International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 12 No. 2, 2026
https://www.theaspd.com/ijes.php

Regional Disparities and Sluggish Agricultural Development in Southwestern Haryana: Issues and Prospects

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Abstract

The present study analyses the spatial and temporal changes in agricultural development, cropping pattern and agricultural structure of Southwestern Haryana from 1967-70 to 2017-20, with particular emphasis on irrigated and rainfed differentiation. Based on secondary data obtained from official sources such as the Statistical Abstract of Haryana, State agricultural data and Livestock Census reports, the study reveal a clear transition from a coarse cereal-pulse dominated cropping system during 1967-70 to a wheat and mustard-centric system in the post-Green Revolution period. While bajra and gram were the dominant crops during the pre-irrigation phase, the expansion of canal and groundwater irrigation led to a substantial increase in wheat acreage, particularly in the north-eastern districts and mustard in southwestern districts of the study area. By 2017-20, wheat and mustard emerged as the most dominant crop, followed by bajra, and cotton reflecting a combination of irrigation availability, agro-climatic suitability, and market incentives. The aim of the study is to analyze the regional disparities in agricultural development in Southwestern Haryana through a study of cropping patterns, irrigation, and productivity across districts. Agricultural land productivity in the study area has increased over time but it is still much lower than the average agricultural land productivity of the state and rest of the state. Cartographic and graphical techniques were employed for effective spatial visualization and interpretation of results. The findings underscore the need for region-specific agricultural planning focused on sustainable crop diversification and efficient water use in Southwestern Haryana.

Keywords: *Cropping Pattern, Irrigated and Rainfed Agriculture, Regional Disparities, Agricultural Transformation, Southwestern Haryana.*

INTRODUCTION

Agriculture continues to be the backbone of the rural economy in India, providing livelihood to a substantial proportion of the population and shaping regional patterns of economic development. The nature and efficiency of agriculture in any region are largely determined by its cropping pattern. Cropping pattern refers to the proportion of total cultivated area allocated to Southwestern Haryana represents one such region where agricultural development is strongly influenced by semi-arid climatic conditions, sandy soils, erratic rainfall, and limited groundwater availability. These constraints have historically restricted the choice of crops, compelling farmers to rely heavily on drought-tolerant crops such as bajra and gram, particularly in rainfed areas. The expansion of canal and tubewell irrigation since the 1980s has brought notable changes in the cropping structure, especially with the increasing dominance of wheat and the gradual emergence of oilseeds and commercial crops in selected districts. Nevertheless, significant inter-district disparities persist, reflecting differences in irrigation intensity, soil characteristics, and access to modern agricultural inputs.

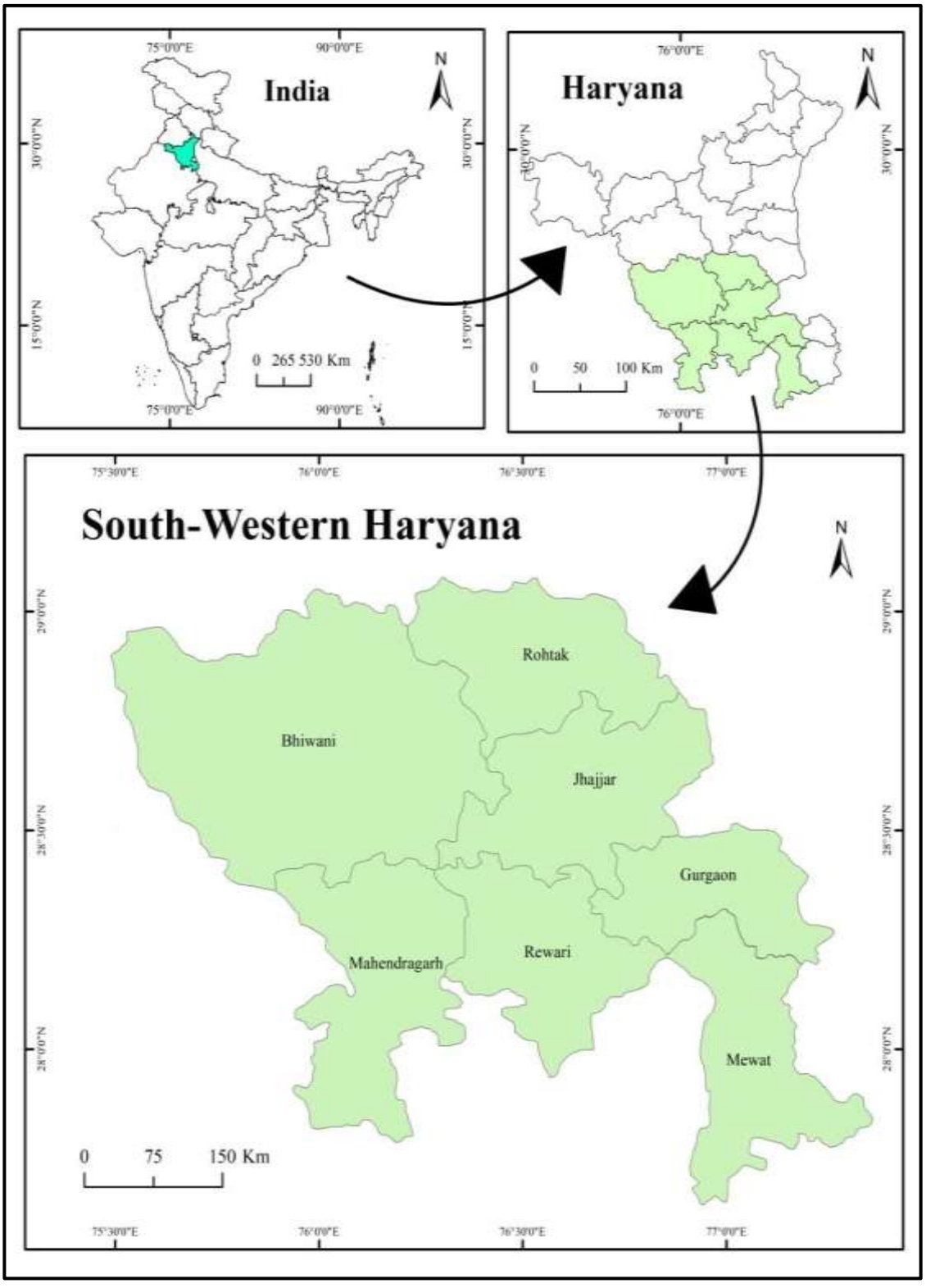
In this context, the present study attempts to examine the agricultural development through a spatial and temporal analysis of cropping pattern in southwestern Haryana. By analyzing changes over time and variations across districts, the study seeks to highlight the adaptive strategies of farmers in response to environmental constraints, technological interventions, and economic incentives, and to provide insights relevant for sustainable agricultural development planning in the region.

