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Pattern and Production of Fruits & Vegetables Crops in Haryana: An Inter-District Analysis

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ABSTRACT

This study examined the spatial patterns and production trends of fruit and vegetable crops across different districts of Haryana, focusing on the 2020-21 agricultural season. The research utilized secondary data from the Department of Horticulture, Haryana, to analyze variations in land allocation and output levels among districts. The study revealed disparities in agricultural output in Haryana, attributed to agro-climatic conditions, infrastructure availability, and farming practices, emphasizing the need for region-specific policies. Haryana's agricultural sector was significantly reliant on horticulture, which not only generated income but also offered employment opportunities and ensured nutritional security. The state's diverse agro-climatic zones offered a fertile environment for fruit and vegetable cultivation, but challenges like water scarcity, climate variability, and limited access to advanced farming techniques persisted. This study aimed to bridge the knowledge gap by assessing spatial trends, production variations, and key factors influencing horticultural development in Haryana. By utilizing a comparative district-wise approach, the research identified regions with high productivity as well as those lagging behind, enabling policymakers to implement targeted interventions. The study highlighted the impact of modern irrigation techniques, government initiatives, and market accessibility on Haryana's horticultural landscape, offering insights for resource allocation and farmer support systems. The research contributed to the discussion on sustainable agricultural practices and the future of horticulture in Haryana through its analysis of fruit and vegetable production.

Keywords: Horticulture, Fruit and Vegetable Production, Haryana

INTRODUCTION

Horticulture played a crucial role in the agricultural economy of Haryana, contributing significantly to food security, employment generation, and rural livelihoods. The state had a diverse agro-climatic environment that allowed for the cultivation of a wide range of fruits and vegetables (Kumar et al., 2020). Over the past few decades, the expansion of horticulture had been driven by technological advancements, government support programs, and increasing market demand for fresh produce (Singh & Kumar, 2014). The significance of horticultural crops in Haryana was evident from their contribution to the state's agricultural GDP. Unlike traditional cereal crops, fruits and vegetables provided higher economic returns per unit area and required less water, making them a viable option for sustainable agricultural development (Sharma, 2014). Despite this potential, the sector faced multiple challenges, including limited irrigation facilities, post-harvest losses, and market inefficiencies, which hindered optimal productivity and farmer profitability (Chander & Boora, 2023).

To address these challenges, the Haryana government had implemented various initiatives, such as the National Horticulture Mission (NHM) and state-level subsidy programs, to encourage the adoption of modern horticultural techniques (Malik et al., 2019). These interventions had led to increased production levels, improved infrastructure, and better access to high-quality seeds and fertilizers. However, disparities in horticultural productivity among districts indicated the need for more targeted policies to ensure balanced regional development (Kaur et al., 2023). This study aimed to analyze the spatial patterns of horticultural crop production in Haryana, identifying key factors influencing yield variations and recommending policy measures for enhancing productivity. By examining district-wise data on fruit and vegetable cultivation, the research provided insights into how resource allocation, market accessibility, and environmental conditions impacted horticultural growth in the state.

Horticulture included the cultivation of various fruits such as apples, oranges, grapes, bananas, and berries. Fruit culture involved practices such as orchard establishment, pruning, pest control, and harvesting to ensure high-quality fruit production (Kumar et al., 2020). Horticulture encompassed the cultivation of vegetables for human consumption. This involved techniques such as crop rotation, soil preparation, planting, watering, and fertilization to optimize vegetable yields and quality. Floriculture focused on the cultivation of ornamental plants, flowers, and foliage for aesthetic and

decorative purposes. It included the production of cut flowers, potted plants, and landscaping materials for use in gardens, parks, and floral arrangements (Kaur et al., 2023). Horticulture also included activities related to post-harvest handling, storage, processing, and marketing of horticultural products. Proper post-harvest management techniques helped preserve product quality, extend shelf life, and minimize losses during storage and transportation (Chander & Boora, 2023).

