

Evaluating the Effectiveness of the Mission for Integrated Development of Horticulture (Midh) in Promoting Sustainable and Climate-Resilient Horticulture in Kullu District, Himachal Pradesh

Dr. Vijay Kumar Sharma¹, Dr. Pawan Kumar Thakur², Anjali Bala³

¹Assistant Professor, Dept. of Interdisciplinary Studies, H. P. University, Summer Hill, Shimla-HP (India)

Dr. Pawan Kumar Thakur

²Ph.D. (Rural Development) Dept. of Interdisciplinary Studies, H. P. University, Summer Hill, Shimla-HP (India) PIN 171005

³Research Scholar, (M.B.A Rural Development) Dept. of Interdisciplinary Studies, H. P. University, Summer Hill, Shimla-HP (India)

Abstract—This study examines the implementation and outcomes of the Mission for Integrated Development of Horticulture (MIDH) in Kullu district, Himachal Pradesh, with a focus on Anni, Nirmand, and Naggar blocks. Based on primary data from 83 farmers and supporting secondary sources, the research evaluates the scheme's role in enhancing crop diversification, income, employment, and climate resilience. Findings show moderate gains in horticultural productivity, income, and labour generation, particularly in Naggar. However, challenges persist, including subsidy delays, limited awareness, weak extension services, and poor access to post-harvest infrastructure. Women's involvement was high in on-farm activities but minimal in training, decision-making, and institutional participation. While sustainable practices were widely reported, adoption of climate-resilient technologies remained low. The study concludes that MIDH holds potential for inclusive horticultural development but requires timely subsidy disbursement, stronger awareness campaigns, improved extension services, and targeted support for women, youth, and small farmers. Strengthening grassroots delivery and promoting climate-smart practices will be essential for ensuring long-term resilience and equity in Himalayan horticulture.

Index Terms—Mission for Integrated Development of Horticulture (MIDH), Horticultural productivity, Crop diversification, Climate resilience, Rural livelihoods, post-harvest infrastructure, Small and marginal farmers, Women's participation, Extension services, Sustainable agriculture

I. INTRODUCTION

Agriculture has long been the backbone of India's economy, sustaining over 50% of its population and contributing approximately 17-18% to the national GDP¹. Within this sector, horticulture has emerged as a dynamic subfield, offering immense potential for economic diversification, nutritional security, and rural development. The cultivation of fruits, vegetables, spices, flowers, and medicinal plants has gained prominence due to increasing domestic demand and global market opportunities, particularly in regions with unique agro-climatic advantages. However, the sector's growth is uneven, with challenges such as climate variability, limited infrastructure, and inadequate market linkages hindering progress, especially in hilly and remote areas². To address these issues, the Government of India introduced the Mission for Integrated Development of Horticulture (MIDH) in 2014, a flagship program designed to revolutionize horticultural practices through integrated and sustainable approaches.

1 S. Kumar, D. R. Singh, and N. P. Singh, "Diversification towards high-value agriculture: Performance and prospects," *Agricultural Economics Research Review*, vol. 32, no. 1, pp. 1–14, 2019.

2 R. Chand, P. A. L. Prasanna, and A. Singh, "Farm size and productivity: Understanding the agrarian crisis," *Economic and Political Weekly*, vol. 52, no. 26–27, pp. 180–182, 2017.

The Himalayan region, particularly Himachal Pradesh, offers unique opportunities for horticultural development owing to its varied altitudes, rich biodiversity, and traditional farming practices. Kullu District stands out with its temperate climate and fertile valleys, which support high-value crops such as apples, off-season vegetables, and medicinal plants. However, despite this natural advantage, farmers face persistent challenges including fragmented landholdings, unpredictable weather, and limited access to modern technologies. To address these gaps, the Mission for Integrated Development of Horticulture (MIDH) has been introduced in the region with the objective of improving productivity, enhancing farmer incomes, and generating employment, while contributing to broader national goals of sustainable development and poverty reduction.³

