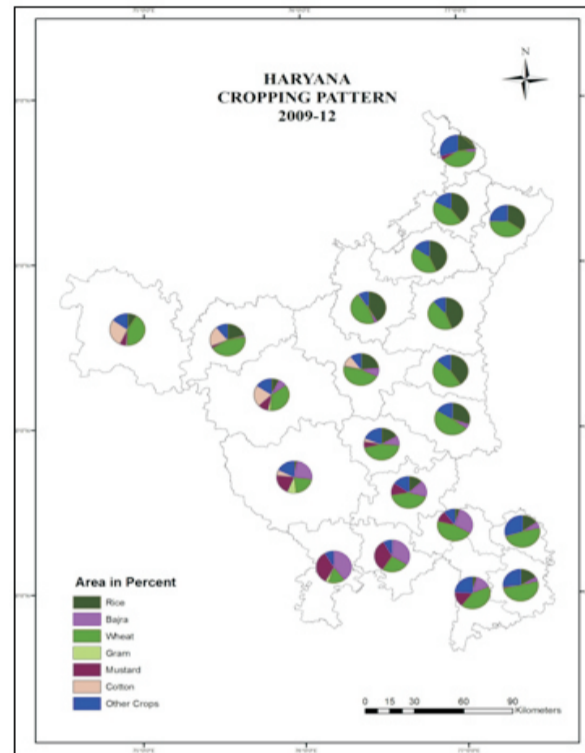
Table: 3 Districtwise Percentage Area of Major Crops in Haryana 2009-12.

Districts	Rice	Bajra	Wheat	Gram	Mustard	Cotton	Other Crops
Ambala	39.8	0.2	42.0	0.0	0.6	0.0	17.3
Panchkula	22.4	2.6	40.3	0.8	4.4	0.0	29.5
Yamunanagar	34.4	0.4	39.6	0.0	1.1	0.0	24.5
Kurukshetra	43.3	0.0	41.0	0.0	0.4	0.0	15.3
Kaithal	41.6	2.3	45.6	0.0	0.2	1.4	8.9
Karnal	43.8	0.2	44.2	0.0	0.2	0.0	11.5
Panipat	40.3	0.3	45.6	0.0	0.5	0.0	13.5
Sonipat	30.3	4.0	48.6	0.0	0.8	0.2	16.1
Rohtak	16.6	9.2	45.1	0.4	6.0	3.6	19.0
Jhajjar	12.5	16.3	42.7	0.2	12.7	0.3	15.2
Faridabad	15.3	6.0	48.0	0.0	1.2	0.0	29.4
Palwal	16.6	4.0	51.2	0.0	1.6	0.2	26.4
Gurgaon	4.2	29.1	45.3	0.0	11.3	0.0	10.1
Mewat	3.5	14.9	41.9	0.3	14.9	0.0	24.4
Rewari	1.4	32.2	25.2	0.0	32.9	0.4	7.9
Mahendargarh	0.0	39.4	15.3	2.6	33.8	0.4	8.4
Bhiwani	2.6	24.6	21.2	7.8	20.3	5.8	17.7
Jind	23.8	8.2	45.7	0.0	1.0	11.0	10.3
Hisar	6.9	7.8	36.2	2.3	9.7	21.7	15.2
Fathehabad	20.3	1.6	44.5	0.1	2.2	20.7	10.6
Sirsa	8.8	0.6	40.9	1.2	5.6	27.9	15.0
Total	19.0	9.4	38.9	1.4	8.0	8.3	14.9

Source: Economic and Statistical Department, Chandigarh (2009-2012).

The cropped area in Haryana area under wheat and rice are continuously increasing whereas the area under gram, sugarcane and barley has been continuously decreasing. Western and central Haryana continuously maintain their dominant position in term of cotton crop. The vital and determining factor in cotton cultivation in these districts is climate. Here the rainfall is low and temperature is high during its growing period and warm dry weather at the time of picking which are the favourable factors for its cultivation. In south-western part of Haryana (Mahendargarh, Rewari and Bhiwani) Bajra and Mustard are the major crops.

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Mustard (34 percent) and Bajra's(39 percent) maximum proportion is found in Mahendargarh district followed by Rewari and Bhiwani. In these districts Bajra and Mustard are dominant crops because of suitable climatic conditions for its cultivation. Here annual rainfall is less than 20 cm which is ideal for its cultivation. The physical environment of these districts is not suitable for other crops like Rice, Maize, etc.

5.CONCLUSION:

The total cropped area in Haryana area under wheat and rice is continuously increasing whereas the area under Gram, Sugarcane and Barley has been continuously decreasing. In northern Haryana, there is dominance of Rice and Wheat cropping pattern.Gram cultivation has drastic declined in term of total cropped area from the base year (1966-69) in which it account 20 percent of the area under cultivation, now it has only 1 percent area under cultivation (2009-12).Central and western Haryana continuously maintain their dominant position in term of Cotton crop.

In case of Yamunanagar district because of level land, fertile alluvial soil, adequate rainfall and irrigation, a high proportion of total cropped area was devoted to Sugercane cultivation.South-western part of Haryana major crops are Bajra, Mustard, Wheat, Gram and Cotton area under cultivation due to less development of irrigation, unreliable rainfall, rough and undulating surface (The Arawalli range and sand dunes). The study reveals that south and western part of Haryana is more diversified area than north and eastern Haryana. Because of the in north and eastern Haryana mostly seen the wheat and rice combination whereas south and western part of Haryana have different type of crops e.g. Wheat, Cotton, Bajra, Mustard, Rice, Gram, Barley etc.

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