Horticulture played a vital role in providing nutritious food, enhancing landscapes, promoting environmental sustainability, and contributing to economic development. It encompassed a diverse range of plant-related activities that were essential for meeting the growing demand for food, enhancing the beauty of surroundings, and preserving natural resources for future generations (Ghosh, 2012). Greenhouse horticulture involved the controlled cultivation of plants in enclosed structures, providing optimal conditions for growth and protection from adverse weather conditions. Nursery management focused on the propagation and production of young plants, including seeds, seedlings, and cuttings, for commercial sale or transplantation. With the increasing urbanization of populations, urban agriculture gained prominence as a way to produce food, enhance food security, and promote sustainability in urban areas. It included practices such as rooftop gardening, community gardens, and vertical farming to grow crops in limited spaces within cities (Singh & Kumar, 2014).

Sustainable horticulture focused on environmentally friendly practices that promoted the conservation of natural resources, minimized chemical inputs, and reduced ecological footprints. It included techniques such as organic farming, water conservation, soil conservation, and agroecology to ensure the long-term viability of horticultural production systems (Sharma, 2014). Horticultural therapy utilized plant-related activities and gardening interventions to promote physical, psychological, and social well-being in individuals with physical or mental health challenges. It had therapeutic benefits for people of all ages and abilities and was used in healthcare and rehabilitation (Malik et al., 2019).

Study Area:
Haryana, located in northern India, was an agriculturally dominant state with diverse climatic conditions suitable for horticultural activities. The state experienced a semi-arid to sub-humid climate, making it conducive for cultivating various fruits and vegetables. With 71,460 hectares dedicated to fruit cultivation and 337,302 hectares for vegetables, Haryana played a significant role in India’s horticultural sector. Major fruit crops included citrus, mango, guava, and pomegranate, whereas vegetables such as potatoes, onions, tomatoes, and cauliflower formed a crucial part of the state’s production. The study assessed inter-district variations in horticulture, identifying regions with high agricultural output and those requiring policy interventions. Haryana's soil composition varied across districts, with alluvial, sandy, and clayey soils supporting different types of crops. The Yamuna-Ghaggar plain in the east provided fertile alluvial soil, which was well-suited for horticultural practices, while the western regions, characterized by sandy soils, required efficient irrigation techniques to sustain vegetable production.

The availability of irrigation facilities, including canals and tube wells, significantly influenced agricultural productivity. The state's well-developed irrigation network, largely dependent on the Western Yamuna Canal and Bhakra Canal, played a crucial role in sustaining horticultural activities. Haryana's proximity to major urban markets, including Delhi and Chandigarh, facilitated the marketing and distribution of horticultural produce. The state benefited from well-established transportation infrastructure, including national highways and rail networks, which helped in reducing post-harvest losses and ensuring timely delivery to markets. Additionally, the presence of agricultural mandis and processing units enhanced value addition for horticultural crops, making them more economically viable for farmers. Government initiatives such as the National Horticulture Mission (NHM) and various subsidy programs were instrumental in promoting horticulture in Haryana. These schemes provided financial assistance, technical training, and infrastructure development, helping farmers adopt modern cultivation techniques. The integration of protected farming methods, including polyhouses and greenhouse cultivation, further boosted productivity, particularly for high-value crops.

Objectives:

i. To analyze the spatial distribution of fruit and vegetable cultivation across Haryana's districts.
ii. To identify factors influencing variations in horticultural output among different districts.
iii. To provide policy recommendations for improving horticultural productivity and sustainability in Haryana.

DATABASE & RESEARCH METHODOLOGY

The study has been based on secondary data collected from the Department of Horticulture, Haryana, for the 2020-21 agricultural season. Data on land area, production levels, and crop distribution across districts have been analyzed to identify spatial patterns. Descriptive statistical methods have been employed to compare district-wise variations, and GIS-based mapping techniques have been used to visualize agricultural disparities. The research has primarily focused on quantitative analysis, highlighting trends in fruit and vegetable production and assessing the impact of factors such as soil fertility, irrigation facilities, and market accessibility on horticultural output.