Study Area

The present study is conducted in the south-western region of Haryana, India. Geographically, Haryana is located in the north-western part of the country, and the study area occupies its south-western tract. This region comprises the districts of Bhiwani, Rohtak, Jhajjar, Gurugram (Gurgaon), Rewari, Mahendragarh, an Mewat (Nuh), as depicted in Figure 1. The study area lies approximately between 28°00′N to 29°30′N latitudes and 75°30′E to 77°00′E longitudes. South-western Haryana is characterized

by a predominantly semi-arid to sub-humid climate, with hot summers, mild winters, and a monsoon-dependent rainfall regime. The region forms part of the Indo-Gangetic plains, with relatively flat to gently undulating topography, though sandy and alluvial soils are common, particularly toward the western and southern margins. Agriculture is the dominant land use, supported by both canal and groundwater irrigation, while rapid urbanization and industrial growth are notable in districts such as Gurugram and Rohtak. Socio-economically, the region exhibits a mix of rural agriarian landscapes and rapidly expanding urban centres.

Fig.1. Geographical location of Study Area.



Objective

- To analyze regional disparities in agricultural development in Southwestern Haryana through a study of cropping patterns, irrigation, and productivity across districts.

Data Source

The present study is based entirely on secondary data collected from a variety of reliable and official sources. Data related to cropping pattern, area under different crops, irrigation, and agricultural productivity have been obtained primarily from the Statistical Abstract of Haryana, Directorate of Agriculture, Government of Haryana, and District Census Handbooks of the concerned districts. In addition, relevant data and conceptual insights have been supplemented through published research articles, books, government reports, and journals related to agricultural geography and rural development. The collected data were carefully compiled, verified, and used for district-wise and temporal analysis to ensure consistency and reliability of results

METHODOLOGY

The present study employs a quantitative and spatial–temporal analytical framework to examine variations in cropping pattern and agricultural productivity in Southwestern Haryana. Secondary data were compiled for multiple benchmark periods to capture long-term structural changes at the district level. Cropping pattern was analyzed through percentage share of individual crops in the total cropped area. Inter-temporal and inter-district comparisons were undertaken to assess structural transformation and spatial differentiation, with a separate analysis of irrigated and rainfed tracts to evaluate the influence of irrigation on crop choice. Cartographic and graphical techniques were employed for effective spatial visualization and interpretation of results.

Cropping Pattern during 1967-70

Figure 2 indicates that from 1967-1970, bajra, gram, and wheat were the predominant crops in south-western Haryana. Collectively, these crops comprised almost two-thirds of the entire cultivated area, signifying their regional significance. Bajra, as a heat- and drought-resistant cereal, was well adapted to the agro-climatic conditions of the region and significantly contributed to the less-irrigated parts of south-western Haryana.

It solely included around one-fourth of the overall cultivated area. Gram became the second most significant crop in the study region, with 22.15 percent of the total cultivated area. Wheat constituted around 16.04 percent of the cultivated land and was predominantly grown in regions with access to rabi season irrigation. Throughout this period, irrigation in south-western Haryana predominantly relied on well irrigation. As a result, drought-resistant and low-water-requiring crops, including bajra, gram, jowar, barley, rapeseed, and mustard, formed the primary cropping pattern in rainfed regions. Conversely, water-intensive crops like rice and sugarcane maintained a negligible significance. In the northeastern regions of the study area, where the groundwater table was comparatively elevated, wheat became a predominant crop. In certain regions, fodder crops were also prominent, in addition to sugarcane, cotton, and rice.

