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MEASURING THE STATUS OF FRUIT CULTIVATION IN HARYANA, 2016–17

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Abstract

Fruit cultivation plays a vital role in agricultural economies, contributing significantly to food security, income generation, and rural livelihoods. This abstract presents a comprehensive assessment of the status of fruit cultivation in the region of Harana during the agricultural years 2016–17. Employing a combination of quantitative and qualitative methodologies, this study examines various facets of fruit cultivation, including crop diversity, production trends, yield variations, market dynamics, and socio-economic impacts. secondary data collected from governmental and non-governmental organizations. To provide a nuanced understanding of the challenges and opportunities within the fruit cultivation sector. The findings of this study reveal a nuanced picture of fruit cultivation in Harana during 2016–17. While certain fruit crops experienced significant growth in production and market demand, others faced challenges related to pest infestations, climate variability, and limited access to resources. Furthermore, socio-economic factors such as land ownership patterns, access to credit, and market infrastructure significantly influenced the cultivation practices and income levels of farmers. The implications of these findings are discussed in the context of agricultural policy formulation, rural development strategies, and sustainable farming practices. Recommendations are proposed to address the identified challenges and capitalize on the opportunities to enhance the resilience and productivity of fruit cultivation in Harana. Overall, this study contributes valuable insights to the ongoing discourse on agricultural development, food security, and rural livelihoods in the region.

Keywords*: fruit cultivation, area, status assessment, Harana,*

Introduction

Farmers choose suitable fruit crops based on factors such as climate, soil conditions, market demand, and their own expertise. Suitable land is selected and prepared for fruit cultivation, which may involve soil testing, land clearing, irrigation setup, and land leveling (Kumar et al., 2016).

Appropriate techniques, including grafting, transferring seedlings, or seed propagation, are used to plant fruit crops. For best growth, spacing and orientation must be done correctly. To

guarantee healthy plant growth and optimal yield, farmers use a variety of cultural techniques, including pruning, fertilizer, irrigation, weed control, and insect management.

Fruit set in many fruit crops depends on pollination. Insects or the wind may do this naturally, or farmers may use controlled pollination methods (Kumar et al., 2016).

Tracking growth stages, treating nutrient deficits, and shielding fruits from pests, illnesses, and unfavorable weather conditions are all part of monitoring fruit development. To guarantee quality and optimize shelf life, fruits are picked at the ideal stage of ripeness. Depending on the fruit's kind and the demands of the market, different harvesting methods are used. It is essential to follow the right procedures for handling, storing, and transporting fruit in order to preserve its quality and reduce losses during handling after harvest. Markets are necessary for farmers to be able to sell their produce. This could entail selling directly to distributors or retailers, engaging in cooperatives or farmer's markets, or selling to wholesalers or retailers (Tuteja, 2011).

Sustainable fruit cultivation techniques are becoming more and more popular as a way to reduce environmental damage, preserve natural resources, and enhance biodiversity. To increase production and profitability, fruit farming needs to continuously learn about and adjust to new technologies, market trends, and environmental problems (Tripathi, et al., 2005).

Fruit crops are vulnerable to a wide range of diseases and pests, which can drastically lower quality and yields. Effective pest and disease management measures, particularly integrated pest management (IPM) approaches, are vital to limiting losses. Fruit crops may suffer from climate variability and extreme weather events like heatwaves, floods, and droughts. Temperature and precipitation variations can interfere with fruit set, flowering, and general crop growth, resulting in decreased yields and heightened vulnerability to pests and diseases (Rathee & Dalal, 2018).

Water availability is critical for fruit cultivation, and water scarcity or inefficient irrigation practices can impact crop growth and yield. Sustainable water management techniques, such

as drip irrigation and rainwater harvesting, are crucial for addressing water-related challenges. Continuous cultivation and improper soil management practices can lead to soil degradation, nutrient depletion, and soil erosion, affecting fruit crop health and productivity. Implementing soil conservation measures and adopting balanced fertilization practices are essential for maintaining soil fertility and health (Behera, 2007).

Fruit farming sometimes calls for labor-intensive operations like planting, trimming, and harvesting, which can be difficult because of a labor shortage and growing labor prices. These problems can be mitigated by mechanization and labor-saving technology, although access to them may be restricted in some areas (Gangwar, 2008).

Objectives

The work aims to identify the types of fruit crops cultivated and their distribution across different geographical areas in Haryana during 2016–17.

Database & Methodology

The present work is based on secondary data. Data have been collected from official reports from agricultural departments. The government of Haryana has utilized this data to gather data on fruit cultivation in Haryana. Relevant literature on fruit cultivation, agricultural economics, market analysis, and rural development has been reviewed to provide theoretical background. The spatial analysis method has been used to analyze spatial patterns of fruit cultivation in Haryana. In order to demonstrate the distribution of fruit crops and pinpoint hotspots within the study area under fruit cultivation from 2016 to 2017, mapping techniques have been used. Based on the natural approach of categorization, thematic maps were prepared using ArcGIS software, and the graph was made in MS Excel.

Result & Discussion

Spatial Pattern of Mango: 2016-17

Table 1 provides a spatial distribution of the area under mango fruit cultivation expressed as a percentage of total agricultural land in various districts of Haryana. It reveals distinct spatial patterns, with certain districts exhibiting significantly higher percentages of land dedicated to

mango cultivation compared to others. For instance, Yamuna Nagar emerges as the district with the highest proportion, accounting for 65.67% of its agricultural land, followed closely by Ambala with 54.31%, Panchkula with 45.26%, and Kurukshetra with 39.38%. These districts likely possess favorable agro-climatic conditions and agricultural practices conducive to mango cultivation, contributing to their prominence in mango production. Conversely, districts like Mahendragarh and Rewari register negligible percentages, indicating minimal or no mango cultivation activity. The disparities in mango cultivation percentages across districts highlight variations in agricultural priorities, resource availability, and market dynamics within the region, underscoring the importance of understanding localized factors influencing crop choices and production patterns (Map 1).

