

SUSTAINABLE HORTICULTURE UNDER MISSION FOR INTEGRATED DEVELOPMENT OF HORTICULTURE IN HIMACHAL PRADESH

PANKAJ THAKUR* and KUSUM LATA AZAD

Department of Public Administration, Himachal Pradesh University, Shimla-171005

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Horticulture plays a pivotal role in the socio-economic landscape of Himachal Pradesh, a predominantly agrarian state with diverse agro-climatic zones conducive to a wide range of fruits, vegetables, flowers, and spices. Unlike the plains, the hill terrain and climatic conditions of Himachal Pradesh favors horticulture over traditional cereal crops. Over the past three decades, horticulture has emerged as a significant driver of agricultural growth, rural employment, and income generation. The Mission for Integrated Development of Horticulture (MIDH), launched in 2014 by the Government of India, is a centrally sponsored scheme aimed at promoting holistic horticulture development through interventions in area expansion, planting material, irrigation, post-harvest infrastructure, market linkages, and capacity building. In Himachal Pradesh, MIDH places emphasis on sustainable horticulture practices to address environmental concerns such as soil degradation, water scarcity, and pest resistance, while ensuring profitability for farmers. Sustainable horticulture in the state includes practices such as organic farming, IPM, INM, mulching, vermicomposting, drip irrigation, and bio-fertilizer application. These methods aim to conserve resources, reduce chemical dependency, and enhance long-term productivity. However, adoption rates vary due

to multiple factors, including awareness, market access, affordability, and institutional support. This study is unique as it brings together two perspectives—those of departmental officials responsible for MIDH implementation and the farmers who are the scheme's ultimate beneficiaries—in Shimla and Kullu districts. Understanding both viewpoints is essential for identifying bottlenecks and aligning policy with ground realities. In this connection, the study was conducted to examine the types of sustainable horticulture practices promoted under MIDH in Shimla and Kullu districts and to compare perspectives of officials and farmers to identify convergence and gaps in sustainable horticulture implementation.

In *Horticulture Development in Himachal Pradesh: A Paradigm Shift* traces the transformation of the state's agriculture from subsistence farming to a diversified, market-oriented horticulture economy. The paper highlights the role of government initiatives, improved planting material, and market linkages in expanding fruit cultivation, particularly apples, across high-altitude areas. It also underscores challenges such as declining apple productivity, climate variability, and the need for diversification into other high-value crops. The author emphasizes

*Corresponding Author Email: pankajthakur511251@gmail.com

strengthening infrastructure, promoting research-driven cultivation practices, and enhancing farmer training as essential for sustaining the state's horticultural growth (Sharma, 2011).

In *Annual Report 2014–15* outlines India's position as the second-largest producer of fruits and vegetables globally, while noting productivity gaps compared to leading nations. The report emphasizes the role of the Mission for Integrated Development of Horticulture (MIDH) and its sub-missions in enhancing infrastructure, promoting sustainable practices, and supporting value chains, particularly in Himalayan states. It also highlights persistent challenges such as inadequate cold storage, high post-harvest losses, and limited processing capacity, recommending infrastructure expansion, public–private partnerships, and market integration to boost farmer incomes and reduce wastage (Ministry of Agriculture and Farmers Welfare, 2015).

Research article namely “Advances in Protected Cultivation Technologies for Horticultural Crops” examine the role of greenhouse, shade net, and polyhouse systems in enhancing productivity, quality, and year-round supply of high-value crops. The paper emphasizes how protected cultivation mitigates climatic risks, optimizes water and nutrient use, and supports the production of disease-free planting material. It highlights the adoption trends, government incentives under schemes like MIDH, and the potential for integrating precision farming tools to improve economic returns and sustainability in horticulture (Kumar *et al.*, 2021)

In “Economics of Horticultural Production” discusses the sector's increasing share in India's agricultural GDP, supported by high-value crop diversification, urban market demand, and targeted government schemes.

They stress the importance of accurate cost of cultivation estimates, value addition through processing, and strong market linkages to improve profitability. The chapter also emphasizes sustainable production methods, infrastructure investment, and informed crop planning as key drivers of long-term economic viability (Baruah *et al.*, 2023).