Cropping Pattern during 1987-90

Figure 3 shows that south-western Haryana's cropping pattern intensified between 1967-70 and 1987-90. However, bajra still dominated the region's cropped area in 1987-90, accounting for about one-third. Wheat became the second most significant crop, occupying 20.05% of the planted area, while gram fell to third, covering 17.45%. The cropping pattern in south-western Haryana began to differ from the rest of the state in the early 1980s. Improving irrigation facilities and spreading package technology changed agricultural methods, driving this transition. Tractors, high-yielding variety (HYV) seeds, chemical fertilizers, plant protection measures, canals and tubewells allowed farmers to grow two to three crops per year. Fine grains replaced coarse cereals. Wheat acreage increased dramatically due to its great response to modern agricultural inputs. Figure 3 shows that wheat area increased dramatically in south-western Haryana.

International Journal of Environmental Sciences
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Cropping patterns varied spatially in the studied area. Bajra accounted for 43.08% of cropped land in Mahendragarh. In contrast, wheat dominated the north- and south-east. Jowar became a secondary crop, while sugarcane remained minor. Gram acreage decreased across the region except in Bhiwani district, where it increased somewhat by the early 1980s. Figure 3 shows that oilseeds made up little over 5% of the planted area in Bhiwani, Gurugram, and Mahendragarh in 1987-90. The proportion of feed crops and pulses decreased. Gram was the major loser in south-western Haryana due to wheat competition. Figure 3 reveals that Bhiwani district cultivated 27.86 percent of its cropped area with gram, while Mahendragarh district cultivated 12.13 percent, gram accounted for less than 1% of cropped land in the remaining districts. Cash crops like sugarcane and cotton were mostly grown in the north-eastern research area. Sugarcane covered 8.12% of Rohtak's cropland. Cotton dominated Bhiwani and Rohtak districts, accounting for over 5% of planted area. Only Rohtak and Jhajjar districts grew rice, representing 5% of the region's planted area.

