

Changing Pattern of Vegetables in Haryana: A Case Study of Karnal Division

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ABSTRACT

The study explores the dynamic and evolving patterns of vegetable consumption, production, and preferences in response to various socio-economic, cultural, and environmental factors. With an increasing population, changing dietary habits, and concerns over environmental sustainability, the vegetable landscape is undergoing significant transformations. This research analyzes the shifts in vegetable cultivation, patterns over time, exploring the impact of urbanization, technological advancements, climate change, and cultural influences. The investigation employs a multidisciplinary approach, incorporating insights from agriculture, nutrition, economics, and sociology. It delves into the adaptation of traditional farming practices to modern, sustainable methods and examines the influence of emerging technologies such as precision agriculture and vertical farming on vegetable production. Furthermore, the study explores the correlation between changing dietary preferences, health consciousness, and the rise of alternative diets with the evolving vegetable consumption patterns. Environmental sustainability is a key focus, investigating the effects of climate change on vegetable cultivation, the emergence of organic farming, and the integration of circular economy principles within the vegetable supply chain. Additionally, the research evaluates the role of governmental policies and international initiatives in shaping the trajectory of vegetable production and consumption. The findings aim to contribute to a comprehensive understanding of the changing patterns of vegetables globally, offering valuable insights for policymakers, farmers, researchers, and consumers alike. Haryana is quickly becoming one of the top states in the horticulture industry and has accomplished a great deal recently. Currently, horticulture occupies 6.79 percent of the land and accounts for almost 9% of the GSDP in crop husbandry.

Keywords: Vegetable consumption, production, Sustainability, Agriculture Organic farming

INTRODUCTION

Socio-economic factors, such as income level, education, urbanization, and food affordability, influence vegetable consumption patterns. Access to fresh, affordable vegetables, as well as knowledge of nutrition and cooking skills, plays a crucial role in shaping consumption behaviors (Meena et al., 2023). Marketing strategies, including advertising, product labeling, and promotions, can influence consumer perceptions and choices regarding vegetable consumption. Effective marketing campaigns highlighting the health benefits, taste, and versatility of vegetables can encourage increased consumption (Chand & Pandey, 2008).

The availability and accessibility of vegetables are influenced by food systems and supply chains, including production practices, distribution networks, and retail environments. Strengthening food systems to ensure reliable access to fresh and diverse vegetables is essential for promoting consumption (Tuteja, 2011). Vegetable consumption has environmental implications, including land use, water usage, greenhouse gas emissions, and biodiversity conservation. Promoting sustainable production practices, such as organic farming and reduced food waste, can mitigate the environmental impact of vegetable consumption (Jha, et al., 2019). Innovations in food preparation techniques, culinary trends, and flavor profiles can influence vegetable consumption. Creative cooking methods, recipes, and culinary experiences that highlight the taste, texture, and visual appeal of vegetables can encourage greater consumption, particularly among those who may be less inclined to eat vegetables. Nutrition education campaigns, cooking classes, community gardening initiatives, and other educational programs can raise awareness about the nutritional benefits of vegetables and provide practical skills for incorporating more vegetables into daily meals. Empowering consumers with knowledge and resources can facilitate behavior change and promote healthier eating habits (Das, 2006).

Objectives

1. To analyze pattern of vegetable cultivation, including the types of vegetables grown, acreage dedicated to each crop, and production levels over time.

- To study the factors driving changes in the pattern of vegetable cultivation, including climate variability, technological advancements, market dynamics, and government policies.

DATABASE & METHODOLOGY

Secondary sources have been employed in research projects. The secondary data were gathered from many sources, including statistical abstracts, reports that were both published and unpublished. In addition, the Haryana Horticulture Department's official reports as well as relevant books, periodicals, magazines, and research journals will be consulted. A series of technical procedures is always the cornerstone of a research effort. The study begins with the collection of secondary data, which are then analyzed to yield important results. Thus, the research process establishes a vital link between the unprocessed data and the final analysis. The current study is based on secondary data. The production of vegetables has been thoroughly examined utilizing secondary data sources. The data was obtained from the Haryana government's Horticulture Department in Panchkula.