This dissertation evaluates the effectiveness of the Mission for Integrated Development of Horticulture (MIDH) through a case study of Kullu District, with a focus on crop diversification, income generation, and employment creation. The assessment is timely, as MIDH completes a decade of implementation by 2024, making it an appropriate moment to reflect on its progress and shortcomings. Given that horticulture contributes more than 50% to Himachal Pradesh's agricultural GDP, and Kullu is a major hub for high-value crops, examining the district-level impact of MIDH offers valuable insights for shaping future horticultural policy.⁴

The policy framework of MIDH is rooted in India's National Agricultural Policy (2000), which emphasized sustainable development and diversification. The mission builds on this foundation by integrating research institutions like the Indian Council of Agricultural Research (ICAR) and state agricultural universities to develop region-specific technologies⁵. In the Himalayan context, collaborations with the Dr. Yashwant Singh Parmar

University of Horticulture and Forestry in Himachal Pradesh have led to the release of climate-resilient apple varieties, enhancing MIDH's impact⁶.

Climate change adds another layer of importance to the study of Kullu. Rising temperatures, erratic rainfall, and increased frequency of hailstorms have impacted traditional crops, with apple yields in Himachal Pradesh declining by 10-15% in recent years⁷. MIDH's adaptive strategies, such as high-density planting and weather-based advisories, are particularly relevant here, making Kullu a critical site to evaluate their effectiveness⁸. The district's diverse agro-climate also allows for the testing of climate-resilient crops like kiwi and walnuts, which are gaining traction under MIDH support⁹. This adaptability positions Kullu as a natural laboratory for understanding horticultural resilience in the face of global environmental shifts.

SCOPE AND SIGNIFICANCE OF THE STUDY

This study evaluates the impact of the Mission for Integrated Development of Horticulture (MIDH) and its sub-scheme, the Horticulture Mission for North East and Himalayan States (HMNEH), on horticulture development in Kullu district, Himachal Pradesh, from 2014 to 2024. The significance of this study lies in its potential to provide evidence-based insights for policymakers, farmers, and development practitioners. As climate change intensifies and global demand for organic produce rises, Kullu's experience under MIDH can serve as a model for other hilly regions. Nonetheless, the findings aim to contribute to the discourse on sustainable horticulture in challenging terrains, aligning with India's vision of an inclusive agricultural economy.

6 P. K. Joshi, "Horticultural development in India: Challenges and opportunities," *Indian Journal of Agricultural Sciences*, vol. 89, no. 10, pp. 1540-1547, 2019.

7 V. M. Prasad, A. Sharma, and R. Gupta, "Organic farming in India: Opportunities and challenges in the Himalayan region," *International Journal of Environmental Studies*, vol. 79, no. 4, 2022.

8 D. Thakur and Y. S. Negi, "Climate change and horticulture in the Indian Himalayas: Adaptation strategies," *Climate and Development*, vol. 12, no. 6, pp. 512-525, 2020.

9 S. Kumar, D. R. Singh, and N. P. Singh, "Diversification towards high-value agriculture: Performance and prospects," *Agricultural Economics Research Review*, vol. 32, no. 1, pp. 1-14, 2019.

3 S. H. Sengar, "Sustainable horticulture development in Himalayan region: Role of government policies," *Journal of Mountain Science*, vol. 17, no. 5, pp. 1123-1135, 2020.

4 D. Jaiswal, R. Singh, and P. Sharma, "Impact of MIDH on the horticulture sector in India," *Journal of Agricultural Economics and Development*, vol. 9, no. 2, pp. 45-58, 2023.

5 S. H. Sengar, "Sustainable horticulture development in Himalayan region: Role of government policies," *Journal of Mountain Science*, vol. 17, no. 5, pp. 1123-1135, 2020.

II. LITERATURE REVIEW

The review of literature aims to explore the evolution of horticultural policy, its impact on rural livelihoods, and the implementation experiences of schemes like the Mission for Integrated Development of Horticulture (MIDH), particularly under the sub-mission for the Himalayan region is (HMNEH). It critically examines the existing body of knowledge to identify research gaps and frame the conceptual foundation for the present study.

Meijerink, et al. (2007)¹⁰ Agriculture remains vital for economic development and poverty reduction, employing over half the workforce in developing countries, including 60% in Sub-Saharan Africa. Although its GDP share is declining, agricultural growth generates strong multiplier effects, stimulating non-farm sectors and pro-poor development. Globalisation and liberalisation have boosted high-value crops such as fruits and vegetables, yet smallholders struggle with strict quality standards and limited market access. Urbanisation further raises demand for farm products and off-farm labour, while challenges like resource degradation and health crises undermine productivity. Policies ensuring extension services, credit access, and inclusive value chains are essential to support small farmers.

