

A Two-Decade Assessment of Declining Horticulture in Uttarakhand Amidst the Challenges of Climate Change

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Abstract

The Indian Himalayan state of Uttarakhand is replete with immense potential for horticulture. Two decades ago, this region engaged in significant exchanges with its neighboring state, Himachal Pradesh. However, over the past decade, a continuous decline has been observed in this sector. On one hand, the region faces the shrinking of the agricultural sector and the problem of rural migration; on the other, the operational mechanisms of government departments within the state have served to discourage horticultural activities. Data spanning the years 2016 to 2023 indicates that the state witnessed a decline of 54% and 44% in agriculture and horticulture, respectively. Most schemes administered by the state's Horticulture Department are failing to translate into tangible results on the ground. Consequently, small-scale farmers—who otherwise could have progressed toward self-reliance—are grappling with despair. This research paper reviews a government scheme, launched a year ago and funded by NABARD under the Rural Infrastructure Development Fund, aimed at establishing 21,000 polyhouses. The objective of this initiative was to enhance crop diversity within the state, generate employment, conserve water resources, and ensure the supply of high-quality produce.

This paper investigates the intersecting climatic, economic, and institutional drivers of this decline. Through a primary demographic and economic survey conducted in the Almora district (n=200), this study uncovers a profound implementation failure regarding the state's highly publicized "protected cultivation" polyhouse schemes. Despite substantial subsidy deposits, 86.9% of surveyed farmers failed to receive their polyhouses, leading to widespread disillusionment. The paper further explores the institutional paralysis within the Directorate of Horticulture—characterized by a 50% staff shortage and poor fund utilization—and critically examines the controversial proposal to merge the Departments of Agriculture and Horticulture. The research concludes with target-based policy imperatives designed to salvage the mountain agrarian economy.

Key words: Schemes, **Horticulture**, **Subsidy**, **Farmers**, staff shortage , block, polyhouses

1. Introduction to the Himalayan Agrarian Paradox

In the Himalayan state of Uttarakhand, more than 76 percent of the population depends on agriculture and animal husbandry. The region supports the successful cultivation of various types of vegetables, as well as fruits such as apples, peaches, and others. Approximately 14 percent of the state's total geographical area is suitable for cultivation and holds immense potential for horticulture; however, irrigation facilities cover only about 45 percent of this arable land. To support these activities, a Directorate of Horticulture has been established at the state level, alongside district-wise Horticulture Departments and their mobile units operating at the block level.

Several schemes and projects, implemented by the State Government in collaboration with the Central Government, necessitate a ground-level analysis; these schemes are listed as follows:

- Fruit Area Expansion (50% Subsidy)
- Mission Apple Yojana
- Greenhouse Construction/Polyhouse Scheme

- Scheme for Fencing in Gardens.
- Beekeeping (Madhumakhi Palan) Yojana
- Mushroom Production & Marketing
- Uttarakhand Integrated Horticulture Development Project (JICA)
- Aromatic Plants Cultivation
- Mukhyamantri Sanrakshit Udyan Yojana
- Digital Agriculture, Rashtriya Krishi Vikas Yojana (RKVY)

1.1 Objectives

this study is guided by 03 primary objectives:

1. We want to know how the Horticulture Department works in the state. We need to see if they can really do their job and if they are doing the schemes they have correctly.
2. We want to find out if the farmers in the state are happy, with what the government's doing for them.
3. We want to see what is really happening with the government's plan for "protected cultivation" in the hilly areas. The government talks a lot about it. We want to know if they are actually doing what they say they will do in the Horticulture Departments protected cultivation plan.

3.1 Past data of Cultivation Area and Yields

Secondary data shows that during the years 2016–2017 and 2022–2023, the net area dedicated to fruit cultivation in Uttarakhand shrank by an alarming 54%, dropping from 177,323.5 hectares to a mere 81,692.58 hectares. Correspondingly, overall fruit yields decreased by 44%, falling from 662,847 metric tonnes to roughly 369,447 metric tonnes within the same timeframe.

Table 1: Percentage Decline in Cultivation Area and Yield of Major Fruits (2016-2023)

Crop Variety	Area Decline (%)	Yield Decline (%)
Pear	-71.61%	-74.10%
Apricot	-71.17%	-69.01%
Plum	-70.49%	-65.18%
Walnut	-67.29%	-52.69%
Apple	-55.05%	-30.18%
Lemon	-53.03%	-58.48%
Mango	-42.20%	-24.46%
Peach	-30.48%	-37.61%

Data Source: Department of Horticulture, Government of Uttarakhand.