Fig. 2. Area Under Crops in Southwestern Haryana during 1967-70

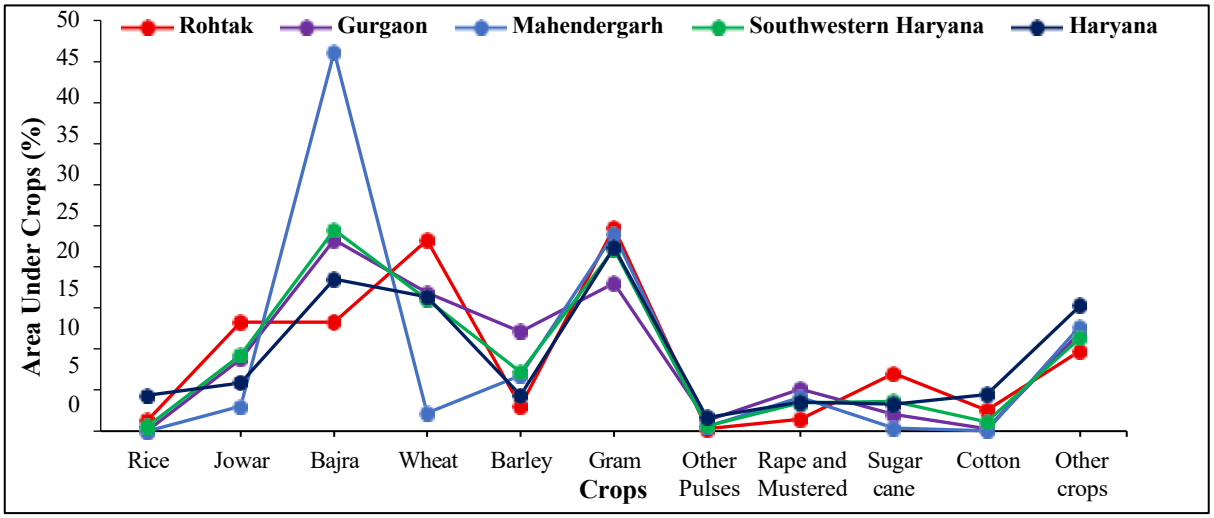


Fig.3. Area Under Crops in Southwestern Haryana during 1987-90

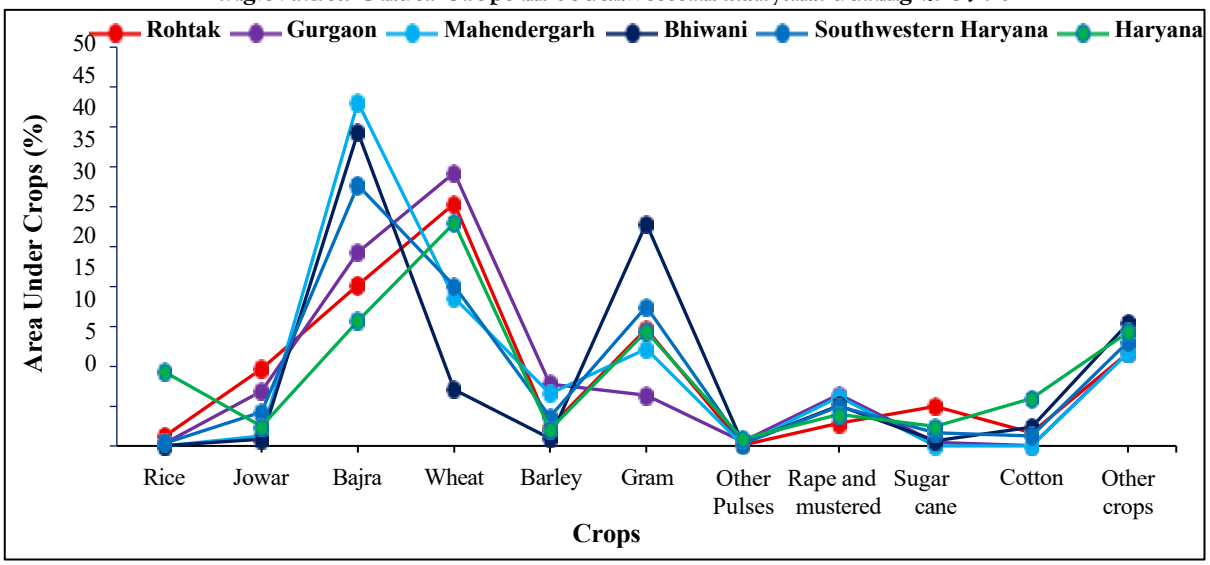
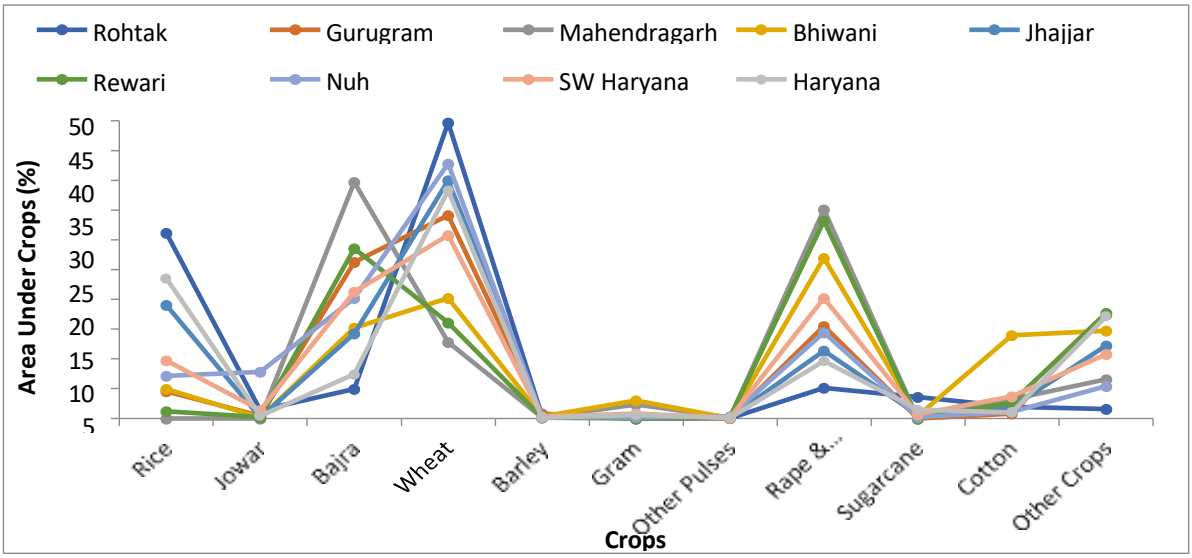


Fig. 4. Area Under Crops in Southwestern Haryana during 2017-20



Source: Statistical Abstract of Haryana.

Cropping Pattern during 2017-20

Figure 4 shows the 2017–20 average percentage of major crop area in south-western Haryana and its districts. Cropping patterns vary greatly between districts due to agro- climatic factors, irrigation availability, and farmer crop selections. Wheat was the most widely grown crop in all areas. It was especially high in Rohtak (49.67%), Jhajjar (39.96%) and Gurugram (34.11%) showing wheat-based agricultural systems' dominance. Stable market support, irrigation facilities, and winter weather may explain this supremacy. Rice cultivation is spatially variable. It is abundant in Rohtak (31.16%) and Jhajjar (19.06%) but scarce in Mahendragarh, indicating serious water shortages. Rice accounts for only 9.7% of the cropped area in south-western Haryana, suggesting restricted expansion in water-scarce areas. Bajra is important among coarse cereals in Mahendragarh (39.68%), Rewari (28.59%) and Gurugram (26.30%). Its resilience to semi-arid climates and low water requirements makes bajra a popular crop in places with little irrigation. Gram cultivation is higher in Bhiwani (3.02%) followed by Mahendragarh (2.34%) demonstrating its relevance as rabi pulse in marginal and rainfed regions. Rapeseed and mustard account for 26.97% of Bhiwani's planted land and 9.69% of the regional total, indicating a shift toward oilseed crops. Cotton and sugarcane are spatially concentrated cash crops. Mahendragarh (3.24%) and Rewari (2.61%) grow a lot of cotton due to good soil and market-oriented farming. In contrast, sugarcane is grown mostly in Rohtak (3.62%) and Jhajjar (0.59%) due to greater irrigation. South-western Haryana's 2017-20 cropping pattern was wheat-dominated with significant regional diversification into bajra, cotton, and rapeseed-mustard. These regional differences show adaptive farming practices to irrigation intensity, agro-climatic appropriateness, and economics.