Report “Sustainable Farming – Sustainable Future” underscores the importance of organic and climate-resilient agriculture in safeguarding environmental health, improving soil fertility, and ensuring long-term food security. It details flagship initiatives such as PKVY, MOVCDNER, the clean plant programme, and PM-PRANAM, highlighting their role in promoting organic clusters, providing virus-free planting material, and incentivizing fertilizer-free farming. The report also outlines significant achievements under MIDH, including area expansion, organic farming coverage, and protected cultivation, framing these interventions as critical to building a sustainable and resilient horticulture sector (Ministry of Agriculture & Farmers' Welfare, 2024).

These works collectively inform the present study by framing sustainable horticulture within both global best practices and the specific challenges faced in the Indian and Himachali context. They emphasize the critical role of policy, training, market linkages, and certification systems - elements central to the Mission for Integrated Development of Horticulture (MIDH) and its effectiveness in promoting sustainable farming transitions in hill regions.

Based on the fruit production data from the last five years, Shimla and Kullu districts have consistently recorded the highest horticultural output in their respective zones. Therefore, the present study was conducted in two districts - Shimla from the South Zone

and Kullu from the North Zone. These districts were selected due to their agro-climatic suitability, high fruit productivity, and effective implementation of the Mission for Integrated Development of Horticulture (MIDH) scheme.

This descriptive study employed a mixed-method approach, integrating quantitative and qualitative data to evaluate the promotion, awareness, and adoption of sustainable horticulture practices under MIDH in Himachal Pradesh. From each district, three blocks with significant horticultural activity were chosen. The sample comprised 12 departmental officials (6 from Shimla and 6 from Kullu) directly involved in MIDH implementation, and 384 horticulture farmers (192 from each district) selected through stratified random sampling to ensure representation across the selected blocks. Two structured questionnaires - one for officials and another for farmers - were used to collect data on the types of sustainable practices promoted, methods of dissemination, adoption frequency, challenges faced, and perceptions of MIDH's effectiveness. Quantitative data were analyzed using descriptive statistics (frequencies and percentages) in Microsoft Excel, while

qualitative responses from open-ended questions were thematically analyzed to capture contextual insights. Tables and figures were prepared to present key findings, supported by narrative interpretation. This design enabled a comparative assessment of policy-level promotion strategies and ground-level adoption patterns, identifying both convergence and gaps between the two perspectives.

Officials were asked to identify which sustainable horticulture practices are promoted in their blocks or districts. The responses have been presented in Table 1. All the officials reported promoting key sustainable horticulture practices - organic farming, Integrated Pest Management, Integrated Nutrient Management, vermin composting, drip/micro-irrigation, and bio-fertilizer use - reflecting a comprehensive approach to environmental sustainability under MIDH. Mulching was slightly less emphasized (91.7 percent), and a small share (8.3 percent) mentioned additional localized innovations. These results indicate that sustainable horticulture promotion is firmly embedded in Mission for Integrated Development of

Table 1. Sustainable Practices Promoted under Mission for Integrated Development of Horticulture as Reported by Officials,

(n = 12)

S. No.	Sustainable Practice	Frequency (n)	Percentage
1	Organic farming	12	100
2	Integrated Pest Management (IPM)	12	100
3	Integrated Nutrient Management (INM)	12	100
4	Vermicomposting	12	100
5	Drip/Micro-irrigation systems	12	100
6	Mulching techniques	11	91.7
7	Use of bio-fertilizers	12	100
8	Others (please specify)	1	8.3

Source: Primary Probe.

Table 2. Awareness of Sustainable Horticulture Practices**(n = 384)**

Sl. No	Responses	Frequency	Percentage
1	Yes	175	45.6
2	No	0	0
3	Not familiar with the term 'sustainable' but I use some of these practices	209	54.4

Horticulture implementation at the grassroots level, aligning closely with the scheme's policy framework.