3.2 Climate Change and the Forced Phenological Shift

This decline is heavily driven by aggressive climatic shifts. Elevation-dependent warming, rising average temperatures, and the critical loss of necessary winter chilling hours have severely disrupted the phenological requirements of temperate fruits. High-quality traditional apples require specific chilling hours (below 7°C for

1,200 to 1,600 hours) during winter dormancy. average temperature in Uttarakhand has increased by approximately 1.5°C, and winter temperatures at high altitudes are increasing by 0.12°C per decade.

Small farmers are slowly abandoning water-intensive traditional staples for climate-resilient pulses, spices like turmeric and chili, including planting material are emerging as the new backbone of hill agriculture.

4. Protected Cultivation": The NABARD Polyhouse Scheme

Recognizing the existential threat to open-field hill agriculture, the State Government and institutional lenders pivoted toward "protected cultivation" as a technological panacea. Protected cultivation—utilizing greenhouses and polyhouses—mitigates weather vagaries and allows for the highly profitable cultivation of off-season crops.

4.1 Scheme Architecture and Economic Feasibility

April 2025: With the aim of further strengthening agriculture in remote hilly regions and boosting farmers' incomes, the Government of Uttarakhand has set a target to construct 14,777 polyhouses within an 11-month period, extending up to March 2026.

The Government of Uttarakhand has formulated a comprehensive strategy to ensure the success of this project. The objective to execute this scheme was undertaken in collaboration with NABARD (National Bank for Agriculture and Rural Development) under the Rural Infrastructure Development Fund (RIDF). However, instead of providing subsidies and technical guidance for the construction of polyhouses, farmers were merely informed of the required dimensions for the structures and were made to deposit the subsidy amount—ranging from ₹20,000 to ₹35,000—in advance.

4.2 The Implementation Collapse (March 2025 – April 2026)

Despite the theoretical profitability, the reality of the scheme's execution has been disastrous. In March 2025, through NABARD, farmers were invited to apply for the installation of polyhouses. However, execution has been plagued by severe bureaucratic delays. Official reports indicate that within the Horticulture Department alone, 15 NABARD-funded projects worth ₹96.47 crore are progressing at an unacceptably slow pace.

Even more alarming is the situation at the grassroots level. Even after depositing the required 20% subsidy amount, more than 96 percent of the farmers in the state had not received their polyhouses a year later. Reports of organized corruption have surfaced, with allegations that companies tasked with the installations vanished after collecting the farmers' deposits, rendering the scheme a massive failure of state oversight.

5. Ground Realities in Kumaon: The Almora District Survey

To quantify the socio-economic impact of this implementation failure and the subsequent profound dissatisfaction among the farming community, a targeted ground survey was conducted in the Almora district, specifically focusing on the Lamgara development block.

5.1 Polyhouse Delivery Failure

The data collected reveals a staggering implementation failure and profound institutional mistrust in Almora.

Table 2: Almora District Polyhouse Implementation Status (As of 2026)

Implementation Metric	Count / Percentage
Total Farmers Depositing 20% Subsidy	229
Polyhouses Actually Installed	30