Amekawa, et al. (2011)¹¹ explores that Agroecology and sustainable livelihoods (SL) offer multidisciplinary approaches to rural development, particularly for small-scale farmers in marginal areas. Agroecology emphasizes ecological farming practices such as crop diversification, nutrient recycling, and natural pest control, while critiquing the environmental and social costs of monoculture. SL studies highlight household strategies, especially non-farm diversification, to reduce vulnerability to shocks. Both approaches promote participatory, bottom-up development but differ in focus: agroecology centers on sustainable farming, whereas

SL encompasses broader livelihood strategies. An integrated framework combining agroecological practices with SL's asset-based approach can strengthen smallholder resilience and aligns with policy goals in Himalayan horticulture.

Tuteja, et al. (2013)¹² conducted a baseline study on horticultural crops in Uttarakhand, assessing sectoral status, constraints, and data gaps. Despite favourable agro-climatic conditions, fruit and vegetable productivity was below the national average, with fruits occupying the largest area but yielding less output. Spices showed high productivity, indicating potential for expansion. The study also reported wide annual fluctuations in area, yield, and production, largely due to climatic and infrastructural challenges. Issues such as scattered holdings, difficult terrain, and limited staff hindered accurate data collection. The authors emphasized targeted interventions, infrastructure improvement, and better data systems for Himalayan horticulture.

Organic horticulture in India, (2016)¹³ has expanded over the past three decades, driven by consumer demand for safe, healthy, and environmentally friendly food (2016). India is a major global fruit producer and contributes significantly to organic production, with 0.8% of farmland managed organically by 1.9 million producers. Rooted in traditional practices, organic farming avoids chemical inputs, addressing soil degradation and health risks linked to the Green Revolution. The sector supports fruits, spices, and cotton with strong export potential to markets such as the EU and US. However, challenges persist in certification, domestic marketing, and strengthening export strategies.

Manjunatha et al. (2017)¹⁴ highlighted the role of agencies such as DCCD, DASD, NHRDF, NSC, Spice Board, and SFAC in implementing key MIDH components like area expansion, rejuvenation, seed production, nursery development, and post-harvest

¹⁰ G. Meijerink and P. Roza, "The role of agriculture in development," *Markets, Chains and Sustainable Development Strategy and Policy Paper*, no. 5, Stichting DLO, 2007.

¹¹ Y. Amekawa, "Agroecology and sustainable livelihoods: Towards an integrated approach to rural development," *Journal of Sustainable Agriculture*, vol. 35, no. 2, pp. 118–162, 2011.

¹² U. Tuteja, "Baseline data on horticultural crops in Uttarakhand (Research Study No. 2013/02)," *Agricultural Economics Research Centre, University of Delhi, India*, 2013.

¹³ Organic horticulture in India," *Horticulture*, vol. 2, no. 4, p. 17, 2016. [Online]. Available: <https://doi.org/10.3390/horticulturae2040017>

¹⁴ A. V. Manjunatha, K. B. Ramappa, I. Maruthi, and P. Kumar, "Impact evaluation of National Horticulture Mission (NHM) and Horticulture Mission for North East and Himalayan States (HMNEH)," 2017

management. Their interventions significantly increased the area and production of crops such as cashew, cocoa, and pepper, with fund utilization exceeding 83%. However, delays in fund release and shortfalls in targets posed challenges. Despite these issues, national-level agencies contributed positively through training, technology dissemination, and cluster-based support. The study emphasized better coordination and timely financial support to sustain horticultural growth in Himalayan regions.

Gupta, P. et al. (2018)¹⁵ The paper provides a focused analysis of farmers' perceptions of climate change in the apple-growing regions of Himachal Pradesh, based on household survey data from Cheog and Baldeyan Panchayats in district Shimla. Findings show that most farmers have noticed changes such as irregular rainfall, warmer winters, and erratic snowfall, linking these to declining apple yields. The study effectively underscores climate change as a major threat to livelihood security and rural stability in the hills. Future research could strengthen these insights by using long-term climatic data and examining farmers' adaptive measures for better policy planning.