Spatial Pattern of Guava: 2016-17

Table 1 presents the distribution of guava fruit cultivation across different districts of Haryana, expressed as a percentage of total agricultural land dedicated to guava farming. Notably, Palwal emerges as the leading district, with 44.10% of its agricultural land under guava cultivation, closely followed by Jind (42.38%), Faridabad (41.78%), and Rohtak (41.31%). Conversely, districts like Sirsa (5.85%), Mahendragarh (9.40%), and Yamuna Nagar (9.74%) exhibit substantially lower percentages, indicating limited guava cultivation activity. These figures highlight significant variations in guava cultivation intensity among Haryana districts, suggesting diverse agricultural landscapes and production preferences across the region. Table 1 shows regional patterns in guava cultivation across Haryana, with southern districts showing higher percentages than northern ones.

Spatial Pattern of Citrus: 2016-17

During 2016–17, certain districts in Haryana exhibit a high intensity of citrus fruit cultivation, with percentages exceeding 45% of agricultural land dedicated to citrus farming. Sirsa, Fatehabad, and Mahendragarh are notable examples, with percentages surpassing 68%. These districts are characterized by favorable agro-climatic conditions, strong market demand, and possibly well-established citrus cultivation traditions. Citrus farming plays a

significant role in the agricultural economy of these regions, contributing substantially to farmers' livelihoods and overall agricultural productivity (Map 3).

Some districts in Haryana demonstrate moderate levels of citrus fruit cultivation, with percentages ranging from 6.12% to 31.51% of agricultural land dedicated to citrus farming. Districts like Karnal, Kaithal, and Panchkula fall into this category, indicating a moderate prevalence of citrus cultivation. In several districts of Haryana, citrus fruit cultivation exhibits a low intensity, with percentages of agricultural land dedicated to citrus farming ranging from 0.41% to 3.12%. Districts such as Ambala, Sonipat, and Kurukshetra fall into this category, indicating minimal citrus cultivation activity during 2016–17.

Spatial Pattern of Ber: 2016-17

Some districts are more prominent than others in the high intensity of Ber fruit growing, accounting for more than 20% of all agricultural area. Rewari, Palwal, and Jind are notable instances, with percentages above 21 percent. There are several districts in Haryana that have rather high rates of Ber fruit growing; the percentage of agricultural land that is used for Ber farming ranges from 6.66% to 16.95%. This group includes districts like Hissar, Kaithal, and Mahendragarh, which show a moderate frequency of Ber cultivation. Even though Ber farming is already prevalent in certain places, there is still room for growth and improvement in growing techniques.

Table 1: spatial distribution of Fruits Cultivation in Haryana, 2016-17

Area under fruits (In %)

Sr. No.	Districts	Mango	Guava	Citrus	Ber	Grapes	Aonla	Chiku	Lichi	Peach	Others
1.	Panchkula	45.26	14.16	3.12	0.41	0.00	7.59	17.21	1.08	1.22	9.96
2.	Ambala	54.31	17.99	0.41	0.25	0.00	0.62	9.45	0.45	1.07	15.44
3.	Yamuna Nagar	65.67	9.74	1.84	0.07	0.00	1.78	9.78	1.72	1.13	8.27
4.	Kurukshetra	39.38	29.52	0.83	0.97	0.28	2.97	9.86	0.62	2.21	13.38
5.	Kaithal	1.91	32.35	4.35	5.22	0.00	9.39	0.35	0.00	0.00	46.43
6.	Karnal	17.89	24.08	6.12	1.77	0.06	5.81	7.29	0.38	1.26	35.34
7.	Panipat	20.00	40.29	1.07	10.24	0.00	2.83	0.10	0.39	1.76	23.32
8.	Sonipat	3.46	18.15	0.48	9.54	0.00	0.81	0.13	0.04	0.57	66.81
9	Rohtak	1.70	41.31	22.39	16.20	0.00	3.14	0.00	0.00	0.34	14.93
10.	Jhajjar	0.39	33.69	18.18	16.77	0.00	2.33	0.19	0.00	0.00	28.44
11.	Faridabad	2.35	41.78	20.89	13.73	0.00	5.75	0.94	0.00	0.00	14.55
12.	Mahendragarh	0.00	9.40	68.15	10.97	0.00	5.22	0.00	0.00	0.00	6.27
13.	Rewari	0.00	21.50	21.11	24.54	0.00	11.08	0.00	0.00	0.00	21.77
14.	Gurgaon	0.09	22.68	12.91	4.76	0.00	4.85	0.00	0.00	0.00	54.72
15.	Bhiwani	0.41	11.59	59.11	8.11	0.00	9.63	0.03	0.00	0.00	11.12
16.	Hissar	1.04	35.39	45.46	6.66	0.19	3.53	0.00	0.02	0.62	7.09
17.	Fatehabad	0.19	13.29	71.92	4.69	0.00	2.12	0.00	0.00	0.37	7.44
18.	Sirsa	0.08	5.85	87.43	2.48	0.13	2.16	0.01	0.00	0.00	1.86
19.	Jind	2.91	42.38	18.15	21.65	0.00	2.83	0.08	0.00	0.42	11.57
20.	Mewat	0.44	24.37	9.64	16.95	0.00	5.88	0.00	0.00	0.00	42.73
21.	Palwal	1.75	44.10	9.51	21.85	0.00	9.37	0.00	0.00	0.13	13.28
	Haryana	**15.65**	**19.22**	**31.51**	**6.72**	**0.04**	**3.66**	**2.87**	**0.34**	**0.51**	**19.47**

Source: Horticulture Department, Haryana, 2018.

