**Assessing Agricultural Growth and Crop Output Dynamics in Himachal Pradesh: A Fifty-Year Perspective**

**Abstract**

This study examined the agricultural growth in Himachal Pradesh from 1971-72 to 2021-22, focusing on growth in the value of output, area, production and yield across major crops. Using compound annual growth rates and decomposition analysis, it assessed both economic outcomes and the underlying drivers of agricultural transformation in the state. The analysis shows that the state experienced relatively stable growth in total value of agriculture output, driven primarily by high value crops like fruits, vegetables, and spices. A notable transition from area expansion to yield driven growth was observed, especially for cereals and horticultural crops. Moreover, decomposition analysis revealed that in recent decades, yield effects have become the dominant contributor to production growth in the state. The study underscores the growing importance of high value crops in driving rural transformation in Himachal Pradesh. These findings underline the need for policy interventions aimed at enhancing crop productivity, investing in improved varieties, expansion of food processing infrastructure and promoting diversification toward high value crops to ensure sustainable agricultural growth in Himachal Pradesh.

**Keywords: Agricultural growth**; **crop yield**; **decomposition analysis**; yield effect; **high value crops.**

**1. INTRODUCTION**

Agriculture sector plays a significant role in the process of economic development, particularly in countries like India, where a significant share of the population continues to rely on agriculture for livelihood and food security (Abebaw, 2025, Ni et al., 2025). Beyond its traditional role as a source of food and raw materials, agriculture contributes to poverty alleviation, employment generation, nutritional stability, and environmental sustainability (Gebbers & Adamchuk 2010, Kitzes et al., 2008, Slavin, 2016, Rafael 2023, Thakur et al., 2024, Singh et al., 2025). In India, the agriculture sector has undergone considerable transformation over the past few decades, diversifying toward high value crops such as fruits, vegetables, milk, eggs, poultry, and fish (Habib et al., 2025, Gulati & Juneja, 2022). These shifts have been driven by changing consumer demand patterns, rising incomes, urbanization, and policy incentives (Birthal et al., 2025).

Since the early 1970s, agriculture in Himachal Pradesh has progressed significantly as evident from the rise in food grains production from 9.45 lakh tonnes in 1972-73 to 16.44 lakh tonnes in 2023-24 (GOHP 2025). The economy of Himachal Pradesh is largely dependent on agriculture and any variation in the production of food grains affects the economy significantly (Thakur & Mohan, 2025, Sharma et al., 2024). The state is especially known for its fruits and vegetables cultivation (Rana et al., 2023). The cultivation of temperate to sub-tropical fruits is favoured by topographical and altitudinal (Roussos, 2024) disparities as well as fertile, deep, and well-drained soils. Himachal Pradesh is widely recognized for its large-scale fruit production, which has emerged as a major focus of agricultural activity among the state's farmers (Bains & Atlas (2022). The area under fruit production has increased from 0.48 lakh hectare in 1971-72 to 2.31 lakh hectare in 2017-18. The state has come to known as ‘*Apple State of India’* (Wani & Songara 2018).

The state has only 11% of the total geographical area (55.67 lakh hectares) available for cultivation. More than 88% of the holdings are small and marginal and accounting for 56% of the operational area (GOHP 2025). Having regional disparities, the share of primary sector (agriculture and allied sector) in the State Gross Domestic Product has remained low and declined from 58.74% (1972-73) to 14.7% during 2023-24. However, agricultural diversification towards fruit and vegetable crops has made a profound impact on the quality of life of small and marginal cultivating households in the state. Awareness of farmers in the state is low and technologies are outdated (Chahal et al., 2015). At the macro level, this effect is reflected in a variety of socio-economic measures and poverty levels that correspond favourably to other mountainous areas as well as the country's developed states (Fahad et al., 2023). Enhancing the growth of agriculture sector is critical for the state’s overall long-term viability.

In this context, a comprehensive empirical assessment of agricultural growth patterns in Himachal Pradesh is crucial. This study seeks to inform policymakers about the structural shifts, emerging opportunities and also helps in identify the constraints to agricultural development. Such insights are valuable for designing region specific strategies that not only enhance productivity but also ensure balanced and inclusive rural development.

**2.** **MATERIALS AND METHODS**

**2.1 Data**

The study sourced time series data for different parameters. Firstly, data on value of agriculture output were collected from 1971-72 to 2021-22 compiled by the Central Statistical Organisation (CSO), New Delhi. Data on area, production and yield of crops grown in the state were collected from various issues of Annual Season and Crop Reports published by Directorate of Land Records, Shimla, Government of Himachal Pradesh. The data on area and production of fruits were collected from Department of Horticulture, Shimla and various issues of Statistical Abstract of Himachal Pradesh published by Department of Economics and Statistics, Shimla.