Cropping Pattern of Irrigated versus Rainfed Areas

South-western Haryana is one of the least irrigated and driest. About 25% of the region's farmed land is unirrigated, and even in irrigated areas, irrigation quality and intensity are low. Groundwater is scarce and used to irrigate rabi crops, especially in the south. Comparing cropping patterns in irrigated and rainfed (unirrigated) areas is useful.

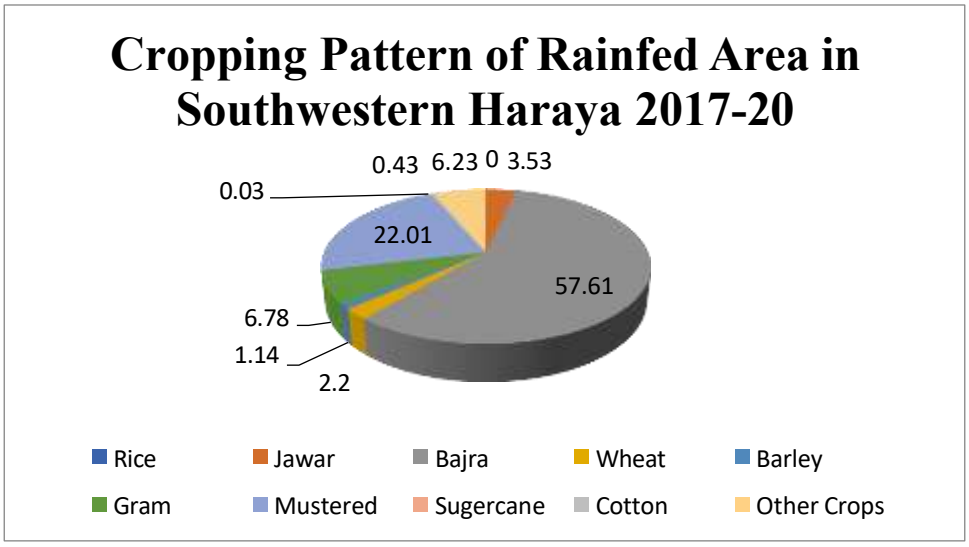
Table 1. Cropping Pattern of Irrigated versus Rainfed Areas

Districts		Rice	Jawar	Bajra	Wheat	Barley	Gram	Mustered	Sugercane	Cotton	Other Crops
Rohtak	Irrigated	21.42	6.5	2.58	52.69	1.03	0.05	2.27	4.19	8.38	0.99
	Rainfed	0	4.39	44.5	1.09	4.94	2.74	39.56	0	2.19	0.39

Gurugram	Irrigated	5.09	0.91	30.58	44.62	1.9	0	13.4	0	0.4	3.1
	Rainfed	0	0	49.2	0	0	0	20.5	0	0	30.3
Mahendergarh	Irrigated	0	0	4.12	33.38	0.5	1.15	56.04	0	4.7	0.11
	Rainfed	0	0	79.67	0	0	10.8	8.52	0	0	1.01
Bhiwani	Irrigated	5.98	0.42	3.4	34.7	2.2	0.65	29.26	0.49	21.87	1.03
	Rainfed	0	0.3	44.38	0	0.38	30.99	22.7	0	0.15	1.1
Jhajjar	Irrigated	17.88	0.05	10.27	49.66	2.4	0.05	10.11	1.37	2.6	5.61
	Rainfed	0	5.77	36.46	2.88	2.52	2.16	41.51	0	0.72	7.98
Rewari	Irrigated	1.32	0.46	22.02	29.49	0.99	0	43.98	0	1.65	0.09
	Rainfed	0	0	98.99	0	0	0	0	0	0	1.01
Nuh	Irrigated	7.1	0	0	71.41	1.07	0	17.43	0.21	0.75	2.03
	Rainfed	0	14.28	50.1	11.46	0.2	0.8	21.33	0	0	1.83
Southwest Hrayana	Irrigated	8.39	1.19	10.42	44.99	1.44	0.27	24.64	0.89	5.76	1.85
	Rainfed	0	3.53	57.61	2.2	1.14	6.78	22.01	0.03	0.43	6.23
Haryana	Irrigated	24.28	0.76	2.92	47.61	0.69	0.17	8.58	1.84	12.4	0.75
	Rainfed	0	2.38	49.41	2.9	0.65	17.22	20.85	0	0.18	6.41

Source: Complied and Computed by Author from State Agriculture Data/ agriharyana.nic.in.

