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Trends and Patterns in The Cultivation of Fruit CropS in Shimla District, Himachal Pradesh

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Abstract- Horticulture plays an important role in the economy of Himachal Pradesh, and the Shimla district is one of the most prominent centres for fruit crop cultivation. An analysis of the trends and patterns in the production of fruit crops is significant since it brings out some important aspects such as change in the composition of crops produced, area under production, total output, productivity, and farmer welfare. An analysis of the trends and patterns in the production of fruit crops is equally vital since it helps in establishing the predominance of some specific crops, the rate at which diversification is taking place, and the development of horticulture in the district. Trends and patterns play an essential role in the future growth of horticulture since constant fluctuations in either the area under production or output will lead farmers into other types of farming activities. With this in view, therefore, the present study attempts to analyze the trends and patterns in fruit crop cultivation in Shimla District. The entire study relies completely on secondary data collected from government publications, statistical abstracts, and publications by the department of horticulture. Though many different kinds of fruit crops are cultivated in Shimla district, only six selected crops have been chosen in this study for consideration owing to their prominent place in area and production besides availability of reliable data. The study provides a descriptive understanding of horticultural dynamics rather than field-based insights. The study suggests that proper planning, supportive policies, and use of modern scientific methods are needed to make horticulture sustainable in the long run.

Keywords: Fruit Crops, Production, Trends, Patterns, Horticulture**.**

I. Introduction

Horticulture has emerged as one of the most dynamic sectors of Indian agriculture due to its significant contribution to nutritional security and crop diversification. It also plays an important role in employment generation and the improvement of rural livelihoods. Economic reforms and technological advancements have accelerated the diversification of Indian agriculture towards high-value horticultural crops since the 1990s (Jha et al., 2019). India has become one of the leading fruit-producing countries in the world, particularly in mango, banana, and papaya production. Horticulture holds a vital place in rural livelihoods by diversifying income sources, easing pressure on cereal-based production systems, and making a meaningful contribution to food as well as nutritional security (Kondal, 2014). The diverse agro-climatic conditions and rich diversity in crops and genetic resources enable India to produce a wide range of horticultural crops round the year (Supriya, 2018). It widely depends on the factors responsible for its growth and development; most interestingly, horticultural efficiency including the concentration of fruit crops are important (Khursheed and Taufique, 2020). Horticulture also offers diversified livelihood opportunities even in marginal and degraded lands due to its wider adaptability under different soil and climatic conditions (Laskar, 2025). In the Himalayan states, particularly Himachal Pradesh, horticulture has played a crucial role in socio-economic transformation due to favourable agro-climatic conditions suitable for temperate fruit cultivation. In recent decades, a marked transition has been observed from traditional subsistence farming to

market-oriented fruit cultivation, particularly in states such as Himachal Pradesh. The physiographic uniqueness, the presence of favorable temperate climatic conditions, and diversified altitudinal gradients have facilitated the cultivation of fruits in the region, thereby making horticulture an essential means of income generation and livelihood security for the people residing in the countryside (Janbandhu, 2024). Himachal Pradesh, famously known as the 'Fruit Bowl of India,' is a renowned horticulture-based economy, wherein fruit cultivation serves as an important source of income for the majority of the rural populace (Thakur and Azad, 2025). There is excellent scope for growing horticulture crops in the state, ranging from a diverse array of temperate fruits such as apples, pears, peaches, plums, apricots, almonds, and cherries (Rather et al., 2021). Its agro-climatic diversity has helped grow different fruits, with apple being the most predominant among these cash crops (Department of Horticulture, 2024). In Himachal Pradesh, the area under horticultural crops expanded 300 times over the period from 1950-51 to 2023-24. The land under horticulture in Himachal Pradesh accounts for nearly a fourth share of the total agricultural area. Of the total fruit crops grown in Himachal Pradesh, the most important is apples, which account for half the total area under fruit crops and over four-fifths of the total fruit production during 2023-24. Interventions made by the government in the form of area expansion programs, new varieties, infrastructural developments, and post-harvest handling practices have played a major role in the development of horticulture in Himachal Pradesh (Thakur and Azad, 2025). In the various activities related to horticulture, fruit production has played an important role economically in the state of Himachal Pradesh.