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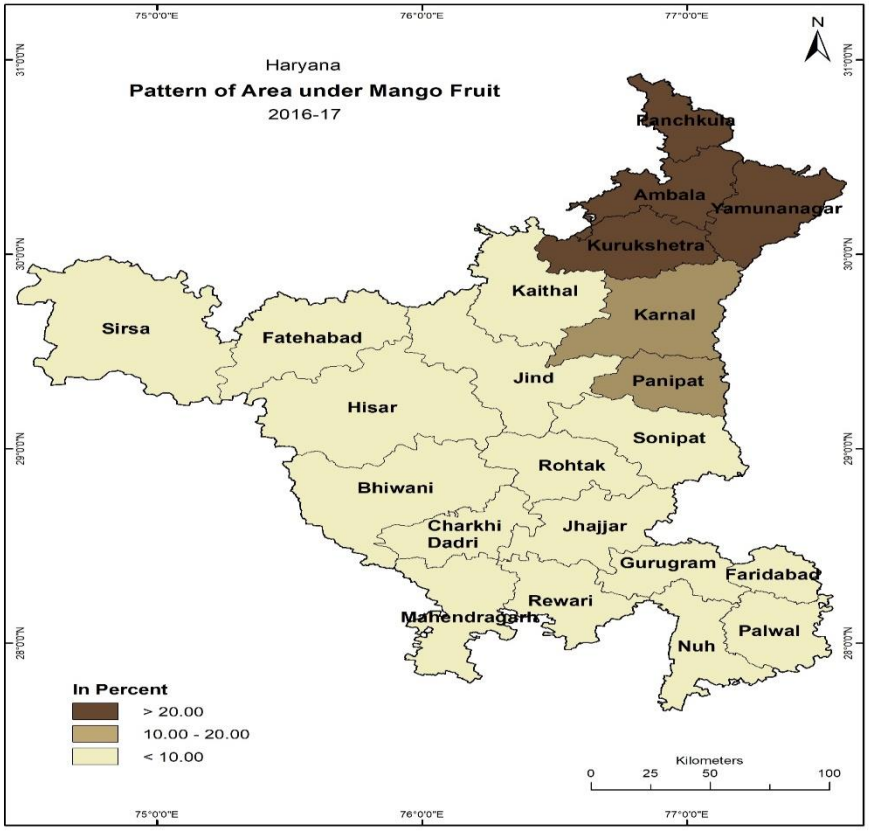
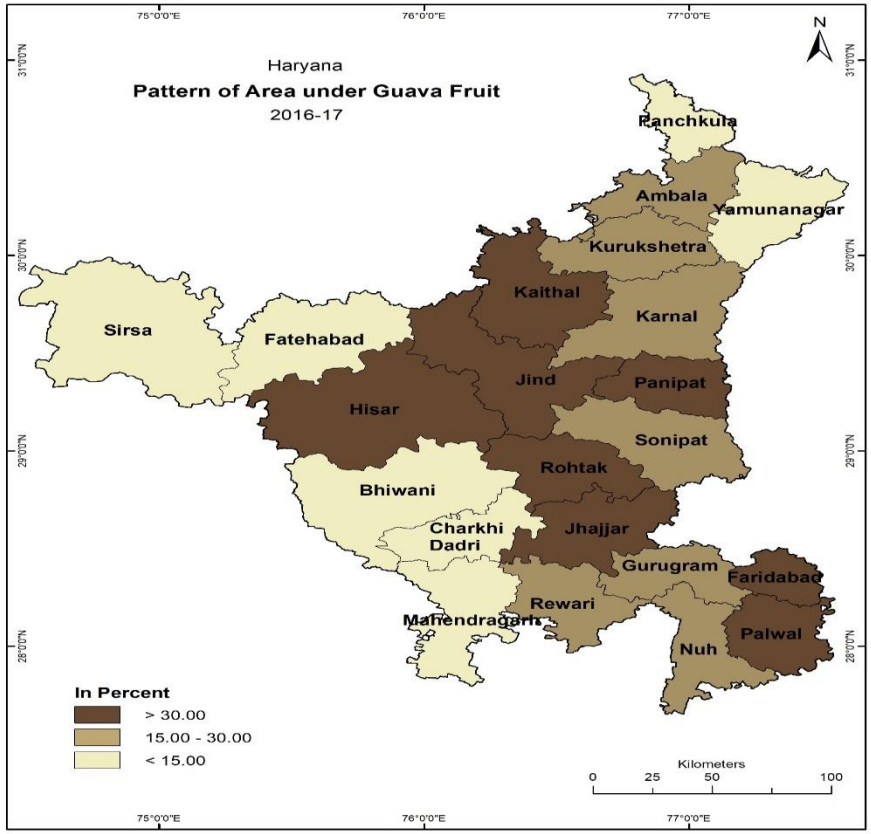