Implementation Metric	Count / Percentage
Delivery Failure Rate	86.9%

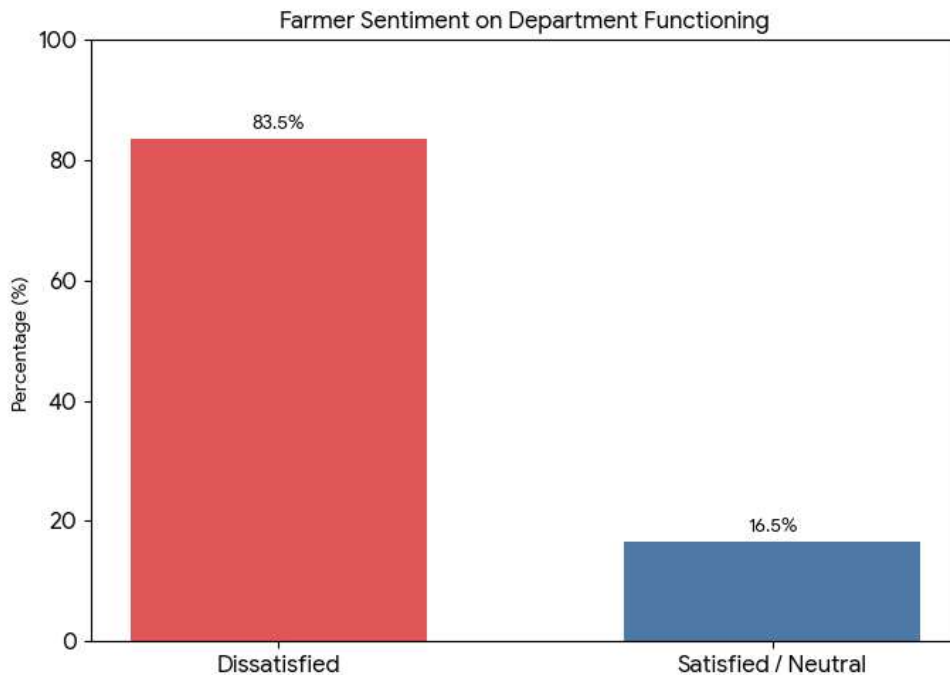
A micro-level survey of 13 farmers in the Lamgara block confirmed these delays from 1 year

In study 12 farmers reported that they had not received their polyhouses even after a year of depositing their money. The single farmer who did receive a polyhouse reported deep dissatisfaction with its structural quality, highlighting the disconnect between standardized designs and the rugged, high-wind realities of the Himalayan terrain. The farmers even stated that the company was supposed to install polyhouses at their homes within 15 days.

5.2 Farmer Satisfaction and Demographics

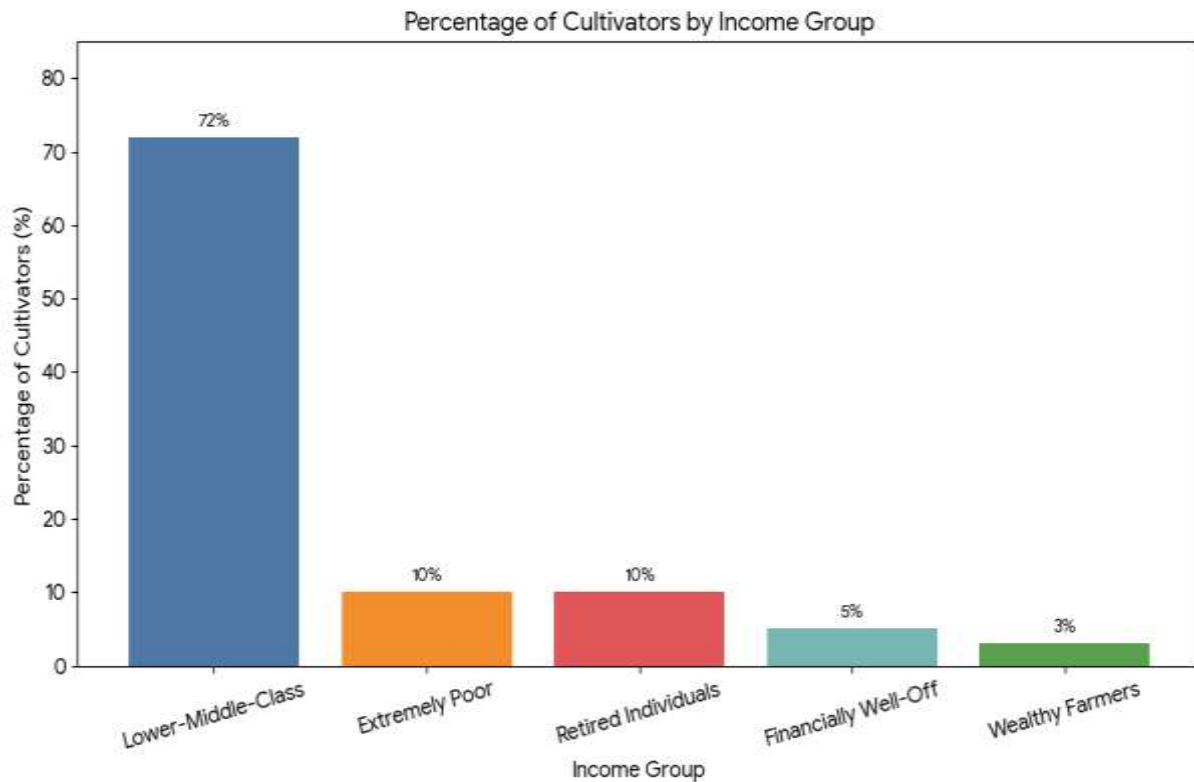
An expanded survey interviewing a total of 200 farmers across the district measured the overall sentiment toward the Directorate of Horticulture.