Shimla, being a district of Himachal Pradesh, has a very important place for the cultivation of temperate fruits such as apples since its earlier times. This has brought about a change in the pattern of agricultural practices and has added to the commercialization of agriculture in this region. The cultivation of fruits in the district of Shimla has had a dynamic development of both time and space since its earlier years. The dynamics of growth and contributions by horticulture crops can be well understood to formulate policies. Though the significance of horticulture is increasing day by day, there is a lack of systematic geographical research focusing on time-series trend analysis as well as spatial patterns associated with cultivation of fruit crops within the blocks.

The previous studies are limited to either specific fruit crops or regional scales, and as such ignore intra-district dynamics crucial from planning point of view. Keeping these considerations in mind, the present work will try to make Shimla district, Himachal Pradesh a case study in terms of dynamics of fruit crop cultivation in a mountainous environment. Horticulture has seen considerable expansion in its area and production during the last few decades in Himachal Pradesh, to emerge as an important constituent of the State's economy. But productivity trends have remained volatile over the years due to vagaries of weather, occurrence of pest, and changing environmental situations (Kumar et al., 2025). Study of trends and regional variation of area under horticulture, its production, and productivity is very important for formulation of agricultural policies, development and increasing the incomes of farming community (Nagaveni et al., 2024). Though horticulture has been contributing considerably towards local/regional economy, studies on area, production, and productivity trends and its regional variation in specific fruit crops within blocks of Shimla district is very limited. Under such a scenario, the current work attempts to fill the lacuna by conducting such a study in Shimla district of Himachal Pradesh.

Objective of the Study

1. To analyse the trends and growth rates of major fruit production in Shimla district from 2011-2022.

II. Database And Methodology

In the present research, the secondary data has been used. The quantitative time-series analysis technique has been employed to examine the production trend of fruits in Shimla district. The data from the year 2011 to 2022 have been used from the Department of Horticulture, Shimla, Himachal Pradesh. Six types of fruit crops, viz. Apple, Pear, Cherry, Apricot, Plum, and Peach have been considered in the current study. Presently, there are 13 CD Blocks in Shimla district. However, in this study, the block-wise analysis has been done considering only 10 blocks. This has been done due to the unavailability of separate horticulture data of Totu and Kupvi blocks. This is because of some changes that have taken place due to the administration, and horticulture activities are not predominant here. The other reason could be the merging of Jubbal and Kotkhai blocks. Until 2021, both blocks operated as one block in Shimla district for administrative purposes. The combined data of the horticultural production of these two blocks have been used to maintain the uniformity of data. In the initial phase of analysis, the annual data of fruit crop production from the year 2011 to 2022 has been segregated into four trienniums: 2011-13, 2014-16, 2017-19, and 2020-22. For every triennium, the average production of fruit crops has been calculated. This has been done by using the method of calculating triennium average. This method is useful in neutralizing the impact of annual variation arising out of climatic factors, market dynamics, and other short-term variations. In the second step of analysis, the growth rate of triennium average has been worked out. It has been calculated by the following method:

Growth Rate (%) = (P2 - P1)/P1 * 100

Where, P1 – Average production of the Previous Triennium

P2 - Average Production of Succeeding Triennium

III. Results And Discussion

Overall Growth Rate Trends of Fruit Production in Shimla District

As an important district for fruit cultivation in Himachal Pradesh, Shimla has seen fluctuations in its fruit production owing to several reasons such as alterations in the areas covered by fruits, change in climate, introduction of technology, and crop rotations. The apple has remained the dominant fruit in the region while other fruits have witnessed minor changes. It is important to analyze the trends in order to observe the patterns of growth of these fruits.