Map 1



Map 2

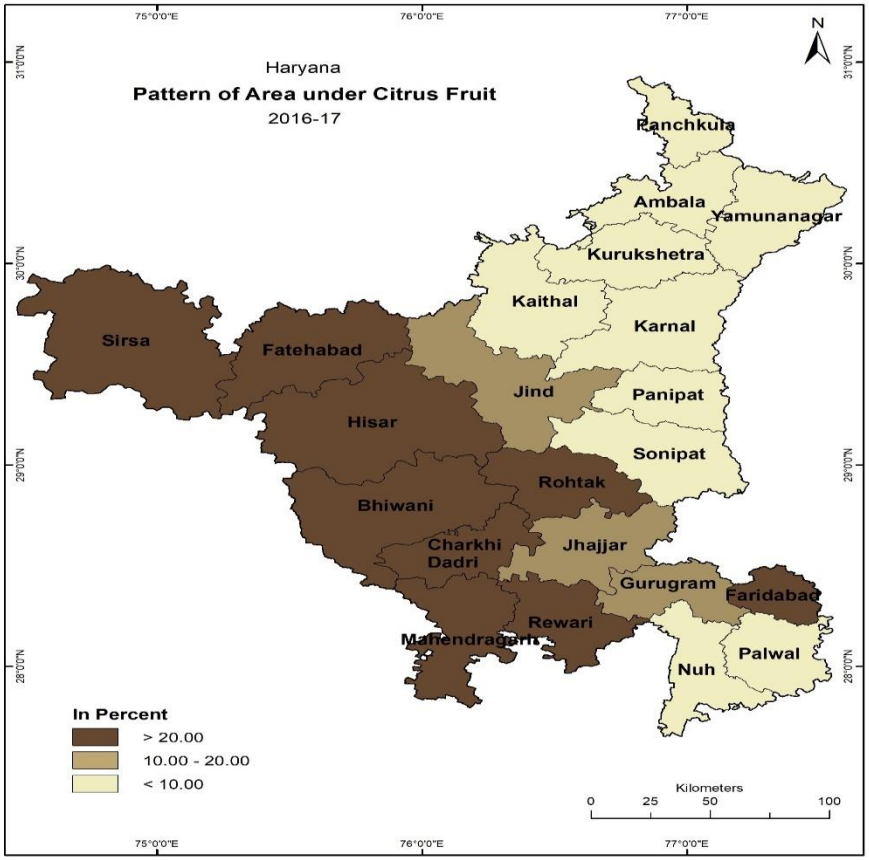
Regarding Ber fruit cultivation in Haryana in 2016–17, Kurukshetra, Panchkula, Ambala, and Yamuna Nagar are among the districts with low cultivation intensity, ranging from 0.07% to 6.72% of the agricultural area devoted to Ber fruit agriculture. There is little evidence of Ber fruit production in these regions, indicating that Ber farming may not have been a major agricultural activity in these locations during 2016–17 (Map 4).

The spatial pattern of grape cultivation underscores the need for strategic interventions to promote grape farming and unlock its potential as a viable agricultural activity in Haryana. Initiatives focusing on improving agro-climatic suitability, providing technical support, facilitating access to markets, and offering financial incentives can help stimulate grape cultivation and enhance farmers' income and livelihoods. Additionally, collaboration among government agencies, research institutions, and private sector stakeholders is essential to promoting innovation, knowledge sharing, and investment in the grape sector.

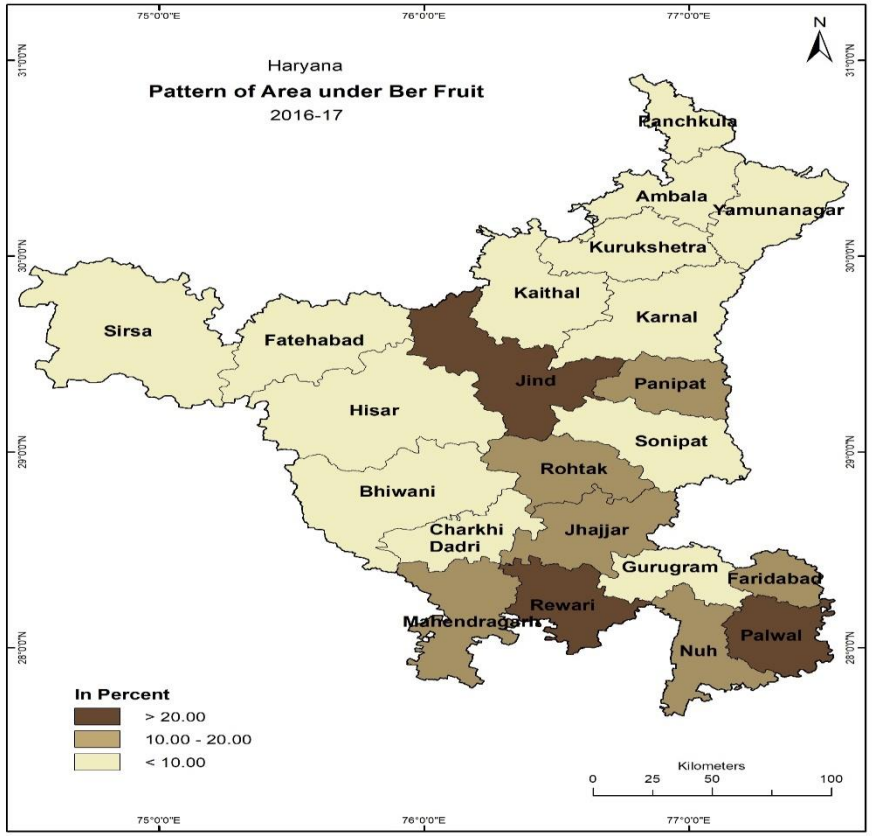
During 2016–17, Karnal and the state as a whole demonstrated a moderate to negligible presence of grape cultivation, with percentages ranging from 0.00% to 0.06%. This indicates limited adoption of grape farming practices in these regions during the specified period. Factors such as lack of infrastructure, knowledge, and market access may contribute to the low cultivation intensity. The majority of districts in Haryana exhibit a low intensity of grape cultivation, with percentages ranging from 0.00% to 0.19%. Districts such as Kurukshetra, Hissar, and Sirsa fall into this category, indicating minimal grape cultivation activity (Map 5).

The spatial pattern of Aonla cultivation highlights the importance of tailored strategies to harness the potential of Aonla farming while addressing constraints in different districts of Haryana. Efforts to sustain and enhance Aonla cultivation should focus on ensuring environmental sustainability, adopting modern farming techniques, and strengthening market linkages to capitalize on the high potential of Aonla cultivation for economic growth and rural development. By leveraging regional strengths and addressing localized challenges, Haryana can optimize Aonla cultivation practices, contribute to agricultural diversification, and bolster rural livelihoods in the state.

In 2016–17, Aonla fruit agriculture was present in a number of Haryana districts at moderate to low levels, accounting for 2.12% to 5.81% of all agricultural land. Among these districts are Gurgaon, Mahendragarh, Faridabad, and Karnal. Although Aonla farming is quite prevalent in these locations, there is always opportunity for growth and improvement in farming techniques. In some regions of Haryana, the cultivation of Aonla fruit is practiced with high intensity.