RESULT & DISCUSSION

Changing Pattern of Vegetables in Karnal Division, 2010-11 to 2020-21

Table 1 displays the areas that have changed from the agricultural years 2010–11 to 2020–21 for the cultivation of potatoes and onions in several Haryana districts and divisions. The agricultural area of potatoes in Kaithal grew by thirty hectares, indicating a favorable trend. On the other hand, the area under cultivation for onions in Kaithal increased by 130 hectares, suggesting a significant change in farming methods. In the Karnal district, the cultivation of potatoes and onions followed different patterns. The area under cultivation for potatoes increased by 2,320 hectares, indicating a notable rise in potato farming. On the other hand, there has been a significant decline in onion growing as seen by the 1,620 hectares fall in the Karnal onion production area. Different patterns in the cultivation of potatoes and onions were seen in Panipat. A decrease in potato farming is reflected in the 1,060 hectares that were removed from the area under cultivation. On the other hand, Panipat's onion growing area grew by 790 hectares, suggesting that onion farming methods have improved. The division of Karnal, which included several districts, had inconsistent trends. Potato cultivation expanded by 1,290 hectares, indicating a rise in potato farming throughout the division. Conversely, the area under cultivation for onions shrank by 700 hectares, indicating a downturn in the farming of onions (Table 1).

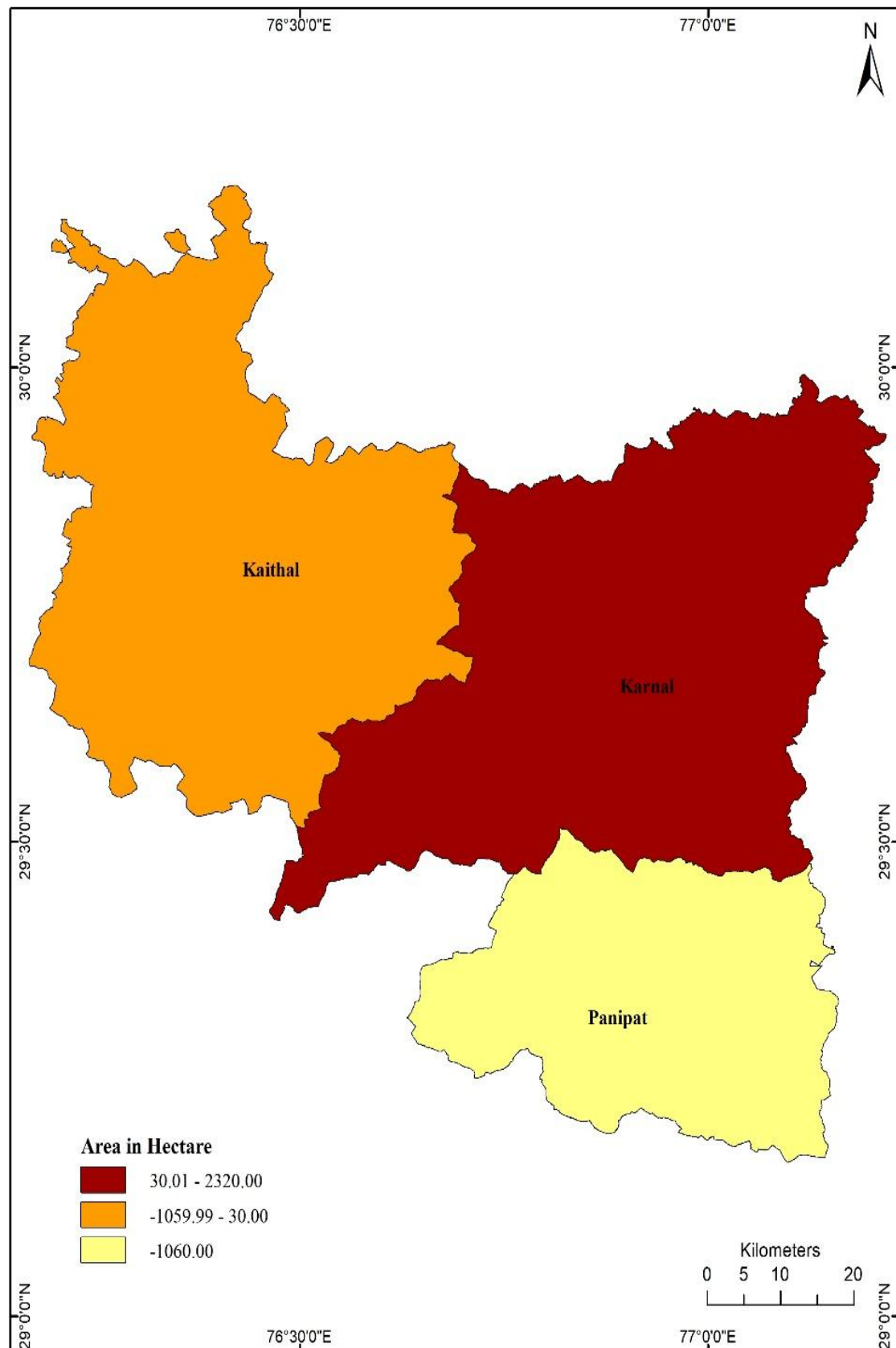
In Kaithal, the area under tomato production expanded by 51 hectares between 2010–11 and 2020–21, suggesting that tomato farming is on the rise. Similarly, the area under cultivation for radish in Kaithal increased by 120 hectares, indicating a significant change in agricultural practices that favor radish. On the other hand, the acreage used for the production of radish and tomatoes decreased in the Karnal district. There was a notable 3,170-acre loss in the area under tomato production, indicating a major decline in tomato growing. Likewise, there has been a noticeable drop in radish farming, as seen by the 1,591-acre reduction in Karnal's radish growing area. There were differences in the cultivation patterns of radish and tomatoes in Panipat. Tomato growing has grown, as seen by the 681 hectares increase in the area under cultivation. Similarly, Panipat's radish cultivation area grew by 2,072 hectares, indicating an improvement in radish farming techniques. The division of Karnal, which included several districts, had inconsistent trends. There has been a fall in tomato growing throughout the division, as seen by the 2,438 hectares decrease in the tomato production area. Conversely, the area under radish cultivation rose by 601 hectares, indicating a promising development in radish farming (Table 1).