Table 1
Average Production and Growth Rate of Major Fruit Crops in Shimla District (2011–13 to 2020–22)

Crops	2011-13	2014-16	2017-19	2020-22
Apple	343699.12	463187.00 (34.77)	229282.00 (-50.50)	351307.67 (53.22)
Pear	5767.43	6166.00 (6.91)	2740.19 (-55.56)	6161.69 (124.86)
Cherry	602.90	642.17 (6.51)	315.95 (-50.80)	643.31 (103.61)
Plum	539.33	787.81 (46.07)	281.20 (-64.31)	763.28 (171.44)
Peach	185.33	172.16 (-7.11)	88.85 (-48.39)	160.43 (80.56)
Apricot	254.33	271.04 (6.57)	133.52 (-50.74)	411.55 (208.23)

Source: Computed by the researcher based on data obtained from Office of Department of Horticulture, Shimla (2011-22)
* Figures in Parentheses indicate Growth Rate (%) of Major Fruit Crops Over Previous Triennium in Shimla District

The results presented in Table 1 reveal remarkable fluctuations in the average production and growth rate of horticultural crops over the periods of time in Shimla district. In terms of quantity produced, apple has been the most prominent horticultural crop throughout the study period since it registered the highest production of all crops. Specifically, apple production experienced an appreciable increase between 2014 and 2016, followed by a sharp decline between 2017 and 2019 and an improvement once again between 2020 and 2022. The same pattern of variation in production could be observed for pear, cherry, plum, peach, and apricot, suggesting notable volatility in the sector under consideration over time. In general, most of the fruit crops showed growth during 2014-2016 years owing to favorable climatic conditions, effective orchard management and adoption of good horticulture practices. Conversely, the decrease in production levels during 2017-2019 is attributed to the negative effects of climate change, including warming, erratic rainfall, spring hailstorms, late frosts at the flowering stage, insufficient winter chilling hours, and increased occurrence of pests and disease incidences, resulting in low fruit set and productivity and reduced fruit quality in temperate fruit crops in the Himalayan region. During 2020-2022, a noticeable trend toward recovery was witnessed especially concerning apricot, plum, cherry, and pear crops.

3. Temporal Block-Wise Analysis

A number of fruits are being grown in Shimla District. However, the analysis is restricted only to six important fruits because of their high area under cultivation and production**.** Among these crops, apple occupies the leading position; however, in recent years, the district has witnessed the diffusion and diversification of other fruit crops.

Shimla district comprises 13 development blocks, but the present study includes only 10 blocks due to the non-availability and inconsistency of horticultural data for the remaining blocks.

Temporal Analysis of Average Production and Growth Rate of Apple, Pear, and Cherry in Shimla District

Table 2 presents the block-wise average production and growth rates of apple, pear, and cherry in Shimla district during the period 2011–13 to 2020–22. Wide disparities are observed among the blocks due to differences in agro-climatic conditions, altitude, irrigation facilities, orchard management practices, and market accessibility. In the First triennium (2011–13), the highest average apple production was recorded in Jubbal & Kotkhai block, whereas the lowest production was observed in Basantpur block. The higher production in Jubbal & Kotkhai can be attributed to its favourable temperate climatic conditions, higher elevation, adequate chilling hours, and long-established specialization in apple cultivation. The block also possesses comparatively larger orchard area, better adoption of improved cultivars, and stronger market linkages, which collectively enhance productivity. In contrast, the low production in Basantpur may be due to comparatively lower area under apple orchards, less favourable climatic conditions, and diversification towards other crops and livelihood

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activities. Similarly, during the last triennium (2020–22), Jubbal & Kotkhai continued to remain the leading apple-producing block with production. of, while Mashobra recorded the lowest production. The continued domination by the Jubbal & Kotkhai district is due to the greater development of commercial horticulture and infrastructure facilities in that area. Low productivity levels in Mashobra may have resulted from the expansion of urban areas in Shimla, fragmented landholdings, old orchards, and changing climatic conditions influencing fruit-bearing capacity.