Haryana
Pattern of Area under Citrus Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 20.00
10.00 - 20.00
< 10.00
Kilometers
0 25 50 100
N

Map 3

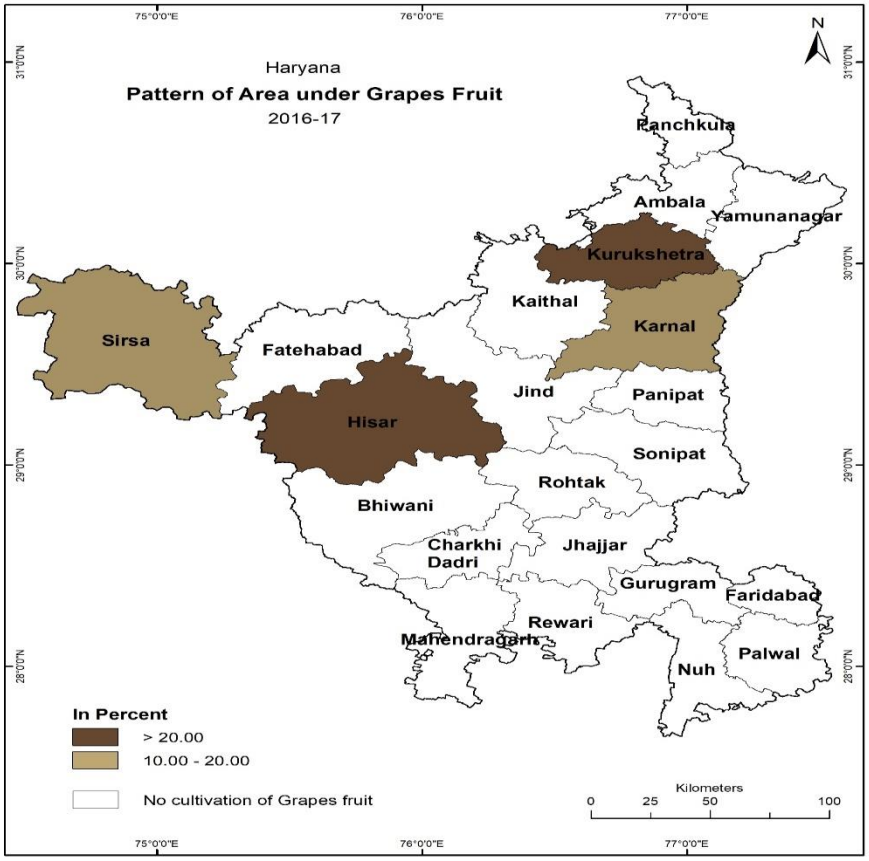

Haryana
Pattern of Area under Ber Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 20.00
10.00 - 20.00
< 10.00
Kilometers
0 25 50 100
N

Map 4

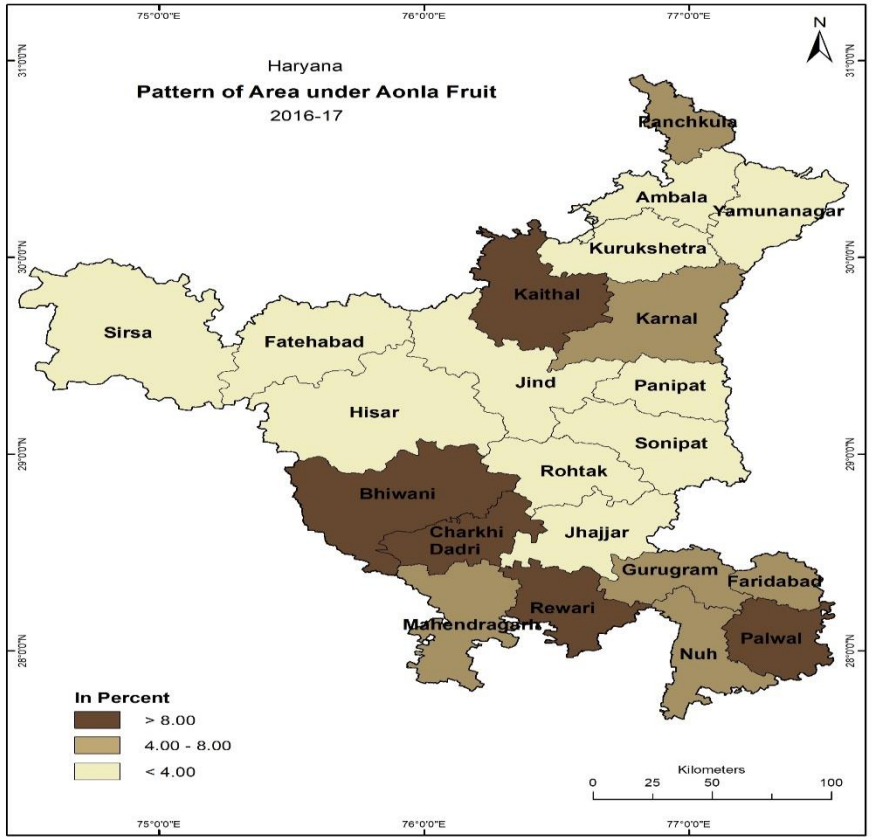
The proportion of agricultural land devoted to Aonla farming exceeds 5%. With 11.08% of its agricultural area devoted to Aonla farming, Rewari is the district that leads the way in this regard. Bhiwani, Kaithal, and Palwal all have percentages above 9%. There is a clear focus on Aonla cultivation in these districts, which is probably due to a combination of market demand, agroclimatic appropriateness, and maybe long-standing farming traditions (Map 5). The agricultural economy of these areas is heavily reliant on aonla farming, which also significantly boosts farmers' incomes and total agricultural output.