RESULT AND DISCUSSION

Spatial Pattern of Area & Production under Fruits Crops: 2020-21

Table 1 has shown a comprehensive overview of fruit cultivation across different districts of Haryana during the 2020-21 agricultural season, measured in hectares (Hec.). Examining the data has revealed considerable variations in the allocation of land for fruit cultivation across districts. Notably, districts such as Yamuna Nagar, Sirsa, and Hisar have exhibited substantial commitment to fruit farming, with respective areas of 9,336, 13,038, and 4,911 hectares. These districts likely possess favorable agro-climatic conditions conducive to fruit cultivation or have historically emphasized this agricultural activity. Conversely, districts like Charkhi Dadri and Kaithal have shown comparatively lower allocations of 333 and 659 hectares, respectively, potentially indicating either lesser suitability for fruit cultivation or a preference for other agricultural practices. The distribution of fruit cultivation areas in Haryana has revealed its diverse agricultural landscape, with districts like Yamuna Nagar and Hisar contributing significantly to the state's fruit production. However, smaller districts like Charkhi Dadri and Kaithal have faced challenges or alternative agricultural focuses, necessitating tailored policies for rural livelihoods.

Table 1 has provided data on fruit production in various districts of Haryana during the 2020-21 period, measured in metric tons (MT). Each row represents a specific district, while the corresponding value in each row denotes the quantity of fruits produced in that particular district. Sirsa district has emerged as a major contributor to fruit production in Haryana, with an impressive output of 2,87,347 metric tons. Other districts with substantial fruit production include Yamuna Nagar with 1,23,170 metric tons, Fatehabad with 97,942 metric tons, and Jhajjar with 72,660 metric tons. These districts likely benefit from favorable agro-climatic conditions, extensive cultivation areas, and/or efficient agricultural practices, enabling them to achieve high fruit production levels.

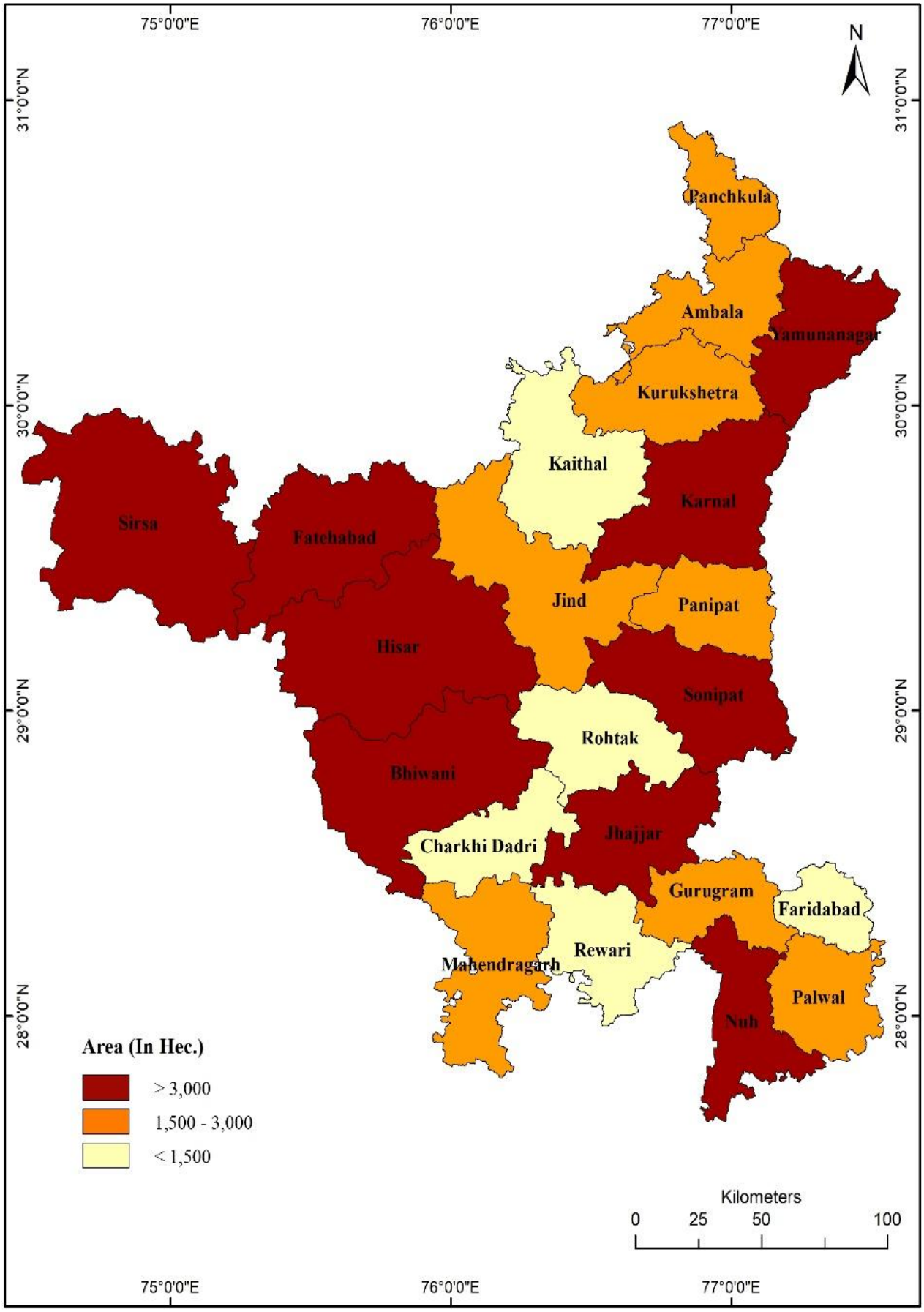
Equally, some districts have exhibited comparatively lower fruit production figures. For instance, Charkhi Dadri and Mewat districts have had relatively modest fruit production of 8,907 and 18,477 metric tons, respectively. Factors such as limited cultivable land, unfavorable climatic conditions, or lower agricultural intensification may have contributed to these lower production levels. Nevertheless, even districts with lower production have still contributed to the overall fruit output of Haryana, albeit to a lesser extent (Table 1).