Farmers' Perspective of Sustainable Horticulture Practices

To assess the level of awareness among farmers regarding sustainable horticultural practices promoted under MIDH, beneficiaries were asked if they were familiar with techniques such as organic farming, drip irrigation, mulching, and vermicomposting, which aim at long-term soil and crop health. The responses are presented in Table 2.

The findings in Table 2 reveal that 45.6 percent of farmers were formally aware of sustainable practices promoted under MIDH, while 54.4 percent reported using some techniques without associating them with the term "sustainable." Notably, none of the respondents were entirely unaware, suggesting that MIDH interventions - whether through formal training or informal channels -

are reaching the farming community. This indicates practical uptake of environmentally friendly methods, even when technical terminology is not well understood.

Sources of Learning

Beneficiaries were asked to identify the primary source through which they learned about sustainable horticultural practices such as organic farming, drip irrigation, mulching, or vermicomposting. Each respondent could select only one option. The responses are shown in Table.3

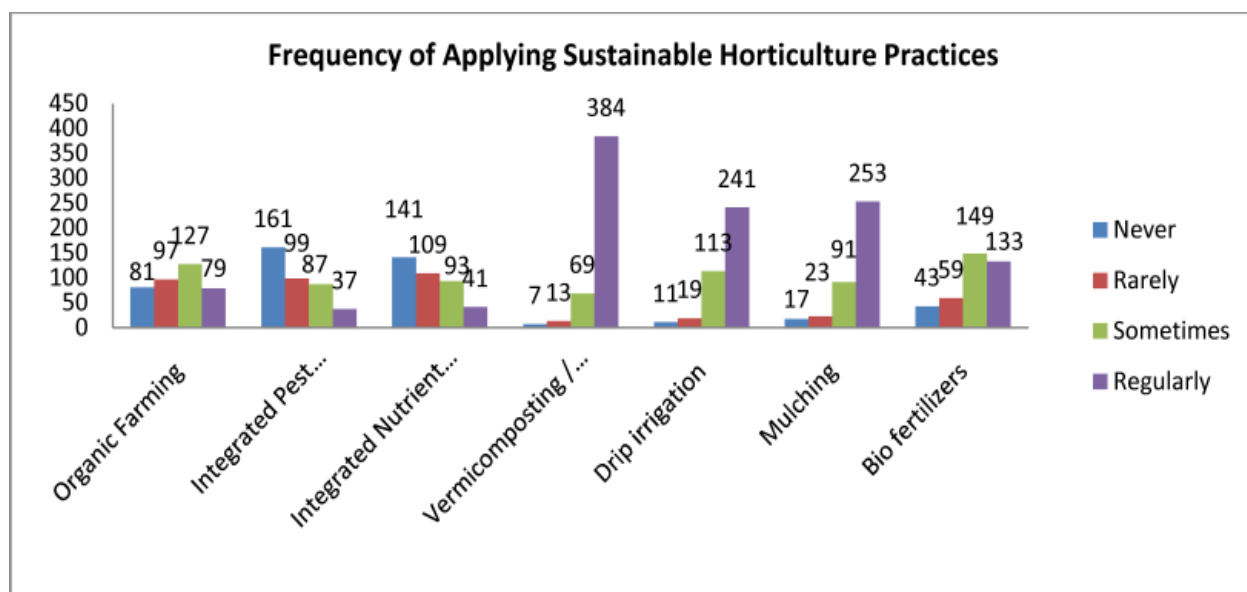
According to Table-3, training programs and camps emerged as the primary source of knowledge (44.0 percent), underscoring their central role in skill development. Internet and social media were the second-most common source (23.4 percent), reflecting increasing digital engagement, particularly among younger farmers. Peer learning through fellow farmers accounted for 19.5 percent, while direct interaction with government officials was

Table 3. Sources of Learning about Sustainable Horticultural Practices**(n = 384)**

S.No.	Response Option	Frequency (n)	Percentage
1	Government Officials	45	11.7
2	Trainings/Camps	169	44.0
3	Fellow Farmers	75	19.5
4	Internet/Social Media	90	23.4
5	Other (specify)	5	1.3
	Total	384	100

Source: Primary Probe

n=384



Source: Author's Framework

Fig. 1. Frequency of Application of Sustainable Practices by Farmers

relatively low at 11.7 percent. These findings point to the need for strengthening departmental field outreach while continuing to leverage both traditional and digital platforms for information dissemination.