Table 1 show irrigated and rainfed farming trends in south-western Haryana. Two-fifths of irrigated land is planted by wheat. Mahendragarh, Bhiwani, and Rewari have lower wheat cultivation rates, with wheat covering 30% of irrigated land. Nearly one-third of irrigated tracts are planted with non-food crops, excluding cotton and sugarcane. Rabi oilseeds, mainly rapeseed and mustard, make up more over two-fifths of the irrigated planted land in Mahendragarh, Rewari, and Bhiwani districts. The overall scenario of differences in cropping pattern between irrigated and rainfed areas in Southwestern Haryana are shown by pie chart Fig No. 5 and 6.



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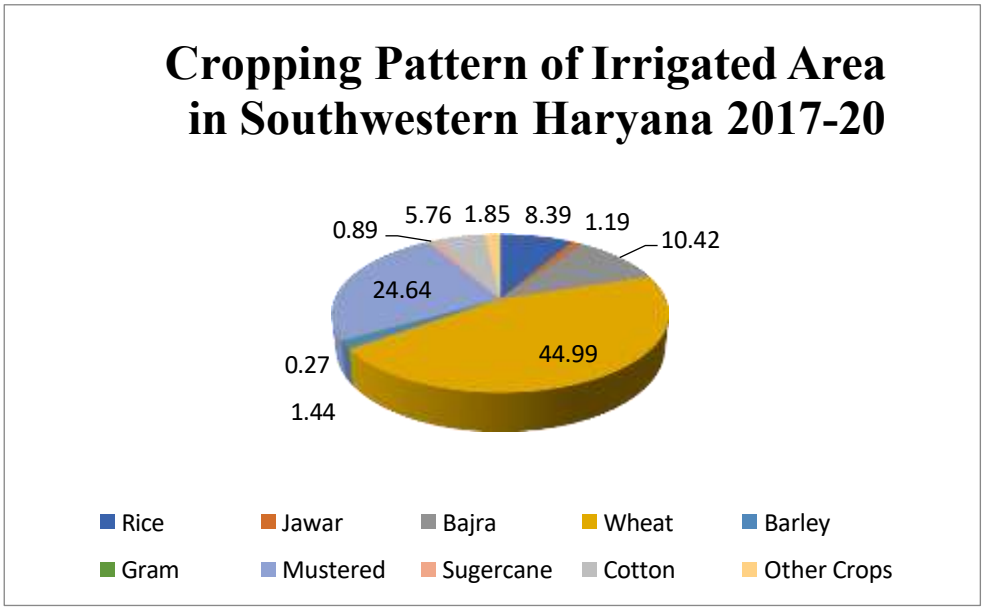

Spatial Variations in Level of Agricultural Productivity

In 1967-70, agricultural productivity varied greatly by location, as seen in Figure 7. During this period, south-western Haryana's average agricultural productivity was Rs. 12,390 per hectare. The northern study area, particularly Rohtak district (Rs. 17,149 per hectare), had the highest productivity, while Mahendragarh district had the lowest (Rs. 7,078 per hectare). The productivity range (Rs. 10,071 per hectare) shows significant regional variance in the region. Given south-western Haryana's tiny size and minimal environmental and institutional diversity, this gap is remarkable. The uneven distribution of irrigation systems, which were almost nonexistent in the south and west, caused this variation. South-western Haryana's agricultural productivity stagnated until the early 1980s, while other sections of the state saw significant increase. Figure 6 shows that land production in the region fell somewhat during the late 1960s and early 1980s, indicating that modern agricultural technology had not spread. Only Rohtak in the northern research area had moderate productivity. Gurugram and Mahendragarh districts in the south and Bhiwani district in the north-west had low agricultural productivity. Bajira, wheat, and gram were grown in Bhiwani, Mahendragarh, and Gurugram in the south-western research region. However, limited irrigation facilities and low technological advancement kept crop yields low. Figure 7 shows that south-western Haryana agriculture productivity rose dramatically after 1987-90. Only Rohtak district had average productivity in 1987-90, whereas Bhiwani, Mahendragarh, and Gurugram had low productivity.

