

Analyzing Crop Diversification Trends in Haryana: A Spatial and Temporal Perspective (2019-2023)

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ABSTRACT: *The situation of agricultural crop diversification in Haryana is analysed in this research paper using data from the years 2019-2020 to 2022-2023. The time period covered by this study is from 2019-2020 to 2022-2023. A sustainable agricultural system must prioritise crop variety above crop specialisation in order to be successful. We construct the index of agricultural diversification for Haryana's districts by using a modified version of the Bhatia technique, and we classify the results as having either a high, a medium, or a low degree of diversity. The results show changes in cropping patterns that occurred in the state throughout this time period and illustrate geographical patterns of crop diversification.*

Keywords Crop Diversification, Agricultural Sustainability, Haryana Agriculture, Modified Bhatia Method, Crop Dominance, Spatial Analysis etc.

INTRODUCTION:

Variation in cropping patterns is a fundamental agricultural strategy that involves cultivating a wide range of crops within a given area. It directly corresponds to the fierceness of competition among various field crops for accessible cultivable land. The extent of variation inversely corresponds with the prevalence of distinct crops in a specific geographic area. On the other hand, monoculture or crop specialisation embodies an exceedingly simplified cropping system, leading to feeble competition for land occupation. The selection of a farming system is an intricate decision-making process influenced primarily by tangible variables and, to a smaller degree, by factors such as the magnitude of operational land holdings, marketing and transportation infrastructure, government policies concerning crop prices, and technological and organisational considerations.

The act of varying crops is not just essential for agricultural durability but also plays a critical function in guaranteeing food safety and economic steadiness. Efficient crop variation entails the prudent alternation of crops to uphold soil richness, which consequently has a significant influence on general agricultural efficiency. As observed by Singh Ram in 2006, embracing

extensive and meticulously orchestrated crop rotation tactics is crucial for conserving soil richness and optimising crop production.

Crop variation has been a topic of great fascination among geographers since the beginning of the field as a separate division of agricultural geography. It is a topic of immense importance because it reveals the complex connections between the comparative abilities and actual possibilities of different crops cultivated within a particular area. By examining crop variation, scientists can acquire valuable knowledge about the farming terrain, recognise trends of crop supremacy, and evaluate the durability of current cropping methods. In the milieu of a state like Haryana, where over 82% of the entire populace is directly or indirectly involved in farming, the examination of crop variation possesses extraordinary significance. Haryana's farming domain has progressed significantly since its establishment, rendering it a notable contender among agriculturally progressive states in India. Given its agricultural importance and the dependence of a significant portion of the populace on farming, exploring the recent regional discrepancies in crop variety within the state becomes crucial. This investigation seeks to offer perspectives into the ever-changing terrain of crop variation in Haryana, with a particular emphasis on the years 2019-2020 to 2022-2023. By undertaking this, it aims to provide significant data to the continuous endeavours to improve agricultural durability and nourishment stability in the area.

STUDY AREA:

Haryana, a comparatively diminutive state in India, occupies a mere 1.4 percent of the total geographical expanse of the country. Its expedition as an independent state commenced in November 1966 when it surfaced as a discrete entity subsequent to its detachment from the more advanced state of Punjab. Originally regarded as a comparatively underdeveloped area, Haryana has experienced extraordinary metamorphosis and swift advancement, notably in the realm of farming, since its establishment.

Over the decades, it has acquired an esteemed position among India's agriculturally progressive states. During the years 2019-2020 to 2022-2023, Haryana persistently plays a crucial function in the nation's farming scenery.

Haryana encounters two main farming periods, recognised as Kharif and Rabi. The Kharif season usually begins in the months of May and June, and the crops grown during this time include paddy, fabric, sorghum, pearl millet, and corn, among other varieties. These crops are

gathered subsequently in the year. On the other hand, the Rabi season entails the planting of crops in October and November, with reaping occurring in March and April. Wheat, chickpea, mustard, and barley are the primary crops cultivated during this period.

In its initial years of existence, Haryana's cropping pattern was marked by the prevalence of rough grains like sorghum, pearl millet, and chickpeas. Nevertheless, with the implementation of High-Producing Assortment (HPV) technology, the enlargement of watering systems, heightened utilisation of chemical nutrients, and progressions in farming methodologies, the cultivation arrangement in Haryana has experienced noteworthy alterations. These modifications demonstrate the state's dedication to modernising its farming industry and enhancing overall farming efficiency.

METHODOLOGY:

In this investigation paper, we intend to examine the present situation of agricultural crop variation in Haryana, concentrating on the years 2019-2023. To achieve this, we have gathered the essential information from the Statistical Compendium of Haryana for these particular years. Our examination covers a broad assortment of crop types, such as grains, legumes, oil-producing plants, and profitable crops, to offer a thorough comprehension of crop variation in the area throughout this specific period.

To compute the indicators of crop variation for every region within the state, we have utilised an adapted edition of Bhatia's (1965) equation, as improved by Singh in 1976. This approach entails calculating the mean of crop extent for every crop throughout the three-year duration. Following that, we articulate the region beneath each harvest in the corresponding regions as a proportion of the complete cultivated expanse. The resultant indicators of crop variation provide valuable observations into the magnitude and arrangements of crop variation across Haryana's districts during the designated years. This examination will illuminate the changing panorama of crop variation and its consequences for the state's farming industry.