Priyadarshini et al. (2019)¹⁶ assessed MIDH's impact in Haryana and Odisha, where horticulture contributes 8.5% to India's gross cropped area. Haryana recorded remarkable growth between 2005–06 and 2017–18, with a 100.39% rise in area and 176.93% in production, particularly kinnow, guava, and banana. Odisha showed modest gains, with 12.73% area and 18.24% production growth. Economic analysis revealed that despite high orchard establishment costs, guava and banana generated favourable net returns within 5–7 years. Constraints included poor post-harvest infrastructure, limited planting material, weak marketing, and lack of training. The study recommends mechanization, processing facilities, and capacity-building for stronger MIDH outcomes.

¹⁵ P. Gupta, V. K. Sharma, and B. Bhattacharya, "Farmer's perceptions on climate change and its impact on apple cultivation in Shimla District, Himachal Pradesh," *International Journal of Creative Research Thought*, vol. 6, no. 1, pp. 171–183, 2018.

¹⁶ M. Priyadarshini, "Impact study of Mission for Integrated Development of Horticulture in Haryana vis-à-vis Odisha," Unpublished master's thesis, Chaudhary Charan Singh Haryana Agricultural University, Hisar, 2019.

Shehrawat et al. (2020) studied farmers' awareness of agricultural schemes in Hisar and Fatehabad, Haryana. Awareness of PMFBY was high (86%), with 87% considering it vital for livelihoods. PMKSY had lower awareness (56%), and only 38% knew subsidy details. NFSM and MIDH recorded 88% awareness, though only half rated MIDH's performance as good. In contrast, awareness of e-NAM (28%) and In-Situ Crop Residue Management was limited. PKVY and Soil Health Card schemes were perceived as underperforming. The study emphasized the need for stronger awareness campaigns and better implementation to ensure farmers benefit from these initiatives.

Singh et al. (2020)¹⁷ assessed farmers' awareness and perceptions of agricultural schemes in Haryana, including MIDH. While awareness of flagship programs like PMFBY and PMKSY was high, only 53% knew of MIDH, and fewer understood its components or subsidies. About half of the respondents rated MIDH's performance as satisfactory, suggesting moderate outreach and efficiency. Education, mass media exposure, and extension contact were key determinants of awareness. The study highlights gaps in knowledge and benefit realization, particularly for diversification-oriented schemes like MIDH, and recommends improved communication, stronger extension services, and better convergence across agricultural programs.

Chaithrashree et al. (2023)¹⁸ reviewed the prospects and challenges of horticultural development programmes in India, with emphasis on MIDH. The study found that MIDH has driven holistic growth through interventions such as area expansion, nursery development, tissue culture, protected cultivation, and organic farming. Structured implementation via national, state, and district committees ensured better coordination and accountability. Positive outcomes included increased area and productivity, improved post-harvest infrastructure, and stronger cold chain

¹⁷ M. Singh and V. C. Mathur, "Structural changes in horticulture sector in India: Retrospect and prospect for XIth Five Year Plan," *Indian Journal of Agricultural Economics*, vol. 63, no. 3, pp. 332–348, 2008.

¹⁸ J. Chaithrashree, "Seminar I: Problems and prospects of horticultural development programmes: An overview," Seminar report, Department of Agricultural Extension, University of Agricultural Sciences, Bangalore, 2023.

systems. However, issues such as poor-quality planting material, inadequate market infrastructure, and delayed fund flows persist. The report recommends targeted policies, capacity building, and IT-based monitoring.

Devi et al. (2024)¹⁹ evaluated the impact of the National Horticulture Mission (NHM), a sub-scheme of MIDH, on banana cultivation in Assam. Between 2016 and 2020, NHM significantly increased production, productivity, and beneficiary incomes compared to non-beneficiaries. Food security improved, with adequate access rising from 45% to 76%, alongside better health outcomes linked to nutrition and income gains. Beneficiaries also reported asset creation and housing improvements, though constrained by funding limits. Socio-personal factors like family size and farming experience had no significant effect. The study highlights NHM's role in enhancing livelihoods and food security for banana growers.