Figure 1 is derived from Table 2 showing that the maximum growth in the production of apples has been experienced by the Basantpur block from 2020 to 2022. This could have happened because of the rejuvenation of old orchards, planting at higher densities, better

Table: 2

Block wise Average Production and Growth Rate of Apple, Pear, and Cherry in Shimla District (2011–13 to 2020–22)

Block	Apple				Pear				Cherry			
	2011-13	2014-16	2017-19	2020-22	2011-13	2014-16	2017-19	2020-22	2011-13	2014-16	2017-19	2020-22
Theog	32385.35	41043.20 (26.74)	19586.00 (-52.28)	42093.00 (114.91)	294.00	245.83 (-16.38)	3.83 (-98.44)	608.67 (15788.24)	7.75	6.42 (-17.16)	DNA	11.28
Mashobra	3205.19	3924.46 (22.44)	1382.33 (-64.77)	2801.67 (102.68)	158.33	315.77 (99.44)	140.43 (-55.52)	112.50 (-19.89)	16.47	9.88 (-40.01)	6.53 (-33.91)	4.24 (-35.12)
Narkandha	42654.27	48085.86 (12.73)	16073.00 (-66.56)	44952.33 (179.60)	130.47	114.23 (-12.45)	12.04 (-89.46)	95.58 (693.85)	176.92	135.63 (-23.14)	94.03 (-30.84)	90.78 (-3.46)
Chirgaon	24980.88	43481.13 (74.03)	27701.67 (-36.30)	35177.67 (26.99)	66.67	49.12 (-26.32)	17.48 (-64.41)	34.07 (94.90)	3.03	6.75 (122.77)	5.73 (-15.11)	9.93 (73.30)
Rohru	52744.88	80883.82 (53.35)	45999.00 (-43.13)	50968.67 (10.80)	39.60	64.15 (62.00)	58.54 (-8.74)	25.62 (-56.23)	8.67	11.95 (37.83)	15.00 (25.52)	39.60 (164.00)
Chopal	30684.74	36305.26 (18.75)	-15821.67 (56.58)	33187.00 (109.77)	923.33	798.67 (-13.51)	60.67 (-92.40)	76.73 (26.46)	7.00	6.20 (-11.43)	2.80 (-54.84)	3.80 (35.71)
Basantpur	1853.60	2324.47 (25.40)	1102.00 (-52.60)	3288.67 (198.43)	31.00	61.23 (97.52)	43.33 (-29.23)	138.00 (218.46)	DNA	DNA	0.45	0.50 (11.11)
Jubbal & Kothkhai	113378.65	133879.37 (18.08)	70902.33 (-47.04)	102005.00 (43.87)	4077.03	4465.33 (9.53)	2358.33 (-47.19)	4896.12 (107.62)	372.57	295.33 (-20.73)	173.10 (-41.39)	257.37 (+48.68)
Nankhari	19119.91	27570.43 (44.20)	12692.00 (-53.96)	14713.67 (15.92)	19.33	51.67 (167.24)	44.90 (-13.10)	49.43 (10.09)	2.17	169.67 (7723.96)	17.67 (-89.59)	135.99 (669.75)
Rampur	22691.64	45555.50 (100.75)	18022.00 (-60.43)	22120.00 (22.74)	29.00	0.00 (-100)	0.63	32 (416.93)	7.00	0.00 (-100.00)	0.63	6.47 (927.78)

Source: Computed by the researchers based on data obtained from Office of Department of Horticulture, Shimla
*Figures in Parentheses show Growth Rate of Blocks

management techniques, and favorable climatic conditions in the last few years. On the other hand, the minimum growth was witnessed by the Rampur block from 2020 to 2022 because of variable snowfall, hailstorms, moisture stress, and alternate bearing nature of apple orchards.

A similar pattern was observed in pear production, with Jubbal & Kotkhai recording the highest production and Nankhari the lowest during the initial triennium. The higher production in Jubbal & Kotkhai may be the suitability of temperate conditions and mixed fruit orchard systems prevalent in the block. On the other hand, the very low production in Nankhari indicates that pear cultivation is not a major horticultural activity in the area due to limited orchard area and farmers' preference for apple cultivation. Similarly, in the final triennium (2020–22), Jubbal & Kotkhai again remained the leading pear-producing block with production of, whereas Rampur recorded the lowest production. The low production in Rampur may be associated with relatively warmer climatic conditions and lower suitability for temperate pear varieties.