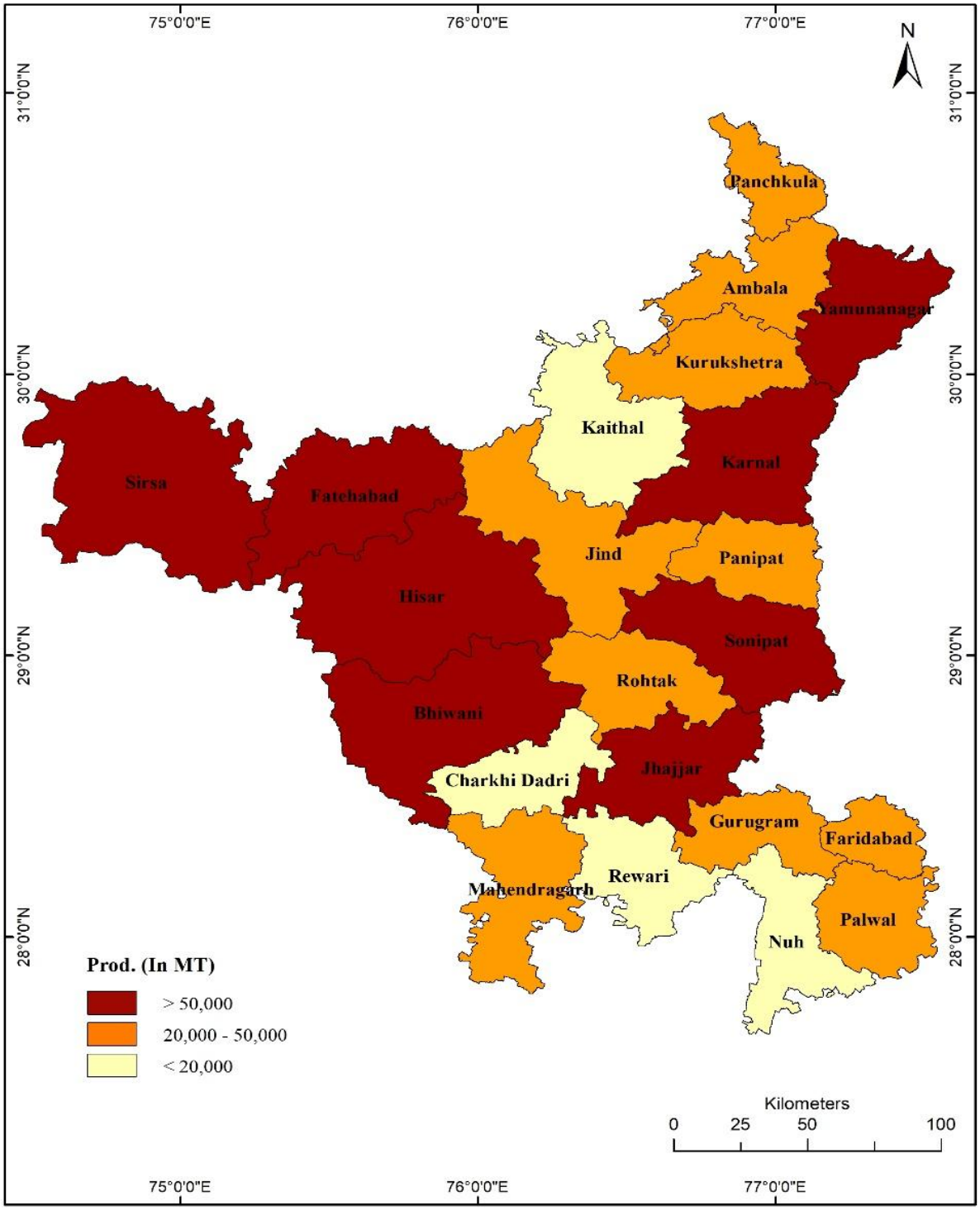
Table 1: Pattern of Horticulture in Haryana, 2020-21