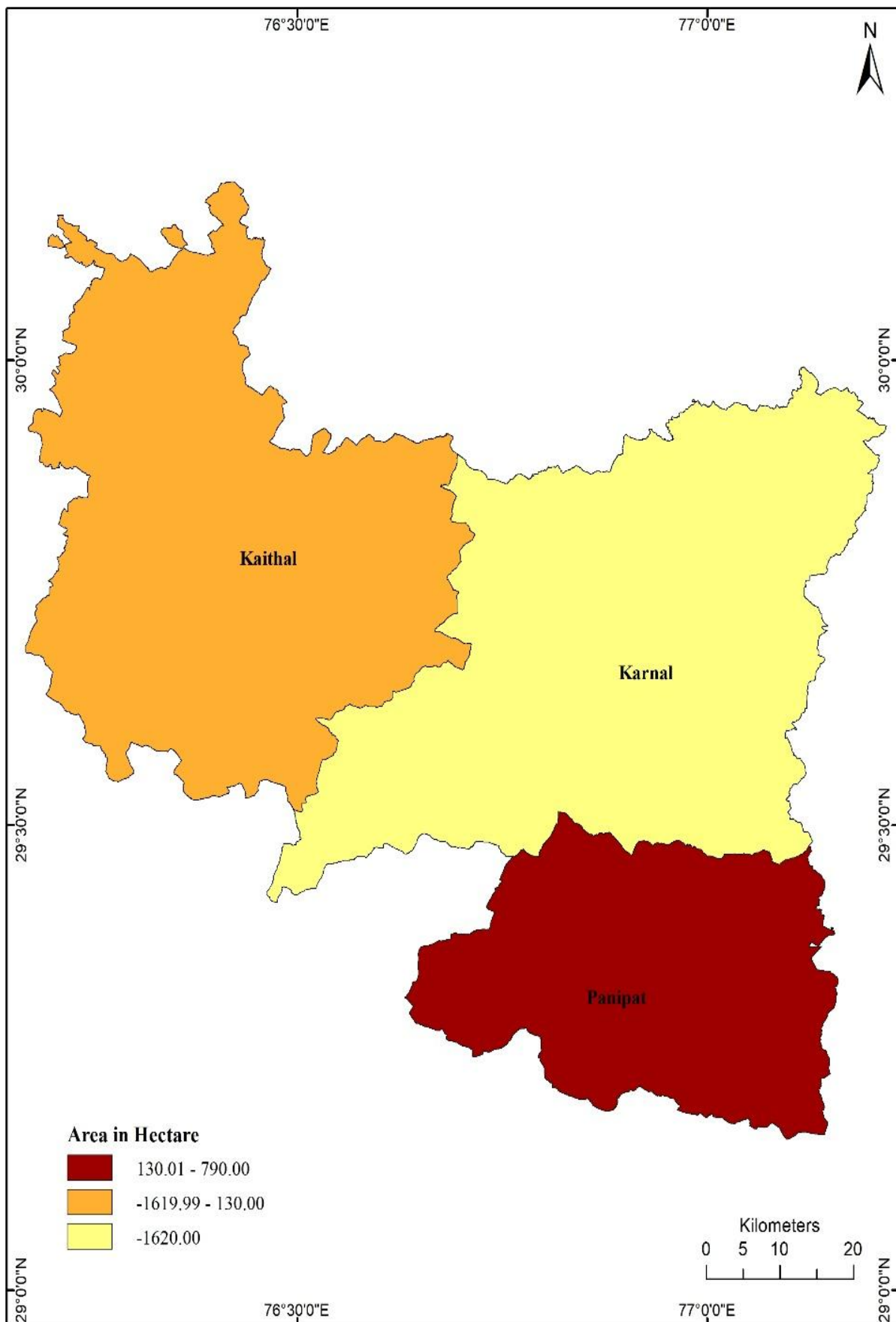
Table 1: Changing Pattern of Vegetables in Karnal Division, 2010-11 to 2020-21
(Area in Hectare)