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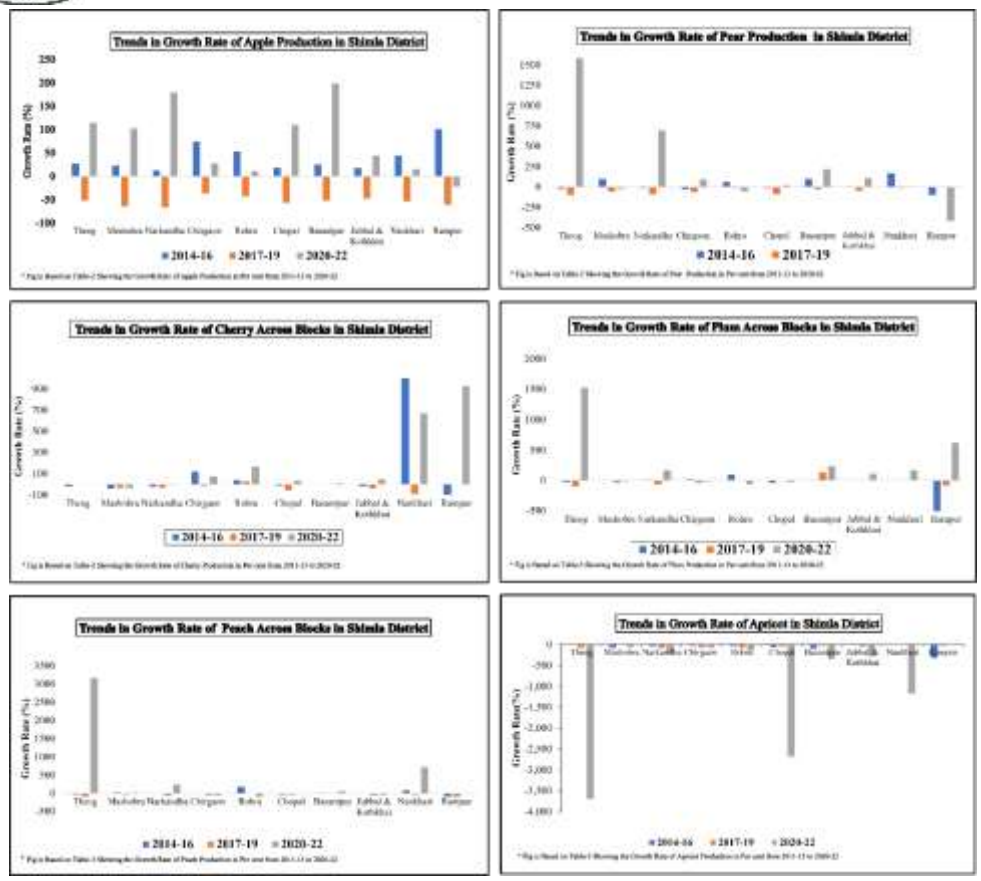

Figure 1

Fig. 2 indicates that the highest growth was observed in Theog block during 2020–22. The exceptionally high growth appears to result from a very small production base in the preceding triennium, where even a moderate increase in output generated an unusually high percentage growth. In contrast, the lowest growth rate was recorded in Rampur block during the same triennium, which may be due to climatic uncertainties, pest incidence, and declining orchard productivity.

In respect of cherry production, in both cases i.e., in the case of initial triennium, which was from 2011-13 as well as final triennium, which was 2020-22, the highest production of cherry has been registered in Jubbal & Kotkhai block, whereas the least production of cherries has been recorded in Nankhari block and Basantpur block respectively. This could be explained by considering the fact that Jubbal & Kotkhai block had favorable agro-climatic conditions for growing cherries. Whereas the negligible production in Nankhari could indicate less importance of cherry cultivation in Nankhari block. Thus, it can be safely said that throughout the study period, Jubbal & Kotkhai block was the leading block in respect of production of apples, pears and cherries. This is due to its favorable agro-climatic conditions, higher proportion of orchards and adoption of scientific practices in horticulture. On the other hand, the other blocks had problems of climatic suitability, small orchard area, aging plantations and lack of infrastructural facilities.