Sr. No.	Districts	Area (In Hec.) Prod. (In MT)			
		Fruits		Vegetables	
		Area	Prod.	Area	Prod.
1.	Panchkula	1,675	22,921	4,163	64,030
2.	Ambala	2,632	34,839	26,727	5,12,852
3.	Y/Nagar	9,336	1,23,170	33,552	6,67,687
4.	Kurukshetra	1,701	31,390	19,558	4,44,940
5.	Kaithal	659	11,842	7,862	1,37,636
6.	Karnal	3,677	53,430	21,260	4,43,505
7.	Panipat	1,667	28,676	50,781	9,15,440
8.	Sonipat	4,823	96,616	10,421	92,633
9.	Rohtak	1,373	25,738	14,506	1,47,117
10.	Jhajjar	3,769	72,660	8,758	1,07,880
11.	Faridabad	1,347	31,633	5,550	95,768
12.	Mahendragarh	2,123	48,462	7,814	97,743
13.	Rewari	1,082	17,844	7,587	1,10,693
14.	Gurgaon	1,655	20,707	8,221	1,47,153
15.	Bhiwani	3,931	70,705	14,935	1,83,570
16.	Hissar	4,911	60,892	10,288	1,39,172
17.	Fatehabad	3,968	97,942	12,595	1,61,182
18.	Sirsa	13,038	2,87,347	9,617	1,68,883
19.	Jind	1,870	39,613	14,114	3,07,644
20.	Mewat	3,429	18,477	30,016	6,39,514
21.	Palwal	2,460	27,251	17,688	2,66,001
22.	Charkhidadri	333	8,907	1,289	18,193
Haryana		71,460	12,31,062	3,37,302	58,69,236

Source: Department of Horticulture, Haryana, 2022.