Districts	Potato	Onion	Tomato	Radish	Carrot	Cabbage	Cauliflower	Chillies	Bhindi	Brijal	Arbi	Peas	Leafy Veg.	Others	Total
Kaithal	30	130	51	120	-20	170	-80	180	-30	130	20	60	250	351	1,362
Karnal	2,320	-1,620	-3,170	-1,591	-267	-1,250	-1,704	-1,160	-565	-951	20	-2,005	-1,270	623	-12,590
Panipat	-1,060	790	681	2,072	5,645	3,740	3,605	800	2,050	300	-120	-360	2,138	11,220	31,501
Karnal Division	1,290	-700	-2,438	601	5,358	2,660	1,821	-180	1,455	-521	-80	-2,305	1,118	12,194	20,273

Source: Haryana Horticulture Department, 2020-2

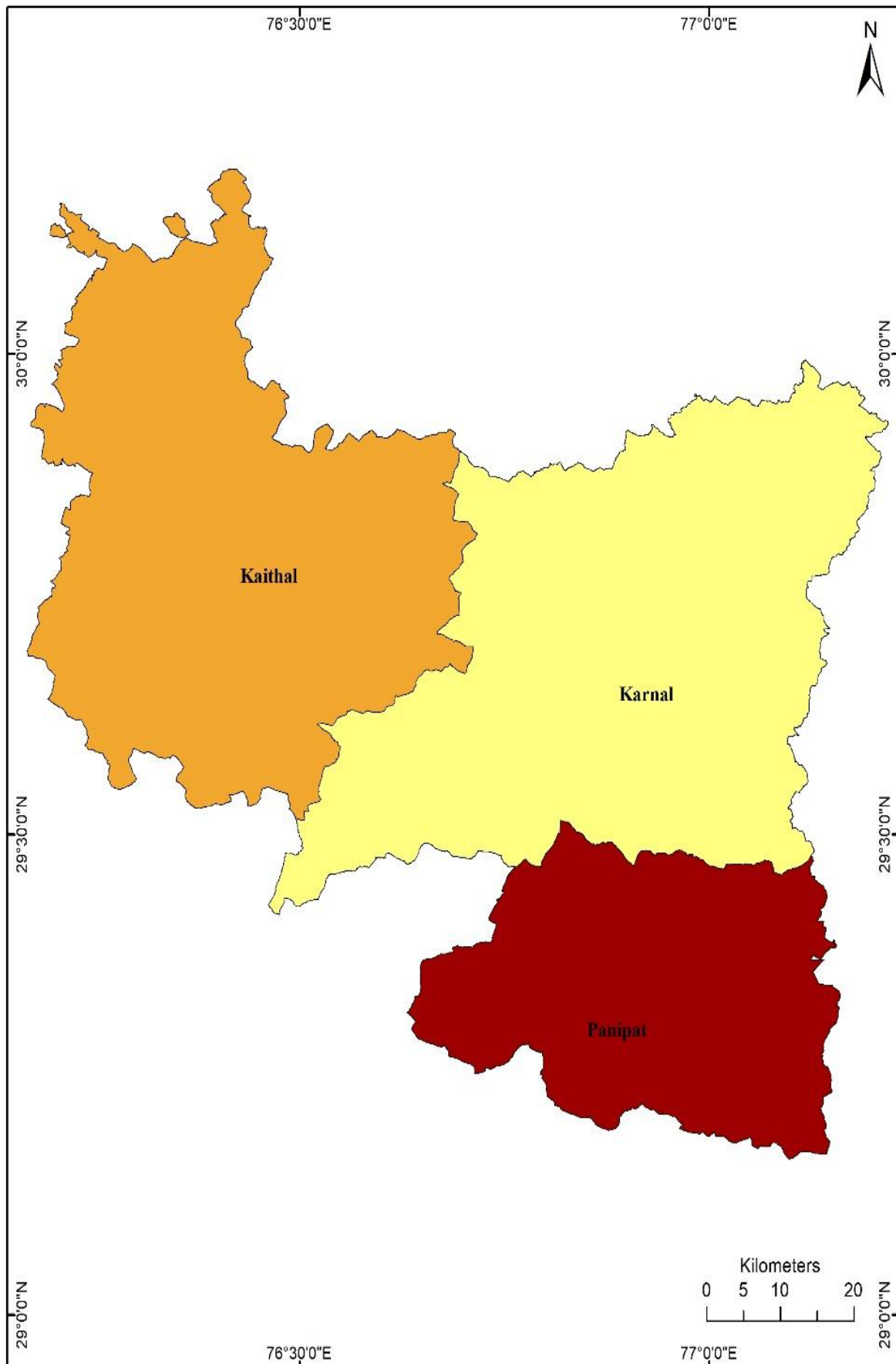
Map 1: Changing Pattern of Potato and Onion Vegetables in Karnal Division, 2010-11 to 2020-21