RESEARCH GAPS

- 1) Despite the introduction of the Mission for Integrated Development of Horticulture (MIDH) in hilly regions like Himachal Pradesh, there is a lack of comprehensive, block-level analysis on the actual awareness, implementation, and effectiveness of the scheme among small and marginal farmers.
- 2) Most existing studies focus broadly on horticulture promotion but fail to capture micro-level realities such as delays in subsidy disbursement, poor field-level outreach by horticulture officials, lack of infrastructure like cold storage or pack houses, and low adoption of climate-resilient practices.
- 3) There is also limited data on gender and youth participation, the role of digital tools, and the functioning of Farmer Producer Organizations (FPOs) under the MIDH umbrella. Additionally, the role of climate-resilient practices promoted under MIDH, such as high-density planting or organic farming and other remains under-researched in the context of mountain agriculture.

¹⁹ P. Devi, P. Bora, P. Das, and M. Dutta, "Impact assessment of National Horticulture Mission on banana growers in Assam," *Indian Research Journal of Extension Education*, vol. 24, no. 3, pp. 47–55, 2024.

III. OBJECTIVES OF STUDY

- 1) To evaluate the economic benefits of MIDH, particularly on income levels and employment generation among small and marginal farmers from 2014 to 2025.
- 2) To identify the key barriers and constraints in effective adoption of MIDH schemes, including infrastructure gaps, awareness, and access to inputs.
- 3) To analyze the role of MIDH in promoting climate-resilient horticulture and propose adaptive strategies suitable for the Himalayan region.

IV. RESEARCH METHODOLOGY

The study aimed to assess the effectiveness of the Mission for Integrated Development of Horticulture (MIDH) sub-schemes in Kullu District, Himachal Pradesh. It adopted a descriptive research design, suitable for analyzing beneficiary characteristics, perceptions, and the outcomes of scheme implementation.

AREA OF STUDY

Kullu District (Himachal Pradesh, India) comprises six development blocks. For this study, three blocks—Naggar, Nirmand, and Anni—were purposively selected based on their active implementation of MIDH and availability of reliable data from the Department of Horticulture.

A stratified random sampling method was used to ensure fair representation. From Naggar Block, 43 beneficiaries (50% of 86) were randomly selected. Nirmand and Anni Blocks together had 80 beneficiaries under a single Horticulture Development Officer; 40 (50%) were randomly selected. The final sample thus comprised 83 beneficiaries across the three blocks.

DATA ANALYSIS AND INTERPRETATION

The present study focuses on the implementation and outcomes of the Mission for Integrated Development of Horticulture (MIDH) in Anni & Nirmand and Naggar blocks of Himachal Pradesh. The analysis is based on primary survey data of 83 respondents, supported by secondary information. This section presents findings on demographic and socio-economic characteristics, program-related impacts,

and key insights into the challenges and opportunities of MIDH.

LAND-HOLDING PATTERN

Land ownership shows variation across blocks. In Anni & Nirmand, 55% of respondents are small landholders (4–8 bighas), while medium holders (8–16 bighas) comprise 20%. Marginal farmers (<4 bighas) account for 15% and large farmers (>16 bighas) 10%. In Naggar, landholding is more diverse: large farmers (27.91%) and medium farmers (34.88%) dominate, while small and marginal farmers represent 18.60% each. At the combined level, small landholders constitute 36.14%, medium 27.71%, large 19.28%, and marginal 16.87%. These findings reflect MIDH's importance for small and medium farmers, while also signaling opportunities for commercialization among larger landholders.

AWARENESS OF MIDH

Levels of awareness about MIDH remain moderate. Overall, 61.45% of respondents reported being somewhat aware of the scheme, 26.51% fully aware and 12.05% not aware at all. This partial awareness restricts full participation and underscores the need for enhanced Information, Education, and Communication (IEC) strategies by the horticulture department.

CROP INTRODUCTION AND DIVERSIFICATION

A considerable share of farmers (45.78%) reported not introducing any new horticultural crops under MIDH. In Anni & Nirmand, vegetables were the most commonly introduced crop (40%), while in Naggar, apples and persimmons dominated (25.58%). Adoption of stone fruits such as peaches and plums was limited, and no farmers reported adopting walnuts, flowers, or aromatic plants. Before MIDH, most farmers cultivated 2–3 crops (56.63%), a trend that continued post-MIDH but with some increase in the number cultivating 4–5 or more crops. The elimination of the “none” category after scheme implementation reflects increased participation, though diversification remains limited.