Farmer Satisfaction Survey (n=200)



The survey also captured the socio-economic profile of the affected cultivators. The data reveals that the financial burden of these failed policies falls disproportionately on vulnerable populations who cannot afford to have their limited capital trapped installed government schemes.

4: Economic Profile of Surveyed Cultivators



This data proves that the core demographic targeted by the poverty-alleviation aspects of the scheme—the lower-middle class and the extremely poor (combining for 82% of the demographic)—are the ones bearing the brunt of the administrative failure.

6. Institutional Paralysis and the Departmental Merger Controversy

The failure of the polyhouse scheme is inextricably linked to severe operational dysfunction within the Directorate of Horticulture and Food Processing.

6.1 Staff Shortages and Extension Failure

Audit reports show that the department is working with a shortage of staff more than 50% short. Also it does not have a team for internal audits.

The Mobile Horticulture Teams, called Udhyan Sachal Dal Kendras are not enough to cover the difficult areas. As a result officials at the level have a hard time collecting basic data and sharing technology.

Without well-trained workers to help farmers they do not get the technical advice needed to manage complex polyhouse environments.

This leads to crop diseases such as blight and powdery mildew. The states low use of funds is a direct result of this lack of capacity. Historically it has ranged from 45.0% to 72.5%.

The departments ability to utilize funds is impacted by the shortage of staff and lack of an internal audit wing. The Mobile Horticulture Teams face challenges in covering terrains, which affects their work. Farmers suffer due to a lack of guidance leading to issues, like crop diseases. Uttarakhand state struggles with low central fund utilization, which's a consequence of its capacity constraints.

6.2 The Merger Proposal and Agronomic Pushback

In an attempt to streamline administration, reduce overlapping costs, and create a more effective structure for service delivery, the government initiated proceedings to merge the Department of Horticulture with the Department of Agriculture into a single, unified entity. A seven-member committee, chaired by Additional Secretary Ram Vilas Yadav, was constituted to oversee the integration.

Agriculture in the plains is predominantly cereal-dominated, whereas hill horticulture focuses on high-value, highly perishable commodities demanding complex post-harvest management and precision farming. Critics warn that subordinating horticulture to a larger, cereal-focused agriculture bureaucracy will dilute the focus on cash crops, leading to further sectoral collapse and accelerating farmer out-migration.

7. Policy Suggestions

Based on the empirical evidence of sectoral decline, the implementation failure of the "protected cultivation" rollout, and the acute dissatisfaction among the farming demographic, the following systemic reforms are urgently recommended:

1. Farmers are demanding that the state must immediately refund the deposited subsidy money to the along with all accrued interest. This is a vital step to restore trust and alleviate the severe financial stress placed on the maximum numbers of lower-middle-class and extremely poor farmers identified in the study.
2. **Stakeholders are demanding that tr** eliminate the delays, corruption, and accountability vacuums caused by private vendors, all technical, procurement, and sales-related activities within the state should be executed strictly through a dedicated, accountable state agency.
3. The proposed merger of the Departments of Agriculture and Horticulture should proceed to eliminate bureaucratic redundancy, but with strict stipulations. The newly unified department must preserve specialized extension wings for Hilly horticulture and be assigned clear, measurable, target-based tasks to ensure accountability.
4. The chronic 50% shortage of personnel and extension workers within the horticulture sector and **issue of promotion policy** must be resolved immediately.
5. Most progressive farmers suggested that, in the future, they would accept subsidies for polyhouses only if the structures were installed in a timely manner. They demanded that the department be strengthened and equipped to effectively address the challenges facing the Himalayan states in the context of climate change.

In conclusion, the failure of the March 2025 NABARD polyhouse scheme highlights a deeper institutional crisis. Deploying highly subsidized capital to address a structural problem without simultaneously resolving logistical nightmares and filling profound institutional vacuums will only result in further economic erosion. A holistic, farmer-centric approach is the only viable path to rescuing the Himalayan agrarian economy.