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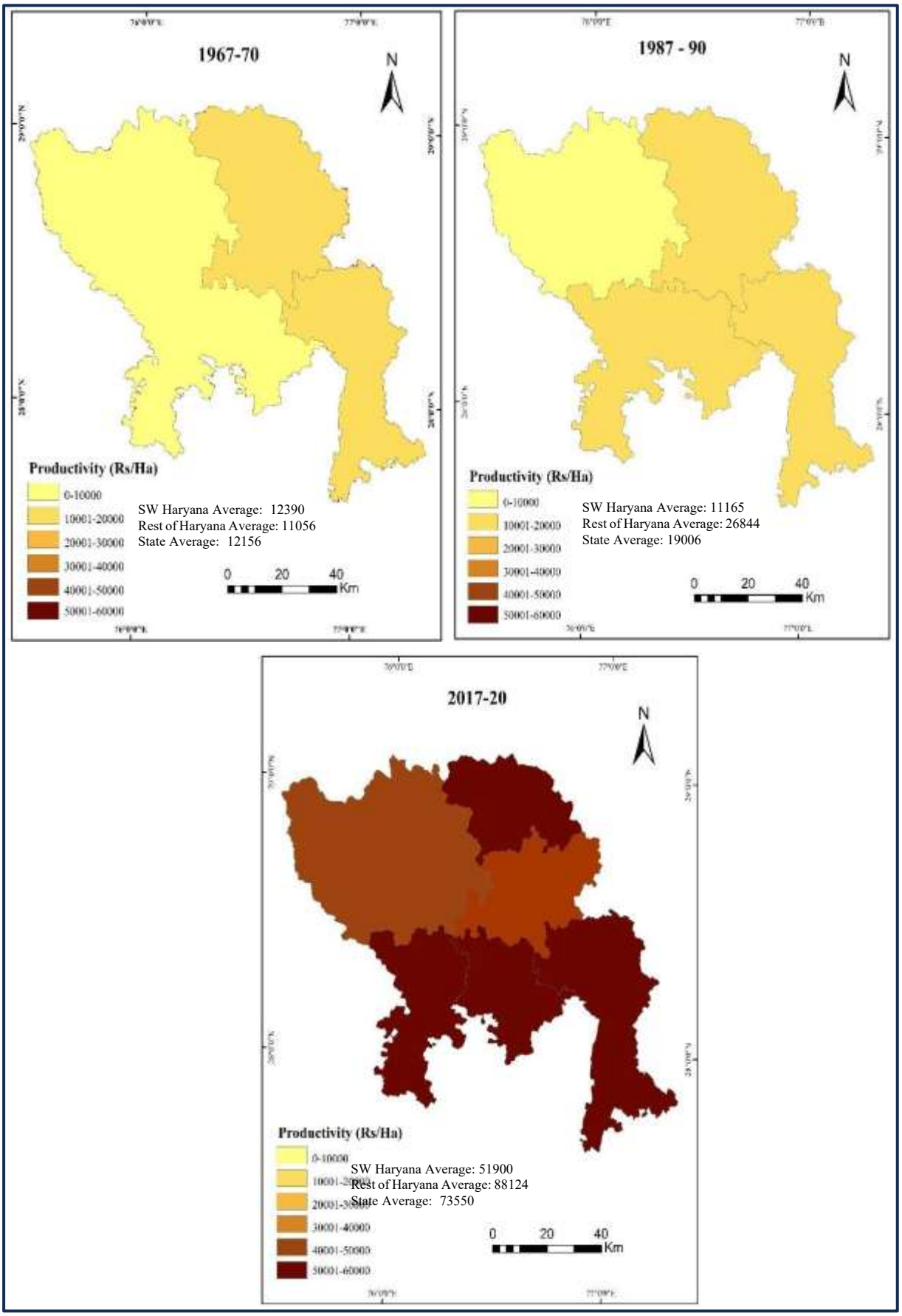

Fig. 7. Agriculture productivity in Southwestern Haryana.

Several beneficial achievements in south-western Haryana's agriculture industry from 1987-90 to 2017-20 improved the overall situation. Rewari, Bhiwani, and Jhajjar similarly had production of Rs. 25,000-30,000 per hectare. Rohtak district led agricultural productivity with wheat, rice, cotton, and sugarcane, the main cash crops. South-western Haryana's agricultural productivity lags behind the eastern, central, and northern regions despite these increases over the past three decades. Although agricultural land productivity in the study area has increased over time but it is still much lower than the average agricultural land productivity of the state and rest region of the state . In 2017-20 agricultural land productivity of the study area is 51900 rupees / hec. while the productivity of rest Haryana and Haryana are 88124 rupees and 73550 rupees / hec.. accordingly. Future agricultural development in the region is directly tied to water resource development and efficient water management, the biggest limitation to sustained productivity growth.

Determinants of Agricultural Development

South-western Haryana still lags behind among other sections of the state in agricultural development, as shown by its lower agricultural productivity and input utilization. Modern agricultural technologies and irrigation development affect state agricultural productivity, according to the report. With only six districts, a formal correlation or regression analysis between agricultural productivity and its explanatory variables was impossible. The interrelationships between irrigation and agricultural input factors are evaluated alongside district-wise agricultural productivity levels in an alternative comparative approach. Table 2 shows district-level variables. Analysis shows no correlation between cropping intensity and land production. For example, Gurugram and Bhiwani districts have high cropping intensity but middle agricultural productivity. Rewari and Rohtak districts have moderate productivity and high land productivity, respectively. The lack of irrigation in Bhiwani and Gurugram means that farmers have expanded cropping by growing traditional crops. Intensification has not increased agricultural productivity. In south-western Haryana, irrigated land increases agricultural productivity. Rohtak, Rewari, Mahendragarh, and Jhajjar have increased irrigation. These districts have moderate to high agricultural productivity. The number of times a field is watered in a year does not consistently increase agricultural yield. Gurugram and Bhiwani have higher irrigation intensity but lower productivity. However, Mahendragarh district has considerable productivity despite low irrigation intensity, while Jhajjar district has low productivity. Seasonal irrigation levels explain this trend. Many tubewells irrigate cultivated land in Mahendragarh and Rewari districts, but only during rabi. Through multiple cropping or varied high-value crops ,productivity improvements are limited by low irrigation intensity.