CHANGES IN AREA UNDER HORTICULTURE

After MIDH implementation, 27.71% of respondents reported a significant increase in horticultural area, with stronger impact in Anni & Nirmand (37.50%) compared to Naggar (18.60%). A further 15.66% reported slight increases, while 53.01% reported no change, particularly in Naggar (65.12%). Only 3.61%

experienced decreases. These findings suggest localized success but limited expansion overall.

QUALITY OF INPUTS AND YIELD IMPACT

Perceptions of seed and planting material quality varied. While 21.69% rated inputs as good and 2.41% as excellent, 24.10% found them average and 12.05% poor. A large proportion (39.76%) could not assess quality, especially in Naggar. Yield outcomes also varied: 65.06% reported no change, 31.33% experienced increases (more in Anni & Nirmand), and only 3.61% reported decreases. Among those with yield gains, most reported increases of 26–50%. Overall, benefits remain uneven, pointing to the need for better extension and monitoring.

INCOME PATTERNS

Income levels improved after MIDH but remain uneven across blocks. Pre-MIDH, most farmers earned between ₹2–4 lakh annually (25.30%), with many below ₹2 lakh. Naggar had more high-income farmers. Post-MIDH, 34.94% fall in the ₹1–4 lakh range, and more farmers entered higher-income brackets, particularly in Naggar (≥₹7 lakh). However, 16.87% still earn less than ₹50,000, indicating persistent income disparities.

Post-Harvest Losses and Infrastructure

Despite the availability of pack houses and cold storage facilities under MIDH, 68.67% reported no change in post-harvest losses. Only 10.84% noted minor reductions and 15.66% moderate reductions. A majority (66.27%) reported that such infrastructure was unavailable in their area, and only 12.05% found it easily accessible. These gaps significantly undermine MIDH's effectiveness in reducing losses.

LABOUR USE AND WOMEN'S INVOLVEMENT

Labour patterns varied, with 31.33% hiring no external labour and 16.87% hiring more than 10 labourers, especially in Naggar. Women's contribution was high in on-farm tasks (91.57%), but participation in training, marketing, or FPO activities was negligible. Institutional involvement of women through SHGs or FPOs was also very limited. These findings indicate that while women provide critical labour, their roles in decision-making and leadership remain minimal.

TECHNOLOGY AND MARKETING

Access to MIDH technologies was higher in Naggar (69.77%) than in Anni & Nirmand (30%). Nearly half of farmers sell directly in markets, but 22.89% remain fully dependent on middlemen, particularly in

Naggar. None reported marketing through cooperatives or FPOs, highlighting a major institutional gap. Over half of respondents reported no improvement in crop prices under MIDH, suggesting weak market linkage components.

TRAINING, DIGITAL TOOLS, AND EXTENSION

Training and capacity-building efforts in the study area are strikingly inadequate: 67.47% of respondents reported that no training programs were available in their locality, and only a small fraction—9.64%—rated any training they had received as “good.” This gap in organized, high-quality instruction leaves farmers with limited exposure to improved agronomic techniques, climate-adaptive practices, and effective pest- and disease-management approaches. By contrast, digital tools appear to offer a promising complement; 50.60% of respondents found digital resources “very helpful,” a share that rises to 69.77% in Naggar, suggesting uneven but meaningful penetration of mobile- and internet-based advisory services. Despite this, 86.75% of respondents perceived extension services as ineffective, indicating that formal, in-person technical support systems are failing to meet farmer needs. Together these findings point to a dual challenge: (a) weak on-the-ground training and extension capacity, and (b) uneven digital uptake that is not yet a full substitute for hands-on guidance. Addressing these shortfalls will require scaling locally relevant, participatory training programs, integrating digital advisories with field demonstrations, strengthening extension staffing and incentives, and designing blended learning approaches that combine mobile alerts, farmer field schools and seasonal camps to ensure knowledge reaches and is adopted by smallholders across all study pockets.