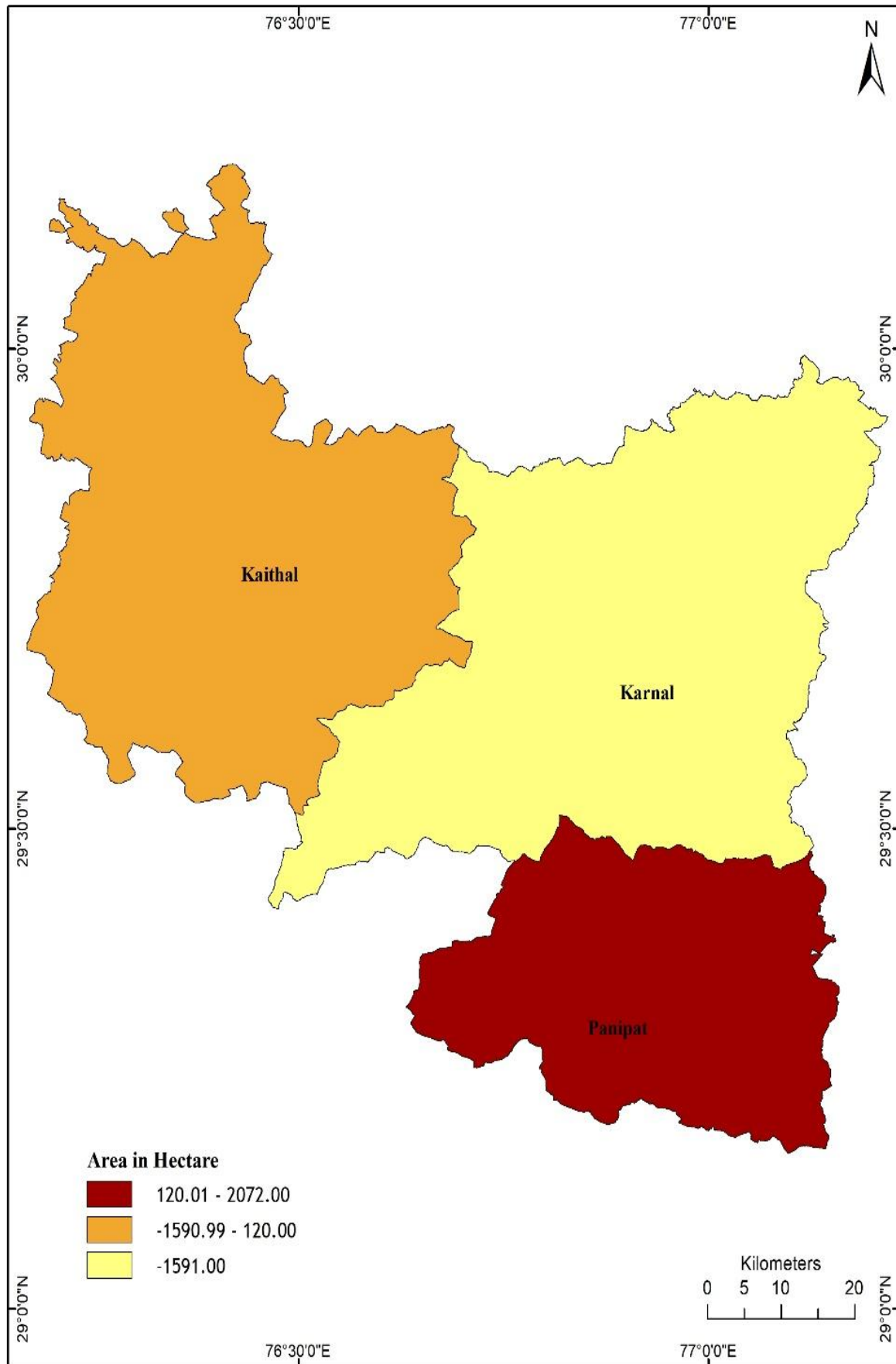




Source: Haryana Horticulture Department, 2010-11 to 2020-21

Map 2: Changing Pattern of Tomato and Radish Vegetables in Karnal Division, 2010-11 to 2020-21





Source: Haryana Horticulture Department, 2010-11 to 2020-21

In Kaithal, the area used for carrot cultivation decreased by 20 hectares, suggesting a slight decrease in the practice. Conversely, the 170 hectares increase in cultivated area in Kaithal suggests a positive shift in cabbage farming practices. The areas of Karnal devoted to the cultivation of carrots and cabbage decreased. The 267 acres of fallow land show a decrease in the amount of carrot farming. In a similar vein, 1,250 hectares of the Karnal cabbage agricultural zone were lost, signifying a significant drop in the practice of growing cabbage. In Panipat, there were variations in the ways that carrots and cabbage were grown. The area under cultivation has increased by 5,645 hectares, indicating a dramatic growth in carrot farming. Similarly, 3,740 hectares more acreage was planted to cabbage in Panipat, suggesting that farming practices had improved. Karnal's division, encompassing multiple districts, exhibited erratic patterns. The division's total cultivated area increased significantly by 5,358 hectares as a result of the expansion of carrot farming. Additionally, the crop area of the Karnal division has increased by 2,660 hectares, indicating a significant trend in cabbage growth (Table 1).