Table 1 describes the spatial pattern of Chiku fruit cultivation across districts of Haryana during the 2016–17 agricultural year. Notably, Panchkula emerges as the leading district, with 17.21% of agricultural land dedicated to chiku farming, indicating a significant emphasis on chiku cultivation in this region. Moderately prevalent cultivation is observed in districts like Kurukshetra (9.86%), Yamuna Nagar (9.78%), and Ambala (9.45%), suggesting varying degrees of Chiku cultivation intensity across these areas. In contrast, several districts exhibit negligible Chiku cultivation, with percentages ranging from 0.00% to 0.35%, including Faridabad, Kaithal, and Jhajjar. These disparities underscore the diverse spatial distribution of Chiku farming activities within Haryana, influenced by factors such as agro-climatic suitability, market demand, and farmers' preferences (Map 6).

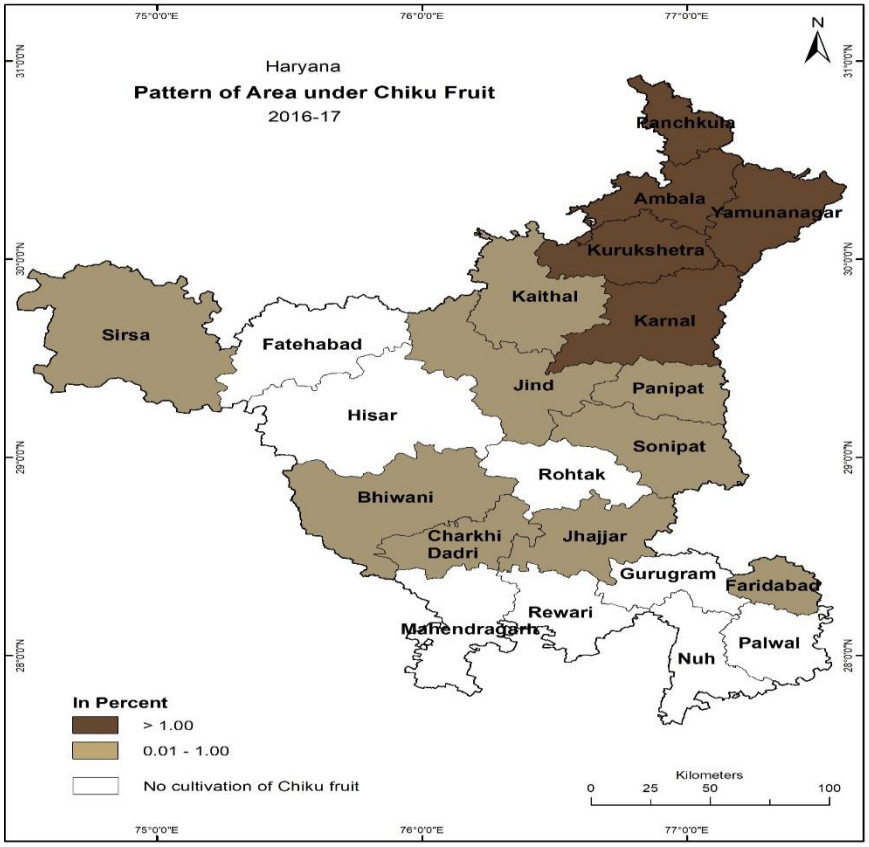
The spatial distribution of Lichi fruit cultivation in the districts of Haryana during the 2016–17 farming year is shown in table 1. With 1.72% of its agricultural land devoted to Lichi farming, Yamuna Nagar stands out as the top district, suggesting that Lichi cultivation is highly valued in this area. Districts such as Panchkula (1.08%), Kurukshetra (0.62%), and Ambala (0.45%) exhibit moderately prevalent cultivation, indicating varied degrees of intensity in Lichi agriculture across these areas. On the other hand, there is very little Lichi cultivation in a number of districts, such as Faridabad, Kaithal, Jhajjar, and others, with percentages as low as 0.00%. These differences highlight the heterogeneous spatial distribution of Lichi farming operations in Haryana, which is impacted by market demand, farmer choices, and agroclimatic suitability. Table 1 shows regional variations in Lichi fruit cultivation across Haryana, with Yamuna Nagar having the highest intensity. This diversity reflects factors like soil fertility, water availability, temperature, and market dynamics, requiring targeted interventions for sustainable practices (Map 7).


Haryana
Pattern of Area under Grapes Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 20.00
10.00 - 20.00
No cultivation of Grapes fruit
Kilometers
0 25 50 100
N