CLIMATE IMPACTS AND RESILIENCE

Climate-related risks are pervasive across the study area and their toll is particularly acute in Anni & Nirmand, where all respondents reported experiencing climate impacts, compared with a lower but still substantial 62.79% in Naggar. Respondents identified a suite of recurring hazards — most notably hailstorms, unseasonal rains and droughts — each of which undermines different stages of the crop cycle: hail and untimely rains damage blossoms and fruit, while drought constrains vegetative growth and reduces fruit size and quality. The agricultural consequences are severe; in Anni & Nirmand 82.50%

of respondents reported significant yield declines attributable to these extreme events. Despite the clear and present nature of these risks, uptake of proven climate-resilient practices remains limited: only 21.69% of the overall sample had adopted measures intended to increase resilience. Specific practices such as shade nets, drip irrigation, high-density planting and organic farming were each taken up by only small minorities, indicating weak penetration of the very technologies that could reduce vulnerability. Paradoxically, a large share of respondents (about 90.36%) reported using some form of “sustainable practices,” but these tend to be low-intensity or traditional measures that provide modest risk reduction rather than the deeper, systemic adaptation needed in the face of escalating variability. The pattern points to several barriers — insufficient access to finance for capital-intensive measures, limited technical extension and demonstration, poor availability of inputs and coordinated support, and imperfect information on cost–benefit trade-offs — which together constrain broader adoption. Addressing these gaps will require targeted interventions: subsidized or phased financing for on-farm investments (drip systems, frost protection, shade houses), strengthened agro-meteorological advisories, capacity-building and farmer field demonstrations, and improved market incentives for climate-smart outputs. Without such a coordinated effort, farmers will remain exposed to recurrent losses and the region’s agricultural resilience will remain weak.

OVERALL SATISFACTION WITH MIDH

Overall satisfaction with the scheme is low and concerning: 50.60% of respondents reported being not satisfied at all, while only 2.41% described themselves as highly satisfied. The depth of dissatisfaction varies by location, with Anni & Nirmand showing a higher share of dissatisfied respondents (55%) compared with Naggar (46.51%), pointing to uneven performance across the study area. These figures suggest important shortcomings in implementation, outreach and service delivery — for example, problems with accessibility of benefits, inadequate communication about entitlements, delays or complexity in disbursement processes, poor fit between offered services and local needs, or weak frontline support and grievance redressal. The high baseline of discontent also risks eroding trust in institutions and

reducing uptake of future initiatives unless addressed. To restore confidence, program managers should diagnose local bottlenecks (administrative, informational, logistical), strengthen community outreach and feedback mechanisms, simplify procedures where possible, and prioritize capacity building for extension and delivery staff. Targeted corrective actions in the poorly performing pockets (Anni & Nirmand) would likely yield the greatest improvement in overall satisfaction and program effectiveness.

ANALYSIS AND RECOMMENDATIONS

This paper presents the final, consolidated analysis of research conducted on the Mission for Integrated Development of Horticulture (MIDH) in Kullu district, Himachal Pradesh. It synthesizes the study's major empirical findings, evaluates outcomes against the original research objectives, and offers a set of practical, evidence-based recommendations aimed at addressing the implementation gaps revealed by the field data. The discussion underscores both the achievements and the limitations of MIDH in the region—particularly its contributions to horticultural productivity, farmer incomes, employment generation and climate resilience among small and marginal farmers—and highlights where policy and implementation reforms are needed to make the scheme more inclusive, accessible and impactful over the long term.

The study concentrated on MIDH's implementation in three purposively selected blocks—Anni, Nirmand and Naggar—with the explicit objective of assessing the scheme's effectiveness in (a) diversifying cropping patterns, (b) raising farmer incomes, (c) expanding employment opportunities, and (d) promoting the adoption of sustainable and climate-resilient horticultural practices. Primary data were collected from 83 farmers across the three blocks, supplemented by stakeholder interviews and secondary program records. The resulting evidence paints a nuanced, mixed picture of incremental progress interspersed with persistent structural challenges.