Bibliography

1. Protected Cultivation of Horticultural Crops in Uttarakhand: An Economic Analysis - MDPI, <https://www.mdpi.com/2073-4395/11/4/692>
2. (PDF) CHALLENGES OF AGRICULTURE IN UTTARAKHAND HIMALAYA - ResearchGate, https://www.researchgate.net/publication/376683524_CHALLENGES_OF_AGRICULTURE_IN_U TTARAKHAND_HIMALAYA
3. Greenhouse Farming in High Altitude Areas of North-West Himalayan Region of India - Bioinfo Publications, <https://bioinfopublication.org/include/download.php?id=BIA0004827>
4. Structural Transformation of Agriculture in Himachal Pradesh - This document is discoverable and free to researchers across the globe due to the work of AgEcon Search. Help ensure our sustain, https://ageconsearch.umn.edu/record/315389/files/00_Paper_19831_handout_597_0.pdf

5. Agriculture in Uttarakhand - Himkatha, <https://www.himkatha.org/copy-of-people-and-their-land-in-hp>
6. Evolution of horticulture in Himachal Pradesh: A 53-year analysis of area, production, and productivity trends - Agronomy Journal, <https://www.agronomyjournals.com/archives/2025/vol8issue7S/PartC/S-8-7-28-970.pdf> 8
7. STATE OF THE HIMALAYAN FARMERS AND FARMING - Integrated Mountain Initiative, https://www.mountaininitiative.in/wp-content/uploads/2023/05/StudyReports-04-IMI_FAO_Report_on_SOMA.pdf
8. Uttarakhand saw 54 pc decline in area under horticulture production in last six years, <https://www.aninews.in/news/national/general-news/uttarakhand-saw-54-pc-decline-in-area-under-horticulture-production-in-last-six-years-research20240529181057/>
9. Changing Horticultural Production in Uttarakhand under Conditions of Global Warming - Junction, <https://tribe.t8np75rys.junction.express/uploads/wp-content/uploads/2024/06/changing-horticultural-production-in-uttarakhand.pdf>
10. Global warming effect: Horticulture yield declining in Uttarakhand - Deccan Herald, <https://www.deccanherald.com/environment/global-warming-effect-horticulture-yield-declining-in-uttarakhand-3044483>
12. Decline in Fruit Production in Uttarakhand: How to restore it? - BKC Aggregators, <https://www.bkcaggregators.com/2024/07/decline-in-fruit-production-in.html>
11. Climate change reshapes Uttarakhand agriculture, pulses stay resilient: Report, <https://www.indiatoday.in/india/story/uttarakhand-hill-agriculture-cultivation-potatoes-pulses-spices-study-2719109-2025-05-03>
12. Uttarakhand to build 17000 polyhouses in a year | Dehradun News - The Times of India, <https://timesofindia.indiatimes.com/city/dehradun/uttarakhand-to-build-17000-polyhouses-in-a-year/articleshow/99598364.cms>
13. Uttarakhand Receives ₹916 Crore NABARD Funding to Boost Rural Infrastructure and Development - <https://indianmasterminds.com>, <https://indianmasterminds.com/news/uttarakhand-nabard-916-crore-rural-infrastructure-funding-ridf-189023/>
14. Report of 2013 - Comptroller and Auditor General of India, https://cag.gov.in/webroot/uploads/download_audit_report/2013/Uttarakhand_Social_and_Public_Sector_1_2013.pdf
15. Baseline Data on Horticultural Crops in Uttarakhand - Delhi University, https://aerc.du.ac.in/userfiles/downloads/pdf-files/18.2013-Baseline%20horti_Uttarakhand%20Usha.pdf
16. Protected Cultivation of Summer Squash in Mid-hills of Uttarakhand - Scholars.Direct, <https://scholars.direct/Articles/horticulture/jhsr-3-012.pdf>
17. Subodh Uniyal chairs meet on merger of Agriculture, Horticulture ..., <https://garhwalpost.in/subodh-uniyal-chairs-meet-on-merger-of-agriculture-horticulture-departments/>
18. Horticulture dept employees against merger with agri dept | Dehradun News - Times of India, <https://timesofindia.indiatimes.com/city/dehradun/horticulture-dept-employees-against-merger-with-agri-dept/articleshow/59652693.cms>
19. <https://journalistindia.com/amp/states/uttarakhand/uttarakhand-polyhouse-scheme-target-to-build-14777-polyhouses-in-the-villages-of-uttarakhand-by-march-2026/30/04/2025/>