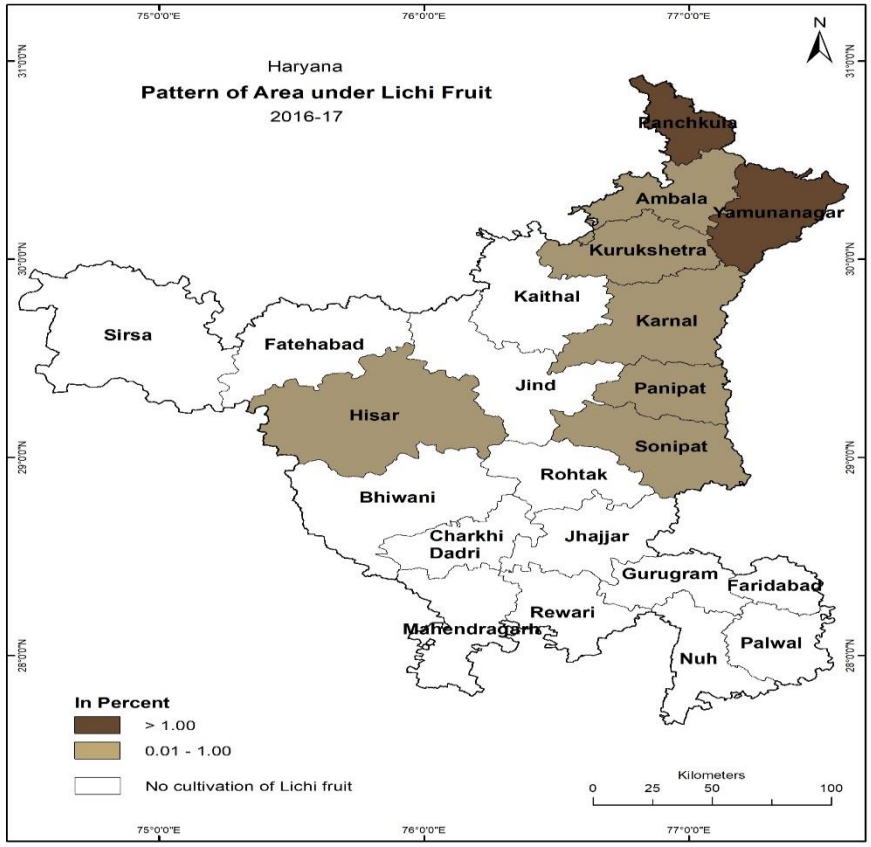
Map 5


Haryana
Pattern of Area under Aonla Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 8.00
4.00 - 8.00
< 4.00
Kilometers
0 25 50 100
N

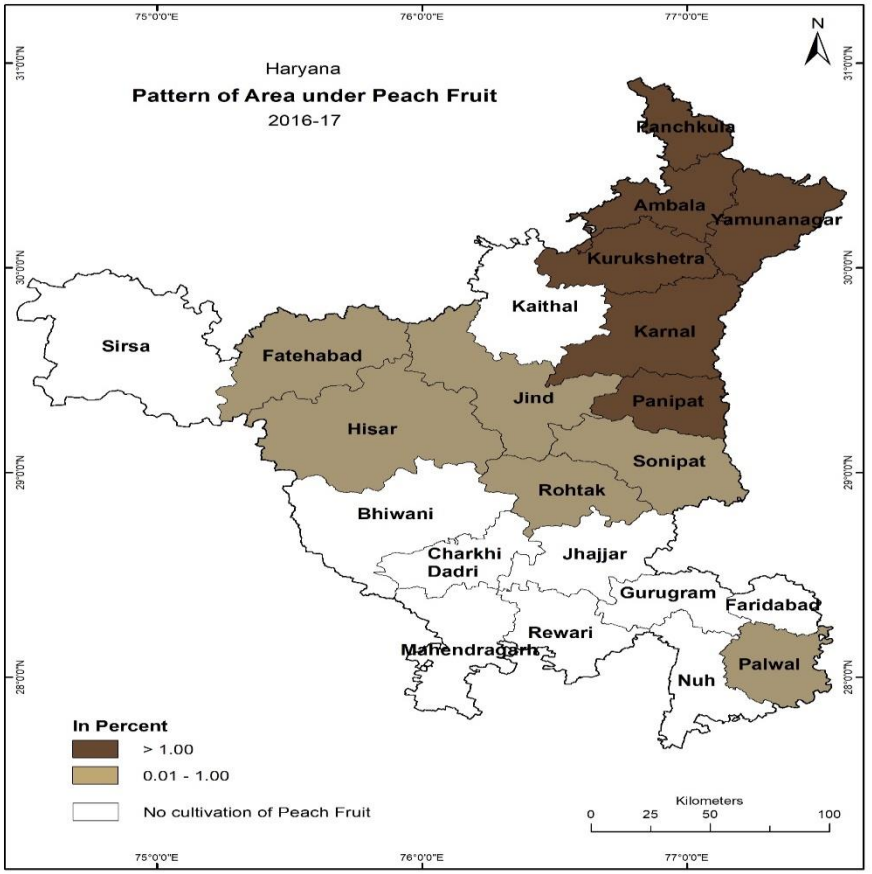
Map 6


Haryana
Pattern of Area under Chiku Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 1.00
0.01 - 1.00
No cultivation of Chiku fruit
Kilometers
0 25 50 100
N

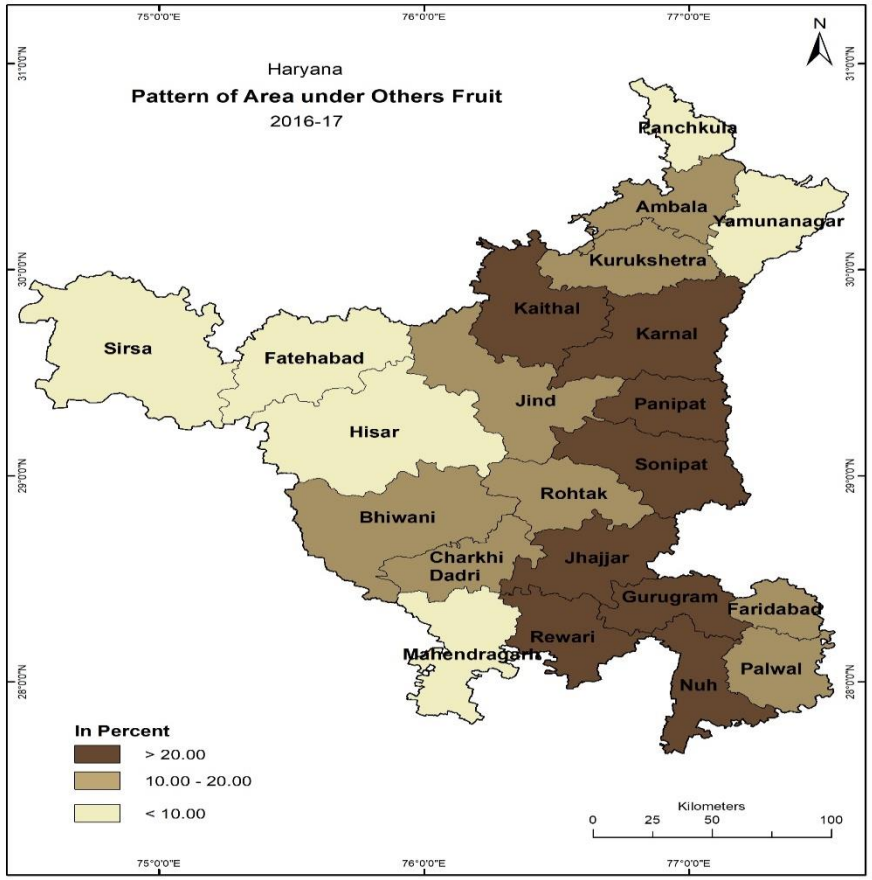
Map 7


Haryana
Pattern of Area under Lichi Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 1.00
0.01 - 1.00
No cultivation of Lichi fruit
Kilometers
0 25 50 100
N