From the fig. 3, it can easily be seen that Rampur block had shown the highest increase in cherry production during 2020-22. This rapid rise in cherry production could be attributed to increase in the number of orchards as well as better yield in terms of quantity from an

extremely low base. Conversely, Mashobra block had shown lowest rate of increase in cherry production during 2014-16.

Block-wise temporal Analysis of Average Production and Growth Rate of Plum, Peach, and Apricot in Shimla District

Block-wise averages of fruit production and growth rates (%) for plum, peach, and apricot are shown in Table 3 between the years 2011-13 and 2020-22 in the Shimla district. It shows variation over time and space in the production of fruits in various blocks, indicating how the dynamics of horticulture have changed in the Shimla district over time. Fruit production varies greatly depending on a number of factors, including altitude, climate suitability, increase in orchards, adoption of technology, accessibility to markets, and variability in climatic conditions in the Himalayan region.

Table: 3
Block wise Average Production (in MT) and Growth Rate of Plum, Peach, and Apricot in Shimla District (2011–13 to 2020–22)

BLOCK	PLUM				PEACH				APRICOT			
	2011-13	2014-16	2017-19	2020-22	2011-13	2014-16	2017-19	2020-22	2011-13	2014-16	2017-19	2020-22
Theog	39.73	28.80 (-27.51)	1.27 (-95.59)	20.67 (1527.56)	23.03	13.93 (-39.51)	1.12 (-91.96)	36.57 (3165.18)	11.40	7.51 (-34.12%)	1.43 (-80.96)	54.30 (3696.50)
Mashobra	33.33	35.22 (5.67)	21.70 (-38.39)	18.64 (-14.10)	30.33	36.67 (20.88)	23.67 (-35.45)	30.16 (27.42)	30.86	53.42 (73.09)	29.75 (−44.31)	48.09 (61.64)
Narkandha	72.50	80.07 (10.44)	24.69 (-69.17)	66.61 (169.77)	22.65	20.64 (-8.89)	6.25 (-69.72)	21.24 (239.84)	34.65	19.54 (-43.60)	2.89 (-85.23)	8.89 (207.61)
Chirgaon	4.47	5.19 (16.11)	3.11 (-40.08)	2.60 (-16.40)	10.67	9.58 (-10.22)	4.52 (-52.82)	1.67 (-63.05)	11.17	8.19 (-26.69)	2.50 (-69.48)	4.50 (80.00)
Rohru	22.08	44.06 (99.55)	48.33 (9.69)	15.95 (-67.00)	5.40	15.35 (184.26)	12.17 (-20.72)	0.13 (-98.90)	58.40	36.62 (-37.29)	9.33 (-74.52)	21.90 (134.73)
Chopal	10.80	6.43 (-40.46)	5.43 (-15.55)	3.85 (-29.10)	18.33	11.93 (-34.91)	6.70 -43.84	5.34 (-20.30)	14.2	5.27 (-63.62)	2.80 (-46.87)	50.0 (2685.71)
Basantpur	2.50	2.62 (4.80)	6.17 (135.50)	20.80 (237.12)	12.67	14.04 (10.85)	12.83 (-8.62)	21.00 (63.68)	2.70	5.38 (99.38)	6.60 (22.68)	29.00 (339.39)
Jubbal & Kothkhai	305.02	287.08 (-5.88)	118.23 (-58.82)	249.81 (111.29)	47.15	45.51 (-3.48)	19.50 (-57.15)	10.15 (-47.95)	79.21	86.79 (9.57)	43.00 (-50.46)	161.44 (275.44)
Nankhari	DNA	DNA	0.50	1.33 (166.51)	2.00	3.60 (80.00)	2.00 (-44.44)	16.22 (711.02)	DNA	DNA	0.33	4.24 (1172.73)
Rampur	48.87	298.33 (510.22)	51.67 (-82.68)	369.02 (614)	13.00	0.67 (-94.87)	DNA	1.28	11.47	48.33 (321.40)	35.00 (-27.59)	32.53 (7.06)

Source: Computed by the researcher based on data obtained from Office of Department of Horticulture, Shimla (2011-22)
*Figures in Parentheses show Growth Rate of Blocks

