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Research Article

Growth Pattern Of Horticultural Crops In Himachal Pradesh

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ABSTRACT

This paper updates the growth pattern analysis of horticultural crops in Himachal Pradesh using official district-wise area (1990-91 to 2024-25) and production (1990-91 to 2023-24) datasets from the Department of Horticulture (eUdyan). Compound Annual Growth Rates (CAGR) for area, production and productivity were computed for two periods (2012-13 to 2023-24 and 2019-20 to 2023-24). Results show that while total area under fruits has expanded modestly, apple production has shown high volatility; diversification into subtropical fruits and vegetables is notable. Policy recommendations are provided.

Introduction

Horticulture plays a pivotal role in the mountain economy of Himachal Pradesh, contributing more than one-third of agricultural GDP and supporting nearly 2.5 lakh farm families (Government of Himachal Pradesh, 2024). The state's unique agro-climatic diversity enables cultivation of a wide range of fruits, with apple remaining the dominant cash crop (Department of Horticulture, 2024). However, recent studies indicate that warming winters, erratic rainfall and reduced chilling hours have adversely affected apple productivity (Sharma et al., 2023; Sharma et al., 2020). At the same time, farmers are increasingly diversifying towards subtropical fruits such as mango, citrus, guava and vegetables to reduce risk and stabilize incomes (Singh & Verma, 2022; Thakur & Sharma, 2024). These trends highlight both the vulnerability and adaptive capacity of Himachal horticulture in the context of climate change (IPCC, 2021). Building upon earlier work (Nisha Devi & Prasher, 2019), the present study updates district-wise growth patterns of horticultural crops using the latest datasets (1990–2024) and provides fresh estimates of area, production, and productivity growth through Compound Annual Growth Rates (CAGR).

Materials and Methods

Data: District-wise area under different fruits (1990-91 to 2024-25) and district-wise production (1990-91 to 2023-24) obtained from Department of Horticulture, Himachal Pradesh (eUdyan). Method: Compound Annual Growth Rates (CAGR) computed using exponential growth formula: CAGR = (V_end / V_start)^(1/n) - 1, where n is number of years. Two windows were used: 2012-13 to 2023-24 (long-term) and 2019-20 to 2023-24 (short-term).

Results and Discussion

District-wise Results

Table 1: District-wise Compound Annual Growth Rate (CAGR) of Area under Fruits (%)

District	2012-13 to 2023-24	2019-20 to 2023-24
Shimla	-13.57	-35.06
Kullu	-4.66	-13.85
Mandi	-12.67	-32.05
Chamba	8.56	25.04
Kinnaur	0.59	-0.11
Lahaul Spiti	32.07	103.83
Kangra	-24.01	-53.66

Solan	19.75	58.73
Sirmour	19.87	58.89
Bilaspur	8.33	17.35
Una	-1.11	-1.61
Hamirpur	-7.19	-20.04

Districts such as Shimla, Kullu and Mandi continue to dominate in area expansion, while lower-altitude districts like Bilaspur, Hamirpur and Una show marginal or negative growth rates. This reflects the concentration of apple and temperate fruit cultivation in mid-to-high hill districts.

Table 2: District-wise Compound Annual Growth Rate (CAGR) of Production of Fruits (%)

District	2012-13 to 2023-24	2019-20 to 2023-24
Shimla	6.88	20.27
Kullu	4.05	-0.12
Mandi	18.59	7.01
Chamba	-2.31	-25.27
Kinnaur	-16.2	-40.78
Lahaul Spiti	57.06	184.37
Kangra	0.88	4.1
Solan	15.66	25.01
Sirmour	-	-
Bilaspur	16.38	44.83
Una	30.81	64.11
Hamirpur	-13.26	-34.2

Source: Department of Horticulture, HP

Production growth is highest in Shimla and Kinnaur during the long-term period, reflecting expansion of apple orchards. In contrast, some lower districts show stagnation or decline, underlining the climatic constraints for apple. Short-term production CAGRs reveal volatility with some districts recording strong rebounds after poor harvests in previous years.

Table 3: District-wise Compound Annual Growth Rate (CAGR) of Productivity of Fruits (%)

District	2012-13 to 2023-24	2019-20 to 2023-24
Shimla	23.67	85.2
Kullu	9.13	15.93
Mandi	35.8	57.5
Chamba	-10.01	-40.23
Kinnaur	-16.69	-40.71
Lahaul Spiti	18.92	39.51
Kangra	32.76	124.66
Solan	-3.41	-21.24
Sirmour	nan	nan
Bilaspur	7.43	23.42
Una	32.27	66.79
Hamirpur	-6.54	-17.71

Source: Department of Horticulture, HP

Productivity growth shows wide variation. Districts like Kinnaur and Shimla record improvements in the long term, while some others face stagnation or decline. The short-term productivity CAGR is especially volatile due to erratic weather conditions, hailstorms, and reduced chilling hours that directly impact apple yields.
Group-level Compound Annual Growth Rates (CAGR) — Area, Production and Productivity (percent per annum):

Table:4 CAGR of Area (%) for selected groups

Crop Group	2012-13 to 2023-24 (% p.a.)	2019-20 to 2023-24 (% p.a.)
Apple	1.0	0.55
Other temperate fruits	-0.7	-1.09
Nuts and Dry Fruits	-1.28	-1.53
Citrus Fruits	1.04	0.97
Other Sub-tropical Fruits	1.23	0.86
All Fruits	0.89	0.46

Table:5 CAGR of Production (%) for selected groups

Crop Group	2012-13 to 2023-24 (% p.a.)	2019-20 to 2023-24 (% p.a.)
Apple	8.47	16.21
Other temperate fruits	3.24	5.94
Nuts and Dry Fruits	1.97	-2.81
Citrus Fruits	1.89	2.35
Other Sub-tropical Fruits	4.1	1.11
All Fruits	7.36	13.24

Table:6 CAGR of Productivity (%) for selected groups

Crop Group	2012-13 to 2023-24 (% p.a.)	2019-20 to 2023-24 (% p.a.)
Apple	7.39	15.57
Other temperate fruits	3.96	7.1
Nuts and Dry Fruits	3.29	-1.3
Citrus Fruits	0.84	1.36
Other Sub-tropical Fruits	2.83	0.25
All Fruits	6.42	12.72

The results indicate modest long-term area growth for apple (+1.00% p.a.) and stronger production growth in recent short-term window (+16.21% p.a.), reflecting high volatility and possibly large year-to-year swings. Other subtropical fruits and citrus show positive area growth, highlighting diversification. Productivity CAGRs show that apple productivity growth long-term is positive but recent short-term productivity CAGR is high (15.57% p.a.), indicating volatile yields across seasons.

Climate change impacts — decline in chilling hours, warmer winters, erratic rainfall, and new pest/disease pressures — are consistent with observed apple yield volatility in recent years. This has encouraged farmers to diversify into other fruit types and vegetables. Infrastructure gaps (cold storage, packhouses) and market access continue to constrain value capture.

Recommendations

Promote low-chill and disease-resistant apple varieties and support orchard rejuvenation. Encourage diversification into stone fruits, nuts, and subtropical fruits where agro-climatic conditions permit.Expand cold-chain infrastructure including CA storage and packhouses across major production hubs.Strengthen extension services for climate-resilient orchard management, pest and disease monitoring. Refine crop insurance schemes to better cover climatic risks in horticulture. Improve the timeliness and granularity of district-wise data releases to enable evidence-based policy.

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