Map 1: Spatial Pattern of Area & Production under Fruits Crops in Haryana, 2020-21





Source: Based on table 1

Spatial Pattern of Area & Production under Vegetables Crops: 2020-21:

Table 1 has described the distribution of land area dedicated to vegetable cultivation across districts of Haryana for the 2020-21 agricultural season, measured in hectares (Hec.). Each row represents a distinct district, providing details on the specific land area utilized for vegetable farming within that district. Upon examination, notable disparities have emerged in the allocation of land for vegetable cultivation across various districts. Notably, districts such as Panipat, Yamuna Nagar, and Ambala have exhibited substantial commitments to vegetable farming, with respective areas of 50,781, 33,552, and 26,727 hectares. These districts likely benefit from favorable agro-climatic conditions and robust agricultural infrastructure, enabling extensive vegetable cultivation endeavors. Conversely, certain districts have displayed comparatively smaller areas allocated to vegetable cultivation. For example, Charkhi Dadri and Sirsa districts have featured more modest allotments of 1,289 and 9,617 hectares, respectively, for vegetable farming. Such

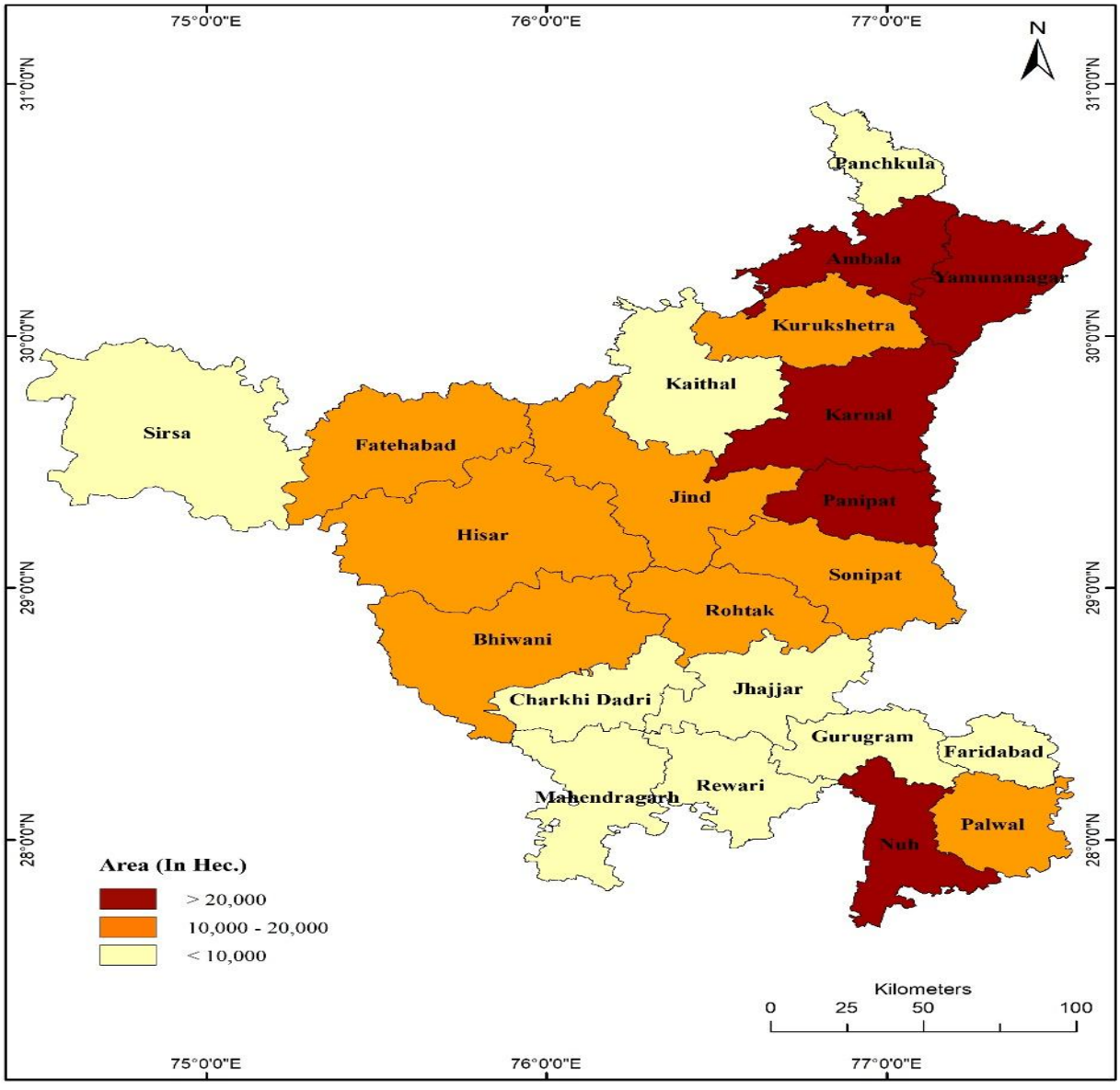
differences may have stemmed from varying factors like land availability, soil fertility, and prevailing agricultural practices unique to each district (Map 2).