The 80 hectares that have fallen into agriculture suggest that the amount of cauliflower grown in Kaithal has decreased. However, an additional 180 hectares were planted for the production of chilies, indicating that agricultural practices for chilies have improved. In Karnal, the areas used for the production of cauliflower and chilies were reduced. The 1,704 hectares of fall in the crop area indicate a significant decline in cauliflower growing. In a similar vein, the 1,160-acre loss of chilli-producing land in Karnal suggests a noticeable downturn in chilli cultivation. In Panipat, the cultivation practices for cauliflower and chilies differed. The 3,605 acres increase in the cultivated area is evidence of the significant growth in cauliflower cultivation.

In addition, the area under cultivation of chilies in Panipat increased by 800 hectares, suggesting a positive trend in chili farming. Karnal's division, encompassing multiple districts, exhibited erratic patterns. The division's total cultivated area has increased by 1,821 hectares, indicating a notable increase in cauliflower farming. However, a 180-hectare loss in the area used to produce chillies in the Karnal division suggests that the number of chilli plants is declining (Table 1). The area under cultivation for bhindi in Kaithal decreased by thirty hectares, indicating a possible downturn in bhindi farming. On the other hand, a beneficial change in brinjal agricultural practices is indicated by the 130 hectares increase in the cultivated area. There were decreases in the bhindi and brinjal growing areas in Karnal. The area under cultivation for bhindi dropped dramatically by 565 hectares, indicating a severe decline in bhindi farming.