Table. 2. A Comparative Statement of Level of Agricultural Productivity, Cropping Intensity, Level of Irrigation and Use of Modern Agricultural inputs in SW Haryana (2017-20)

District	Agricultural productivity	Cropping Intensity	Irrigated Area	Irrigation Intensity	Fertilizers Consumption	Pesticides	HYV Seeds	Tractors	Pumping sets
Rohtak	High	Moderate	High	Moderate	High	Moderate	High	Moderate	Low
Gurgaon	Moderate	High	Low	High	Moderate	Moderate	Moderate	Moderate	Moderate
Mahendergarh	Moderate	Moderate	High	Low	Moderate	Moderate	High	Low	Moderate
Bhiwani	Moderate	High	Moderate	High	Low	Low	Low	Low	Low
Jhajjar	Low	Moderate	High	Moderate	Low	Low	Moderate	High	High
Rewari	Moderate	Low	High	Moderate	Moderate	High	Moderate	Moderate	High

Source : Calculated by Author from Statistical Abstract of Haryana.

To increase agricultural productivity in south-western Haryana irrigation coverage, timing, intensity, and efficiency must be improved. Chemical fertilisers boost agricultural output in south-western Haryana. Rohtak has high fertilizer usage per acre and agricultural productivity. The fertiliser uses and production of Rewari, Mahendragarh, and Gurugram districts are moderate. Bhidwani and Jhajjar use less fertilizer. Beneficier use does not explain productivity differences between Jhajjar and Bhiwani districts, which have poor and moderate agricultural productivity, respectively. Small pesticide and insecticide use in south-western Haryana appears to have little impact on agricultural yield. Since Bhiwani and Jhajjar have moderate and poor yield, pesticide use is low. Rewari district uses more pesticides yet has lower agriculture yield. Rohtak district has the highest productivity yet minimal pesticide use, demonstrating that pesticide application does not affect productivity.

Using high-yielding variety (HYV) seeds may boost agricultural productivity. High HYV seed usage and productivity in Rohtak district corroborate this association. While using modest HYV seed, Jhajjar district has low productivity. Modest HYV seed use is associated with moderate productivity in Rewari, Mahendragarh, and Gurugram, whereas Bhiwani is poor. Mechanization indicators link productivity less. In south-western Haryana, agricultural productivity is unaffected by tractor density per 100 hectares. As an example, Jhajjar district has the most tractors yet the lowest agricultural productivity. Mahendragarh and Bhiwani receive low tractor density but moderate productivity. Productivity is also unaffected by pumping set density per 100 hectares of farmed land. Despite low pumping set density, Rohtak offers excellent production, while Jhajjar does not. Both Gurugram and Mahendragarh have moderate pumping set density and productivity, while Rewari and Bhiwani have high and low densities, respectively. Rather than numerical density, irrigation infrastructure effectiveness appears to be more important in agricultural productivity.

CONCLUSION

This study studies cropping patterns, irrigation, and agricultural productivity in Southwestern Haryana for three triennial periods 1967-70, 1987-90 and 2017-20. Irrigation, technology, and market pressures have transformed regional agriculture, according to the study. Such changes have been inconsistent among districts, resulting in ongoing regional agricultural development discrepancies. The cultivation pattern has changed from a varied, subsistence-oriented system dominated by coarse grains and pulses like bajra and gram to a market-oriented system dominated by wheat and mustard. This change is due to Green Revolution technologies, increased irrigation, and assured procurement. Bajira's semi-arid adaptability and low water needs keep it significant in rainfed areas despite this shift. The rise of oilseeds and commercial crops like mustard, cotton suggests diversification, but the decline of pulses raises soil health and nutritional security issues. The contrast between irrigated and rainfed areas shows how water availability affects farming patterns. Irrigated areas are wheat-dominated and more productive, while rainfed areas are more diverse and grow drought-resistant crops. Regional agriculture planning that considers for resource availability is needed due to this dichotomy.

The study also finds large inter-district agricultural productivity gaps. Rohtak, with superior irrigation infrastructure and more contemporary inputs, is more productive than Mahendragarh and Bhiwani, which are limited by water supply and technical dissemination. The data shows that irrigation coverage, fertilizers, and high-yielding variety seeds boost productivity. Although agricultural land productivity in the study area has increased over time but it is still much lower than the average agricultural land productivity of the state and rest region of the state. In 2017-20 agricultural land productivity of the study area is 51900 rupees / hec. while the productivity of rest Haryana and Haryana are 88124 rupees and 73550 rupees / hec.. accordingly. The results show that Southwestern Haryana has made significant agricultural improvement, but water shortages, insufficient diversification, and regional inequities remain. Policy should promote efficient water management; crop diversification, particularly pulses and oilseeds-and greater access to new technology in lagging regions for sustainable agricultural growth. Improving farm revenue and ensuring long-term sustainability in the region requires strengthening crop-livestock integration and institutional support.

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