Map 8


Haryana
Pattern of Area under Peach Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 1.00
0.01 - 1.00
No cultivation of Peach Fruit
Kilometers
0 25 50 100
75°0'0"E
76°0'0"E
77°0'0"E
31°0'0"N
30°0'0"N
29°0'0"N
28°0'0"N
N

Map 9


Haryana
Pattern of Area under Others Fruit
2016-17
Panchkula
Ambala
Yamunanagar
Kurukshetra
Kaithal
Karnal
Sirsa
Fatehabad
Jind
Panipat
Hisar
Sonipat
Rohtak
Bhiwani
Charkhi Dadri
Jhajjar
Gurugram
Faridabad
Rewari
Mahendragarh
Nuh
Palwal
In Percent
> 20.00
10.00 - 20.00
< 10.00
Kilometers
0 25 50 100
75°0'0"E
76°0'0"E
77°0'0"E
31°0'0"N
30°0'0"N
29°0'0"N
28°0'0"N
N

Map 10

Table 1 shows the spatial distribution of peach fruit cultivation across districts of Haryana during the 2016–17 agricultural year. Notably, Kurukshetra emerges as the leading district, with 2.21% of agricultural land dedicated to peach farming, indicating a significant emphasis on peach cultivation in this region. Moderate peach cultivation is observed in Panipat, Karnal, and Panchkula, while some districts show minimal cultivation, highlighting the diverse spatial distribution of peach farming activities in Haryana. The data reveals regional variations in peach fruit cultivation in Haryana, with some districts showing high intensity while others show minimal cultivation (Map 9).

Table 1 shows the spatial distribution of other fruit cultivations across districts of Haryana for the 2016–17 agricultural year. Notably, Sonipat, Gurgaon, and Kaithal emerge as the leading districts with high percentages of agricultural land dedicated to other fruit farming, indicating a significant presence of diverse fruit varieties in these regions. Conversely, districts like Sirsa, Mahendragarh, and Fatehabad exhibit minimal cultivation, reflecting a limited emphasis on fruit farming in these areas. The data highlights varying cultivation intensities across districts, with Sonipat showing the highest intensity at 66.81%, followed by Gurgaon (54.72%) and Kaithal (46.43%). These districts demonstrate a notable emphasis on cultivating various fruit types beyond those explicitly mentioned. In contrast, districts like Sirsa, Mahendragarh, and Fatehabad exhibit minimal cultivation intensity, with percentages ranging from 1.86% to 7.44% (Map 10).

Conclusion

The presented tables offer a comprehensive insight into the spatial distribution and cultivation intensity of various fruits across different districts of Haryana during 2016–17. From the data, it's evident that each district exhibits varying degrees of emphasis on different fruit cultivations, reflecting diverse agricultural practices, local preferences, and agro-climatic suitability. While some districts showcase high cultivation intensity for specific fruits such as mango, guava, and citrus, others demonstrate moderate to low intensity or negligible cultivation for fruits like grapes, aonla, chiku, and lichi. Additionally, the table depicting other fruit cultivations underscores the significant presence of diverse fruit varieties in certain districts, with Sonipat, Gurgaon, and Kaithal emerging as key contributors. These findings highlight the importance of tailored interventions and support mechanisms to promote fruit cultivation, address localized

challenges, and optimize agricultural productivity across different regions of Haryana. By leveraging regional strengths and addressing constraints, Haryana can further enhance its agricultural sector's resilience, contribute to food security, and foster rural development in the state. Fruit growers face challenges in market fluctuations, including limited access to credit, inputs, technology, and extension services, which can impact profitability and market access. To promote sustainable fruit production, improving access to financial services, agricultural inputs, and extension support is crucial, while land use planning and policies prioritize agricultural land preservation. Fruit growers face challenges in meeting quality standards and certification requirements for domestic and international markets, but compliance with food safety regulations and quality assurance practices is crucial. Collaborative efforts among policymakers, researchers, extension services, farmers, and other stakeholders are needed to develop sustainable solutions for promoting resilience, productivity, and profitability in fruit cultivation systems.

Studying the status of fruit cultivation in Haryana in 2016–17 can offer valuable insights into various aspects of agricultural practices, socio-economic conditions, and environmental factors impacting fruit production in the region. While this specific study may focus on a particular timeframe, its future scope could encompass several dimensions.

- To extend the study to analyze trends beyond 2016–17 and observe any shifts or patterns in fruit cultivation practices, production volumes, crop diversification, and market dynamics. This longitudinal analysis can provide a deeper understanding of the evolving landscape of fruit cultivation in Haryana.
- To study the impact of climate change on fruit cultivation in Haryana, including changes in temperature, precipitation patterns, and extreme weather events. Assessing adaptation strategies adopted by farmers and exploring potential mitigation measures can be crucial for sustainable fruit production in the face of climate variability.
- To explore the adoption and effectiveness of various technological interventions such as precision agriculture, drip irrigation, and the use of advanced machinery in enhancing fruit productivity and mitigating production risks. Evaluate the economic feasibility and scalability of these technologies for smallholder farmers in Haryana.

- To analyze the market dynamics of different fruit crops, including supply chains, price fluctuations, export-import trends, and consumer preferences. Identify opportunities for value addition, agro-processing, and market linkages to enhance the competitiveness of Haryana's fruit industry and improve farmers' income.
- To study the socio-economic impact of fruit cultivation on rural livelihoods, employment generation, gender dynamics, and income distribution.

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