**2.2 Analytical framework**

**2.2.1 Estimation of growth**

The growth in area, production, yield and value of output for different crops was calculated by using exponential production function given as

Y = abt

where, Y = Area/production/yield of crop

a = Constant

b = Regression coefficient

t = Time

CAGR (%) = (Antilog b-1) x 100

The compound growth rates were estimated for different periods.

**2.2.2 Decomposition analysis**

Decomposition analysis is used to estimate the relative contribution of area, yield and their interaction to the overall change in crop production over the study period. The model, originally proposed by Minhas (1965) and later redeveloped by Sarma and Subramanyam (1984), is widely used to study studied growth performance of crops across regions and time periods.

Let

$Q=AY$ (1)

Where, Q = Production of crop

A = Area under crop

Y = Yield of crop

Then,

$$Q\_{0}=A\_{0}Y\_{0}$$

$$Q\_{t}=A\_{t}Y\_{t}$$

where, t and 0 represents the current and base period, respectively and t >0

Further,

$$∆Y\_{t}=Y\_{t}-Y\_{0}$$

$$∆A\_{t}=A\_{t}-A\_{0}$$

$$∆Q\_{t}=Q\_{t}-Q\_{0}$$

From equation (1), we can write as

$$Q\_{t}=\left(A\_{0}+∆A\_{t}\right).\left(Y\_{0} + ∆Y\_{t}\right)$$

$$Q\_{t}=A\_{0}Y\_{0}+A\_{0}∆Y\_{t}+Y\_{0}∆A\_{t}+∆A\_{t}∆Y\_{t}$$

$$∆Q\_{t}=\left(A\_{0}∆Y\_{t}\right)+\left(Y\_{0}∆A\_{t}\right)+\left(∆A\_{t}∆Y\_{t}\right)$$

Change in production = Yield effect + area effect + interaction effect

Thus, the total change in production was decomposed into three components viz., yield effect, area effect and the interaction effect due to change in yield and area.

**3. RESULTS AND DISCUSSION**

**3.1 Pattern of agricultural growth in Himachal Pradesh**

The growth in value of agricultural output was computed to reveal significant contrasts between Himachal Pradesh and all-India level over the two periods: 1971-72 to 2000-01 and 2001-02 to 2021-22 (Table 1). The growth in value of output of cereals for both Himachal Pradesh and all India level grew positively, but the growth is low in Himachal Pradesh compared to all India average. Pulses recorded declining growth of 4.02% in Himachal Pradesh in first period, but the rate of growth showed remarkable recovery to a robust 3.87% in the second period, closely aligning with the national growth of 3.76%. Oilseeds, however, saw a decline in Himachal Pradesh from a positive growth of 0.54% in first period to a negative growth of 0.85% in second period, diverging from the national trend of sustained positive growth (3.77% and 2.40%). The most notable improvement came from condiments and spices, which witnessed a sharp rise in growth from 0.95% in first period to 13.58% in second period, significantly outpacing the national average growth of 6.48% in the second period, indicating diversification into high value cash crops in the state (Sharma 2005, Devi & Prasher 2018, Devi & Prasher 2019).). In the similar fashion, the value of fruits and vegetables remained a vital driver of growth, grew positively (6.91% and 3.09%) for both periods in Himachal Pradesh, while national growth also registered positive growth rate in first (3.49%) and second period (4.53%). Interestingly, the value of drugs and narcotics grew by 5.37% in first period but the rate of growth declined by 2.10% in the second period in the state. The growth in total agricultural output remained relatively stable, grew 2.40% in first and 2.30% in the second period, compared to a slightly low growth at the national level from 2.92% to 2.80%, respectively. On the whole, agriculture and allied sector grew positively in the recent decades, particularly forestry (6.48%), livestock (3.86%), and fisheries (4.69%) in Himachal Pradesh, suggesting expanding diversification beyond traditional crops Overall, the growth in value of agricultural output in Himachal Pradesh has remained fairly stable, depends on high-value horticulture crops amid stagnation or decline in traditional crop in the state.

**Table 1: Growth rate of value of agricultural output in Himachal Pradesh and all India**

|  |  |  |
| --- | --- | --- |
| **Particulars** | **Himachal Pradesh** | **India** |
| **1971-72 to 2000-01** | **2001-02 to 2021-22** | **1971-72 to 2000-01** | **2001-02 to 2021-22** |
| Cereals | 1.59 | 0.20 | 2.86 | 2.13 |
| Pulses | -4.02 | 3.87 | 5.21 | 3.76 |
| Oilseeds | 0.54 | -0.85 | 3.77 | 2.40 |
| Condiments and spices | 0.95 | 13.58 | 4.06 | 6.48 |
| Drugs and narcotics | 5.37 | -2.10 | 2.14 | 1.51 |
| Fruits and vegetables | 6.91 | 3.09 | 3.49 | 4.53 |
| Total agriculture | 2.40 | 2.30 | 2.92 | 2.80 |
| Livestock | - | 3.86 | - | 5.17 |
| Forestry | - | 6.48 | - | 2.66 |
| Fisheries | - | 4.69 | - | 6.36 |
| Agriculture and allied activities | - | 2.65 | - | 3.62 |