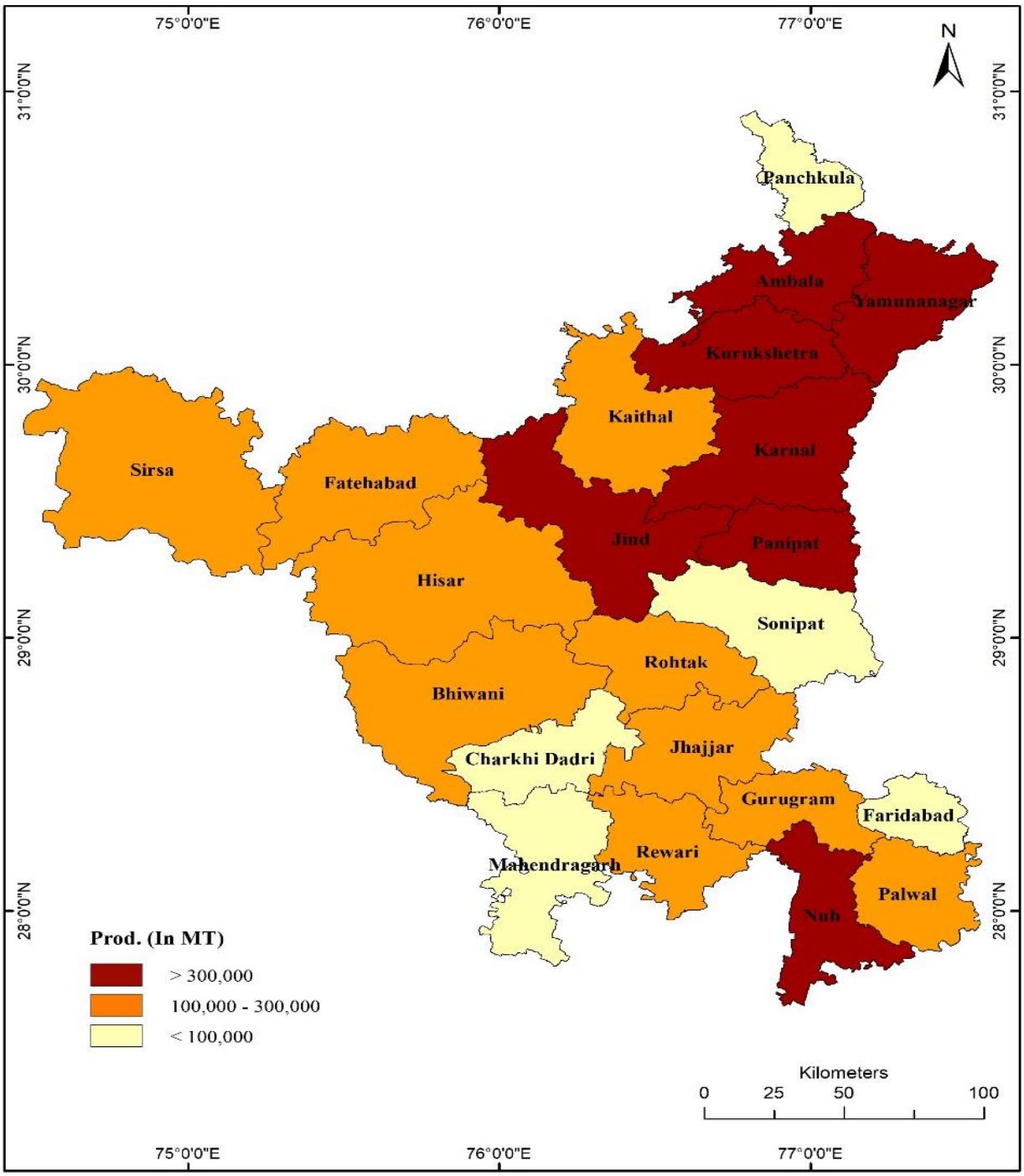
Table 1 has provided a comprehensive overview of vegetable production across different districts of Haryana during the 2020-21 agricultural season. In terms of high production districts, Yamuna Nagar has emerged as the leading contributor, boasting a substantial output of 6,67,687 metric tons (MT). This district likely benefits from favorable agro-climatic conditions, extensive agricultural infrastructure, and advanced farming practices. Similarly, Ambala and Jind districts have also demonstrated significant vegetable production levels, with outputs of 5,12,852 MT and 3,07,644 MT, respectively. Moving to moderate production districts, Mewat stands out despite facing socio-economic and agricultural challenges. With a production output of 6,39,514 MT, Mewat district has demonstrated resilient agricultural practices and highlighted its contribution to vegetable production in Haryana despite adverse conditions. In contrast, Charkhi Dadri district has exhibited relatively lower vegetable production at 18,193 MT, placing it in the category of low production districts. Factors such as land constraints, soil quality, and limited agricultural infrastructure may have contributed to this lower production level (Map 2).