Similar to this, there has been a noticeable drop in brinjal farming in Karnal, as seen by the 951-hectare reduction in the area under cultivation. The cultivation of brinjal and bhindi was trending in different directions in Panipat. The area under cultivation for bhindi grew by 2,050 hectares, indicating a notable expansion in bhindi farming. Furthermore, a positive trend in brinjal agricultural methods is shown in the 300-hectare growth in the area under cultivation of brinjal in Panipat. The division of Karnal, which included several districts, had inconsistent trends. The division's bhindi farming area grew by 1,455 hectares, suggesting a significant increase in the crop. On the other hand, a fall in brinjal farming was evident as the Karnal division's area under cultivation dropped by 521 hectares.

In particular districts and divisions of Haryana, the changing areas of arbi and peas cultivation from the agricultural year 2010–11 to 2020–21 are shown in table 1. Positive changes were observed in Kaithal's arbi and peasant farming areas. The arbi agricultural area has increased by 20 hectares, indicating a growth in arbi farming. In the pea farming region, there was also a positive movement of 60 hectares, indicating a rise in pea growth. While the area under cultivation for arbi in Karnal declined by 20 hectares, the area under cultivation for peas decreased by 2,005 hectares, indicating a considerable decline in peas farming in the region. Negative effects were observed in the arbi and peas cultivation areas of Panipat. There has been a fall in arbi farming, as seen by the 120 hectares decrease in the arbi cultivated area. In a similar vein, the area under pea cultivation shrank by 360 hectares, indicating a significant decline in pea growing methods. The Karnal Division exhibited inconsistent patterns among its several districts.

The division's arbi cultivation area shrank by 80 hectares, indicating a possible downturn in arbi farming. Concurrently, the area under cultivation for peas saw a notable decrease of 2,305 hectares, signifying a notable contraction in pea farming throughout the division.

Positive changes occurred in Kaithal's leafy vegetable and other vegetable cultivation areas between 2010–11 and 2020–21. There has been a growth in the cultivation of green vegetables, as evidenced by the 250 hectare increase in the area under cultivation. Likewise, there was a positive shift of 351 hectares in the other vegetable cultivation area, indicating a growth in the production of other vegetable varieties. The cultivation area of leafy vegetables in Karnal exhibited a negative shift of -1,270 hectares, indicating a notable decline in the farming of leafy vegetables. The cultivation area for other vegetables, however, had a positive change of 623 hectares, suggesting an increase in the cultivation of other vegetable varieties.

Both the cultivation areas of leafy vegetables and other vegetables in Panipat showed notable improvements. There has been a notable increase in the growing area of green vegetables, with an increase of 2,138 hectares. Concurrently, the cultivation area of other vegetables had an impressive increase of 11,220 hectares, indicating a notable rise in the cultivation of other vegetable varieties (Table 1). The Karnal Division exhibited inconsistent patterns among its several

districts. The division's cultivation area for leafy vegetables changed negatively by -1,118 hectares, indicating a significant decline in leafy vegetable farming. On the other hand, the cultivation area of other vegetables showed a notable increase of 12,194 hectares, suggesting a major growth in the cultivation of other vegetable varieties.

CONCLUSION

The information shows the variety of vegetables that are grown in the districts of Haryana, underscoring the necessity of focused interventions to boost output and promote sustainable development. It highlights the economic relevance of these vegetables in Haryana's agricultural landscape, as well as the significance of regional preferences and climate adaptability for particular crops. The information emphasizes how crucial it is to comprehend the distribution and dietary preferences of vegetables across Haryana's districts in order to support farmers, encourage sustainable farming methods, and implement targeted agricultural policies—especially when it comes to peas, which are important to the region's agricultural landscape. The extensive production of leafy and other vegetables highlights Haryana's abundant agricultural resources. It draws attention to how crucial a variety of crops are to the state's economy and food security. Agricultural policies can be developed, resource allocation can be optimized, and the agricultural sector can grow sustainably and in a balanced manner with the help of such data analysis.

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