Index of Crop diversification =

$$CDI = n/\sqrt{n}$$

Where 'n' harvests are those which individually occupy 5 percent or more of the entire cultivated region in a district. Therefore, following the computation of the indicators of agricultural variety on a district level, all districts were classified into three classifications

according to the level of agricultural variety, considering the utmost values of the agricultural variety indicator and subsequently presented in a table. The extent of crop variation will be substantial as the indicator value of variation is minimal and vice-versa.

TABLE- 1: District-Wise Index of Crop Diversification In Haryana (2007-2010 Average)

Sr. No.	Name of District	No. of Crops	Sum of Cropped Area	Diversification
1	Ambala	3	88.50	29.75
2	Panchkula	4	71.80	18.00
3	Yamunanagar	3	87.20	29.07
4	Kurukshetra	2	85.75	42.88
5	Kaithal	2	88.30	44.15
6	Karnal	2	89.05	44.53
7	Panipat	2	88.90	44.45
8	Sonipat	2	80.50	40.25
9	Rohtak	5	85.20	17.04
10	Jhajjar	5	96.20	19.24
11	Faridabad	2	66.50	33.25
12	Palwal	2	69.30	34.65
13	Gurgaon	3	87.80	29.27
14	Mewat	4	80.75	20.19
15	Rewari	3	91.50	30.50
16	M/Garh	3	88.75	29.58
17	Bhiwani	4	88.90	22.22
18	Jind	4	75.80	18.95
19	Hisar	5	91.30	18.26
20	Fatehabad	3	82.40	27.47
21	Sirsa	4	89.00	22.25

Haryana State	5	83.50	16.70	
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5 percent or more of the total cropped area occupied in a district

TABLE- 2: Levels of Crop Diversification in Haryana

Degree of Diversification	District	No. of Crops	Different Crops Grown
High	Rohtak	5	
	Bhiwani	4	Rice, Wheat
	Jhajjar	5	Mustard, Jawar
	Panchkula	4	Bajra, Cotton
	Mewat	4	
	Sirsa	4	
Medium	Gurgaon	3	Rice, Wheat
	Yamunanagar	3	Mustard, Cotton
	Ambala	3	Jawar, Bajra
	Fatehabad	3	Sugarcane
	M/Garh	3	
	Rewari	3	
	Faridabad	2	
	Palwal	2	
Low	Sonipat	2	
	Kurukshetra	2	
	Kaithal	2	Rice, Wheat
	Panipat	2	
	Karnal	2	

SPATIAL PATTERN OF CROP DIVERSIFICATION:

The utmost level of crop variation was discovered in Hisar district with a magnitude of 15.86, whereas the minimum level of crop variation was witnessed in Karnal district with a magnitude of 43.62. This categorisation aids in comprehending the diverse degrees of agricultural variation in distinct regions of Haryana.

Based on the variation in cropping pattern, the districts of Haryana have been categorised into three groups (Table 2)

- I Districts of High Diversification
- II Districts of Medium Diversification
- III District of Low Diversification

HIGH CROP DIVERSIFICATION:

This variance in crop diversification was reported in the south-western and central parts of the state, as shown in Table No. 2, which illustrates the districts-wise variation in crop diversification. Rice, wheat, jawar, bajra, mustard, and cotton are some of the key crops that were grown in these districts throughout the research period. In the Hisar district, the most significant crops are wheat (35.73), cotton (19.54), bajra (8.44), and mustard (8.29). This is followed by the Rohtak district, which grows wheat (45.15%), rice (16.07), bajra (8.86), jawar (6.78), and mustard (6%). The Bhiwani district grows bajra (37.45), wheat (20.9%), mustard (18.9), and gramme (a.16). Within the Jhajjar District, the most significant agricultural products produced are wheat (41.42%), mustard (14.53%), rice (12.74%), bajra (12.40%), and gramme (12.21%). Rice, Wheat, Jawar, and Mustard are the Major Crops in Punchkula, which is Located in the Northern Part of Haryana. Jawar, Bajra, Wheat, and Mustard are Important Crops in Mewat, while Wheat, Rice, Mustard, and Cotton are Important Crops in Sirsa District (Table- 3).