On the positive side, there is clear evidence of moderate gains in crop diversification and productivity following MIDH interventions. Several farmers reported adopting new horticultural crops and modern techniques—such as high-density planting, improved sapling varieties and more systematic

pruning—that have the potential to raise per-hectare yields and improve long-term orchard performance. These practices were more evident among better-informed and better-capitalized households, suggesting that when technical inputs and planting material are delivered effectively, results can be tangible. Income trajectories displayed modest upward movement for a subset of respondents, particularly middle-income farmers who were able to leverage program support alongside existing assets and market linkages. Employment outcomes were another favorable area: seasonal labour demand rose in many orchards, creating additional income opportunities for local farmworkers and contributing to rural employment, with Naggar showing particularly noticeable increases in seasonal hiring for activities such as planting, pruning and harvesting.

However, these improvements are offset by a suite of implementation challenges that constrain MIDH's broader effectiveness. A recurring theme in the field data is dissatisfaction with the horticulture department's responsiveness and the poor quality of extension services. Most farmers reported infrequent or non-existent technical visits, little hands-on training, and inadequate follow-up after initial project inputs were provided. Awareness of key MIDH features—such as organic certification pathways, price incentives, post-harvest infrastructure (cold storages and pack houses), and digital extension tools—remained low across the sample, and was particularly weak in Anni and Nirmand. Where post-harvest facilities exist, utilisation was limited due to poor access, high transaction costs, or lack of clarity on use-cases and pricing, reducing the potential of these investments to minimise losses and secure better farmgate prices.

Administrative and procedural hurdles further undermined trust and participation. Many respondents described delays in subsidy disbursement, opaque application processes and bureaucratic complexity that deterred smaller, less literate farmers. Several reported waiting months or even years for subsidy approval or encountering incomplete information that made successful claiming difficult. These delays not only diminish the incentive to participate but also erode the timeliness of interventions—critical in horticulture where planting and input windows are seasonally constrained.

Climate resilience—a central priority for MIDH—also exhibited mixed outcomes. While most farmers acknowledged cropping losses from hailstorms, unseasonal rain and drought, adoption of targeted adaptive technologies remained sparse. Drip irrigation, shade nets, frost protection measures and climate-adapted varieties were adopted by only a small minority, largely due to insufficient finance, lack of demonstration plots, and weak linkages to suppliers and technical services. Although many farmers reported practising low-intensity sustainable measures (composting, intercropping, organic manures), these were generally not supported by structured training or monitoring, which reduced their efficacy as bona fide climate adaptation strategies. Taken together, these findings indicate that while MIDH has contributed to improvements in crop diversity, employment and limited infrastructure in Kullu, its full potential is being undermined by shortfalls in outreach, implementation quality and farmer support systems. To realize more equitable and durable gains—especially for the district’s small and marginal farmers—the study recommends a set of targeted measures:

1. Reorient program delivery toward a farmer-centric model that prioritizes timely, transparent subsidy disbursement and simplified application procedures, including mobile- or kiosk-based assistance for documentation.
2. Strengthen extension capacity through increased staffing, performance-linked incentives, and blended advisory models that combine digital alerts with regular field demonstrations and farmer field schools.
3. Bundle credit and credit-plus services: link MIDH inputs with accessible micro-credit or phased financing to enable capital investments (e.g., drip systems, shade nets, cold-storage access) and promote group investments (collective pack houses, community irrigation) to lower individual costs.
4. Expand and publicize post-harvest facilities and market linkages, ensuring farmers understand costing and logistics so that cold storage and pack houses are used effectively to reduce losses and improve price realization.
5. Institutionalize climate-smart demonstrations and participatory trials for locally adapted varieties

and technologies, accompanied by monitoring to capture impacts and inform scaling decisions.

6. Improve transparency and grievance redressal mechanisms to rebuild trust and increase scheme uptake in poorer-performing pockets such as Anni and Nirmand.

V. CONCLUSION

The MIDH scheme has created important opportunities for horticultural development in Kullu but remains constrained by delays, weak extension, and limited inclusivity. Implementing the above suggestions—focusing on transparency, accessibility, gender and youth inclusion, infrastructure development, and climate resilience—can help make the scheme more effective and transformative. Strengthening grassroots delivery will ensure that MIDH not only supports productivity and income growth but also builds a sustainable and resilient future for horticulture in the Himalayan region.