As evident from table 3, during base triennium (2011-13) Jubbal & Kotkhai had the highest production rate of plum. This might be attributed to the favourable climatic conditions, suitability of location, fertile soil and established agriculture practices in the region. Meanwhile, Basantpur had the lowest production rate as a result of the relatively small area devoted to plum orchards and comparatively low specialisation in growing temperate fruits. During the last triennium (2020-22) Rampur became the main plum producer owing to orchard expansion, introduction of new varieties and development of commercial horticulture, while Chopal demonstrated the lowest production as a result of adverse climatic conditions and lower horticultural intensity.

Figure 4 (based on table 2) demonstrates that during the second triennium 2014-16 the highest growth rate of plum production was observed in Rohru due to its rapid increase from low production base and favourable market opportunities. At the same time Rampur demonstrated the lowest growth, which can be explained by climatic factors, including rainfall variability and the age of orchards. As for the last triennium 2020-22 Theog demonstrated the highest growth rate, whereas Rohru demonstrated the lowest growth rate in comparison with other blocks.

During base triennium, the highest peach production in Shimla was registered in Jubbal & Kotkhai. This fact can be explained by the optimal climatic and agricultural characteristics of this area that stimulate peach growing and development of diverse agricultural activities. Meanwhile, the lowest peach production during the same period was noted in Nankhari due to its relatively small peach plantations and commercial importance. However, during 2020-22 triennium Theog block demonstrated the highest peach production owing to its high degree of peach plantation development. On the contrary, Rohru demonstrated the lowest production rates.

According to the figure, there is a high level of spatial and temporal differences in the rate of peach production growth in various blocks in Shimla district during different trienniums. Thus, one of the biggest increases was registered in Theog during 2020-22 indicating peach cultivation rapid development in the block. Besides, Nankhari and Narkanda demonstrated a moderate growth in peach production. Meanwhile, other blocks such as Rohru, Rampur, Chirgaon demonstrate either fluctuation or reduction in peach production.

Jubbal & Kotkhai were leading in apricot production in the base triennium (2011-13) due to conducive weather, favourable altitude, and good horticultural infrastructure. In the final triennium (2020-22), Jubbal & Kotkhai were still the leading blocks because of higher orchard area and horticultural infrastructure development, whereas Nankhari had the least production, suggesting less specialisation for apricots. As for the lowest production areas, the Basantpur block recorded the least production of apricots, possibly because of its smaller orchard area.

Figure 6 depicts the changes in the growth rate of apricot production in various blocks of Shimla District from 2014-16 to 2020-22. As illustrated in Figure 6, the figure shows that there is a decreasing trend in apricot production across all blocks over the three years considered. Though the fall in production is slightly higher during 2014-16 and 2017-19, the production decreased sharply during 2020-22. The blocks with maximum negative growth in the recent triennium include Theog, Chopal, and Nankhari. The possible reasons for this trend could be unfavourable weather conditions like irregular rainfall, frost, hailstorm, inadequate chilling hours, and pest attack.

IV. Conclusions

It can be observed that there is a variation in the production of major fruit crops in Shimla's blocks from 2011 to 2022. Fruit cultivation still remains a vital component of agriculture and has contributed immensely to Shimla's rural economy through the past decades. Apple cultivation has been dominating fruit crops in most of Shimla's blocks till date. In terms of fruit production, Jubbal and Kotkhai, Rohru, and Narkanda have proved their supremacy. Moreover, it has been concluded that the fruit cultivation of the area is significantly affected by climatic changes and any sort of disturbance in the environment. There was an increase in production and growth in horticultural productivity between the years 2014 and 2016; however, there has been a drastic decrease in the horticultural productivity of the region between the years 2017 and 2019. This has been caused by various factors including adverse climatic changes, pest attacks, and production instability. On the contrary, the region's horticulture performed well between the years 2020 and 2022 with improvements in the production of apricot, plum, cherry, and pear. This block-wise evaluation shows the disparity in the performance of fruit cultivation in Shimla. These disparities are greatly caused by the region's environmental and socio-economic factors.

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