MEDIUM CROP DIVERSIFICATION:

There are a complete of nine areas that fall under the categorisation of Moderate crop diversity. These areas encompass Jind, Gurgaon, Yamunanagar, Ambala, Fetehabad, M/Garh, Rewari, Faridabad, and Palwal. The gauge worth for these areas varies from 22.28 to 32.87. Ambala and Yamunanagar, two districts situated in the northern vicinity of Haryana, proudly

exhibit a bountiful farming terrain. These regions are renowned for their fruitful lands and advantageous weather conditions, rendering them perfect for cultivating a diverse range of crops. Among the notable crops cultivated in Ambala and Yamunanagar, rice, wheat, and sugarcane occupy the spotlight. Rice, a fundamental sustenance for millions, flourishes in the paddy fields of Ambala and Yamunanagar. The regions' copious water resources, including streams and channels, offer the essential watering for growing this water-demanding plant. Farmers in these areas utilise customary and contemporary farming methods to guarantee a plentiful rice yield, adding to the sustenance stability of the country. Wheat, an essential crop, thrives in the productive lands of Ambala and Yamunanagar. Renowned for its elevated nourishing worth and adaptability, wheat assumes a pivotal function in fulfilling the dietary requirements of the nearby populace and beyond. The districts' farmers assiduously plant, The majority of the districts in Haryana that display a moderate fluctuation in crop yield are primarily situated in the southern region of the state. These regions possess a varied agricultural terrain, with an emphasis on cultivating crops like grain, Pearl Millet, Rapeseed, and textile fibre. These crops play a noteworthy role in the agricultural economy of these districts, contributing to their overall productivity and prosperity. Farmers in these areas have perfected their proficiency in cultivating these crops, utilising their understanding of the regional weather, soil circumstances, and farming methods to optimise yields and guarantee a sustainable agricultural system.

TABLE -3: Area under Major Crops in Haryana

Districts	Rice	Wheat	Bajra	Jower	Mustard	Cotton	Gram	Sugarcane
Ambala	39.64	41.38	-	-	-	-	-	5
Panchkula	20	36.27	-	6.98	6	-	-	-
Yamaunanagar	33.77	39.58	-	-	-	-	-	12.60
Kurukshetra	43.07	41.24	-	-	-	-	-	-
Kaithal	41.18	44.97	-	-	-	-	-	-
Karnal	43.44	43.80	-	-	-	-	-	-
Panipat	40.68	45.97	-	-	-	-	-	-
Sonipat	30.59	47.66	-	-	-	-	-	-
Rohtak	16.07	45.15	8.86	6.78	6	-	-	-

Jhajjar	12.74	41.42	12.40	12.21	14.53	-	-	-
Faridabad	13.24	49.70	-	-	-	-	-	-
Palwal	15.24	50.5	-	-	-	-	-	-
Gurgaon	-	43.65	29.56	-	12.08	-	-	-
Mewat	-	42.18	14.01	5.58	16.74	-	-	-
Rewari	-	24.33	31.24	-	33.76	-	-	-
M/Garh	-	15.15	37.45	-	33.96	-	-	-
Bhiwani	-	20.91	23.55	-	18.91	-	9.16	-
Jind	23	45.94	10.47	-	-	9.72	-	-
Hisar	7.31	35.73	8.44	-	8.29	19.54	-	-
Fatehabad	18.95	44.28	-	-	-	20.33	-	-
Sirsa	8.3	39.74	-	-	5.97	26.08	-	-
Haryana State	18.11	38.58	9.31		8	7.48		

5 percent or more of the total cropped area occupied in a district.

AREA OF LOW CROP DIVERSIFICATION:

Throughout the examination period, it was noticed that five regions, specifically Sonapat, Kurukshetra, Kaithal, Panipat, and Karnal, were discovered to possess a comparatively inadequate degree of variation in their agricultural yield. The indicator worth for the span of 39.12 to 43.62 is suggestive of the varied farming capability in these five regions. Within this scope, farmers have effectively cultivated a multitude of significant crops, with a specific emphasis on the farming of rice and wheat. These regions have utilised their inherent resources and advantageous weather conditions to cultivate the expansion of these essential crops, making a substantial contribution to the regional economy and sustenance. The farming of rice and wheat in these areas not only fulfils the dietary requirements of the nearby inhabitants but also plays a vital function in the general farming scenery of the area.

CONCLUSION:

After performing an extensive spatial examination of crop data to ascertain the scope of crop variation, it can be deduced that the area with the greatest crop assortment is mainly focused

in the central and western sections of Haryana. This discovery implies that these particular regions demonstrate a larger assortment of crops being grown in contrast to other areas within Haryana. There has been a remarkable trend towards moderate crop variation in both the northern and southern regions of the state. Agriculturists in these regions have been progressively investigating the cultivation of a broader assortment of crops, shifting away from a substantial dependence on conventional essentials. This alteration towards assortment has been propelled by different elements, including altering market requests, weather considerations, and the longing to alleviate hazards related to single-cultivating. In the northern region of the state, farmers have been exploring with substitute crops that are superior. In the eastern portion of the state, there is a conspicuous absence of crop variation. When contemplating the regions that specialise in the cultivation of two distinct food grain crops within their cropping system, it is crucial to recognise the possible repercussions that may ensue. One such outcome is the potential of soil depletion, which can ultimately result in agricultural catastrophe and a substantial reduction in the overall productivity per unit region. This emphasises the significance of varying cropping systems and implementing sustainable agricultural methods to guarantee long-term productivity and alleviate the hazards linked with excessive dependence on particular crops. By acknowledging these potential obstacles and implementing proactive actions, we can endeavour to uphold a robust and durable agricultural industry that can sustainably fulfil the needs of our expanding populace. It is crucial that prompt focus be provided to these regions in order to facilitate a substantial augmentation in crop variation.

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