Frequency of Applying Sustainable Practices

Beneficiaries were asked to indicate how frequently they apply key sustainable horticulture practices promoted under MIDH. Each respondent rated their frequency of use for multiple practices on a four-point scale: *Regularly*, *Sometimes*, *Rarely*, or *Never*. The compiled responses are summarized below in

The adoption pattern shows significant variation across practices. Vermicomposting/cow dung use was nearly universal and regular, indicating strong integration into local farming systems. Mulching (65.9% regular use) and drip irrigation (62.8% regular use) also showed high uptake, likely influenced by visible benefits and subsidy support. Bio-fertilizers were used regularly by about one-third of farmers, with

many applying them occasionally. Organic farming adoption was mixed, with only one-fifth practicing it regularly and a similar proportion never using it. IPM and INM recorded the lowest consistent use (below 11%), suggesting the need for more technical guidance and practical demonstrations for these methods.

Integration into Regular Farming

To assess the **overall adoption** of sustainable horticultural practices, farmers were asked if they consider such practices as a regular part of their farming system. The responses are summarized in Table-4

As per Table-4, sustainable horticulture is integrated to some degree in the practices of nearly 60% of farmers, though only 2.3% have fully embraced it as a core production system. A substantial proportion (40.1%) do not consider these methods part of their regular operations, indicating that partial adoption - often limited to specific techniques - is more common than system-wide sustainability transitions.

Table 4. Adoption of Sustainable Horticulture Practices as a Regular Farming Activity

Sr. No	Responses	Frequency	Percentage
1	Yes, to a great extent	9	2.3
2	Yes, to some extent	221	57.6
3	No	154	40.1

Source: Primary Probe

Table 5. Challenges in Adopting Sustainable Horticulture Practices (n = 384)

Sr.No.	Challenge	Frequency (n)	Percentage
1.	Lack of knowledge	172	44.8
2.	High cost of inputs	148	38.5
3.	No market for organic produce	131	34.1
4.	Not suitable for land/climate	84	21.9
5.	Lack of departmental support	57	14.8
6.	Other	11	2.9

Challenges in Adoption

While many farmers are aware of and have adopted some sustainable horticulture practices, several challenges still hinder their full-scale implementation. Beneficiaries were asked to select all the obstacles they faced in adopting such practices. The responses are summarized in Table-5

The constraints in Table-5, highlight knowledge gaps (44.8 percent) as the most pressing barrier, followed by high input costs (38.5 percent) and lack of assured markets for organic produce (34.1 percent). Climatic or land-related unsuitability was cited by (21.9 percent), while (14.8 percent) pointed to insufficient departmental support. A small share (2.9 percent) mentioned other issues such as labor shortages and certification hurdles. These challenges point to the need for an integrated strategy combining capacity building, financial assistance, market development, and climate-specific solutions to encourage broader and more consistent adoption of sustainable horticulture under MIDH.

This descriptive study examined sustainable horticulture practices promoted under the Mission for Integrated Development of Horticulture (MIDH) in Himachal Pradesh from the perspectives of both officials and farmers. Officials reported unanimous promotion of core sustainable practices such as organic farming, IPM, INM, vermicomposting, drip irrigation, mulching, and bio-fertilizer use. Training programs and awareness campaigns were the main methods used to encourage adoption. From the farmers' side, although nearly half were formally aware of sustainable horticulture, many were already using some practices without associating them with the term "sustainability." Vermicomposting, mulching, and drip irrigation were the most regularly adopted, while IPM and INM had low uptake. The main constraints identified were lack of knowledge, high costs, and absence of organic market linkages. The findings highlight a clear policy–practice gap. While MIDH has succeeded in promoting awareness and initiating adoption, sustained

and comprehensive integration of sustainable practices into regular farming remains limited.

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