Table 2 presents the compound annual growth rate in area, production and yield across major crops in Himachal Pradesh in two periods viz. 1971-72 to 2000-01 and 2001-02 to 2021-22. During the first period, the production of major cereals such as paddy (0.34%), wheat (1.75%) and maize (1.87%) witnessed modest growth, primarily driven by growth in yield (ranged between 0.68-0.72%), despite recording stagnant area growth. Similarly, in the recent period (2001-02 to 2021-22), yield growth rate accelerated further in paddy (2.41%), wheat (2.61%),

and maize (1.40%) while offsetting further contraction in area, particularly in paddy (-1.04%) and wheat (-0.59%). This decrease in area reflects land constraints and possibly a shift away from cereals toward horticulture crops (Sharma 2011). Among pulses, negative growth rate was recorded for gram and mash for both periods, but yield growth was found positive which led to production stabilization. Sugarcane and potato recorded strong yield growth in the first period (3.81% and 4.04%, respectively), but production declined in the latter period, particularly in potato (-1.82%), due to significant area contraction (-3.17%). In case of apple,

**Table 2: Growth in area, production and yield of major crops in Himachal Pradesh**

|  |  |  |  |
| --- | --- | --- | --- |
| **Crop** | **Area** | **Production** | **Yield** |
| **1971-72 to 2000-01** | **2001-02 to 2021-22** | **1971-72 to 2000-01** | **2001-02 to 2021-22** | **1971-72 to 2000-01** | **2001-02 to 2021-22** |
| Paddy | -0.70 | -1.04 | 0.34 | 1.36 | 0.69 | 2.41 |
| Wheat | 0.63 | -0.59 | 1.75 | 1.42 | 0.68 | 2.61 |
| Maize | 0.62 | -0.68 | 1.87 | 0.20 | 0.72 | 1.40 |
| Barley | -1.87 | -1.69 | -1.95 | 0.29 | -0.36 | 1.35 |
| Gram | -10.80 | -5.57 | -9.62 | -1.22 | 0.89 | 5.64 |
| Mash | -2.22 | -3.75 | -2.12 | 1.27 | 2.17 | 4.72 |
| Sugarcane | -0.48 | -3.13 | 3.36 | 0.53 | 3.81 | 3.31 |
| Potato | -0.27 | -3.17 | 4.13 | -1.82 | 4.04 | 0.89 |
| Apple | 4.00 | 1.72 | 4.04 | 2.72 | 0.04 | 0.98 |
| Groundnut | -8.14 | -7.58 | -9.28 | -4.94 | -1.42 | 3.57 |
| Sesamum | -1.51 | -4.60 | -1.38 | -6.64 | 0.73 | -0.74 |
| Rapeseed & mustard | 2.44 | -0.28 | 3.52 | 3.67 | -0.93 | 3.51 |
| Linseed | -3.42 | -11.79 | -5.20 | -11.15 | -1.05 | 4.27 |
| Chillies | 2.17 | -0.83 | 0.56 | 7.03 | -1.59 | 6.90 |
| Ginger | -1.24 | 0.45 | 2.07 | -0.07 | 2.15 | 0.45 |

positive growth in area and production was recorded for both periods although yield growth remained stagnant, indicated continued reliance on area expansion in apple. Oilseed crops such as groundnut, rapeseed & mustard, linseed, and sesamum faced consistent area and production declines, although yield witnessed positive growth in second period for all oilseed crops except sesamum (-0.74%). Chillies emerged as a high-performing crop in the recent period, with yield growth of 6.90% and production growth of 7.03% despite a decrease in growth of area (-0.83%). For ginger, in first period, area declined slightly by 1.24%, while production (2.07%) and yield (2.15%) registered positive growth. In second period, area under ginger grew marginally by 0.45%, production declined by -0.07% and yield growth slowed to 0.45%, indicated increase in productivity of the crop. Hence, the shift from area-led to yield-driven growth is evident across most crops, with yield improvements becoming increasingly crucial for sustaining agricultural output in the face of shrinking or stagnant cultivated land.