CONCLUSION

The study has provided valuable insights into the horticultural landscape of Haryana, revealing significant inter-district variations in fruit and vegetable cultivation. Sirsa, Yamuna Nagar, and Hisar have emerged as key fruit-producing districts, while Panipat, Yamuna Nagar, and Ambala have dominated vegetable farming.

Map 2: Spatial Pattern of Area & Production under Vegetables Crops in Haryana, 2020-21





Source: Based on table 1

These variations have been attributed to factors such as agro-climatic conditions, irrigation facilities, and policy interventions. The study has emphasized the need for district-specific strategies to enhance horticultural productivity and ensure equitable agricultural development across Haryana. In other terms, Haryana has dedicated approximately 71,460 hectares to fruit cultivation and 337,302 hectares to vegetable farming during 2020-21, contributing significantly to the state's agrarian economy. However, post-harvest losses have remained a concern, with nearly 20-30% of perishable produce wasted due to inadequate cold storage and logistics infrastructure. Enhancing storage facilities and improving transportation networks can substantially reduce these losses, benefiting both farmers and consumers.

The role of technology in improving horticultural output cannot be overstated. Precision farming, drip irrigation, and protected cultivation methods have demonstrated yield improvements of up to 25-30% in pilot projects across Haryana. Scaling up these initiatives with government support and financial incentives has the potential to drive sustainable growth in the sector. Additionally, strengthening farmer-producer organizations and cooperatives has empowered smallholder farmers by ensuring better market access and fair pricing mechanisms. Another critical aspect has been sustainability. The overuse of chemical fertilizers and pesticides has led to soil degradation in several districts. Encouraging organic farming, agroforestry, and integrated pest management has improved soil health and ensured long-

term agricultural viability. Climate resilience strategies, such as rainwater harvesting and drought-resistant crop varieties, must also have been promoted to safeguard farmers against unpredictable weather patterns.

For future perspectives, we have recommended that a comprehensive and targeted approach integrating technology, policy support, and sustainable farming practices is essential for the growth of Haryana's horticultural sector. Addressing regional disparities and ensuring efficient resource allocation have enhanced productivity, boosted farmers' incomes, and positioned Haryana as a leader in India's horticulture industry. Strengthening the value chain, from production to marketing, has been key in maximizing the sector's economic and social impact.

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