**3.2 Decomposition analysis**

Decomposition analysis was used to trace out the contribution of area, yield and their interaction towards the change in agricultural production (Sagar 1980).. Table 3 presents the findings for the two periods viz., 1971-72 to 2000-01 and 2001-02 to 2021-22 in Himachal Pradesh. The aim was to understand whether the factors influencing growth in production has changed over the period or not. During the first period (1971-72 to 2000-01), yield emerged as the primary component to growth in paddy (338.87%), wheat (116.37%) and maize (66.30%), despite recording negative area effect for paddy (-182.84%) and wheat (-31.12%). In contract, pulses showed strong area effect (167.18%) but a sharp negative yield effect (-159.20%), indicated productivity constraints. **In contrast, pulses** showed a strong area (167.18%) and interaction effect but a sharp negative yield effect (-159.20%), indicated productivity constraints. The pattern shifted in the second period (2001-02 to 2021-22), with yield becoming the dominant growth driver for paddy (360.24%), wheat (133.67%), and pulses (115.87%), while area effects turned negative or marginal. Maize showed a different trend as its production growth was largely due to area effect (140.67%). In case of potato, increase in production was primarily driven by yield effect (107.89%) in first period. However, in second period, potato showed strong area (134.67%) and interaction effect (56.24%) but yield declined sharply to -90.90%, indicating declining productivity of the crop. Oilseeds had balanced contributions from both area (50.92%) and yield (57.07%) in first period. Oilseeds exhibited highly volatile growth with an exceptionally high area (5507.05%) and interaction effect (2645.49%) with a severely negative yield effect (-8052.54%), suggesting inefficient increase in area without yield improvements in the state. Among horticultural crops, apple output initially grew due to area expansion (-2.39%) and modest yield gains (107.62%) despite a minor negative interaction effect (-5.23%). Later, both yield (72.63%) and interaction (17.37%) positively contributed, signalling the impact of better cultivation practices and technology (Sharma & Singh 2021). Similarly, fruits in the first period exhibited strong growth through area expansion (391.12%), but affected by negative yield (-24.99%) and interaction (-120.82%) effects. In contrast, the second period saw a shift toward yield-led growth (91.69%) with declining area contributions (3.07%) and slightly positive interaction (5.24%), reflecting improved productivity and better coordinated changes. Overall, the analysis highlighted a transition from area-driven to yield-driven growth in many crops, especially horticulture, while cereals faced land constraints, while oilseeds experienced instability, emphasizing the need for targeted interventions to enhance productivity and sustainability of agriculture sector in the state.

**Table 3: Decomposition analysis of different crops and crop groups in Himachal Pradesh**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of component** | **Paddy** | **Wheat** | **Maize** | **Pulses** | **Potato** | **Oilseeds** | **Apple** | **Fruits** |
| 1971-72 to 2000-01 |
| Area effect | -182.84 | -31.12 | 21.91 | 167.18 | -2.66 | 50.92 | 107.62 | 254.70 |
| Yield effect | 338.87 | 116.37 | 66.30 | -159.20 | 107.89 | 57.07 | -2.39 | -33.88 |
| Interaction effect | -56.03 | 14.75 | 11.79 | 92.02 | -5.23 | -7.99 | -5.23 | -120.82 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2001-02 to 2021-22 |
| Area effect | -193.97 | -17.38 | 140.67 | -3.98 | 134.67 | 5507.05 | 10.01 | 3.07 |
| Yield effect | 360.24 | 133.67 | -47.52 | 115.87 | -90.90 | -8052.54 | 72.63 | 91.69 |
| Interaction effect | -66.27 | -16.29 | 6.85 | -11.88 | 56.24 | 2645.49 | 17.37 | 5.24 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

**4. CONCLUSION**

This study examined the growth and decomposition of agricultural in Himachal Pradesh. The growth rate in value of agricultural output in Himachal Pradesh remained stable over time. The significant growth was found in crops like fruits, vegetables, and spices, while traditional crops like oilseeds and cereals showed slower or negative growth. Crop-wise growth in Himachal Pradesh has moved from area expansion to yield improvement, particularly in cereals, chillies, and apples, as stagnant farmland has made boosting productivity of agricultural output. The decomposition analysis showed that yield played a major role in driving the overall increase in production across most crops over the decades, particularly in cereals and horticultural crops. The study revealed that area under foodgrains is continuously decreasing, especially pulses, underscoring the need to promote high yielding and climate resilient varieties of cereals and pulses to enhance productivity in Himachal Pradesh. This shift suggested that the farmers are moving toward alternative crops due to limited technology, small landholdings and market uncertainties. Although the cultivation of fruits and vegetables is expanding, low productivity remains a major concern. Replacing aging orchards with improved varieties and adopting high yielding vegetable seeds, alongside better market access, processing infrastructure, and supportive policies is vital for strengthening the rural economy. Additionally, the promotion of other commercial crops beyond fruits and vegetables is essential to harness emerging market opportunities and ensure long term agricultural sustainability in the state.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

The author(s) affirm that no generative AI tools including Large Language Models (ChatGPT, Copilot) or text-to-image generation technologies were used in the preparation, writing or editing of this manuscript.

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