**Constraints And Suggestions Of Orchard Growers After Adopting Subsidiary Crop Cultivation Practices In Mango Orchard Of Southern Rajasthan, India**

ABSTRACT

The integration of subsidiary fruits crop cultivation within orchard-based farming systems has emerged as a vital strategy for enhancing farm income, optimizing resource utilization and ensuring sustainability. Despite its recognized benefits, adoption of subsidiary crop practices among orchard growers’ remains limited due to various constraints. The present study investigates the key constraints faced by orchard growers in adopting subsidiary crop cultivation and the suggestions offered to overcome these constraints. Primary data were collected through structured interviews with fruits orchard growers across selected districts using a well-designed interview schedule. A total of 240 respondents were randomly selected for data collection. An Ex-Post-Facto research design was used in the present study. The findings revealed that major constraints include insufficient market linkages (84.41 MPS), limited access to quality inputs (81.74 MPS), low confidence levels (58.13 MPS), financial limitations (57.27 MPS), inadequate technical knowledge (47.80 MPS), lack of irrigation facilities (47.67 MPS), and poor extension contact (47.64 MPS). Additionally, social factors such as poor extension contact (47.64 MPS) and low confidence levels (58.13 MPS) further hinder adoption. Growers suggested improved input supply mechanisms (82.50%), better credit access (70.83%), enhanced training programs (69.50%) and robust extension services as potential measures to support adoption. The study underscores the need for targeted policy interventions and capacity-building initiatives to support orchard growers in diversifying their production through subsidiary crops, thereby strengthening the resilience and profitability of orchard-based farming systems.

**Keywords:** Adoption, Constraints, Orchard Growers, Subsidiary Crops, Suggestions

Introduction

Horticulture plays a pivotal role in India’s agricultural growth, contributing nearly 33 per cent to the agricultural Gross Value Added (GVA). With higher productivity and income potential compared to food grains, the sector supports nutritional security, rural employment, and farm diversification. The launch of initiatives like the National Horticulture Mission (NHM), now integrated under the Mission for Integrated Development of Horticulture (MIDH), has significantly enhanced the productivity and area under horticultural crops. One key component of NHM is the promotion of new orchard establishment, which is particularly impactful in regions like Udaipur and Banswara of southern Rajasthan, where climate and soil conditions favour fruit crop cultivation.

However, a critical constraint during orchard establishment is the long gestation period of 5–7 years before fruit trees begin yielding economically. This period poses financial stress for small and marginal farmers who lack interim income sources. To mitigate this challenge, the integration of short-duration subsidiary crops—such as vegetables, legumes, and herbs—between orchard rows has emerged as a sustainable solution. These crops offer quick returns, enhance soil fertility, improve water use efficiency, and help reduce pest incidences through ecological diversification.

Despite these benefits, several constraints hinder widespread adoption of subsidiary cropping. These include limited technical knowledge, inadequate access to quality inputs, poor irrigation infrastructure, lack of market linkages, and minimal extension support. Furthermore, constraints related to pest and disease management, high cost of cultivation, and absence of post-harvest facilities further affect the profitability of such systems.

To address these issues, suggestions include strengthening capacity-building programs, providing timely input subsidies and irrigation support, improving access to credit, enhancing marketing infrastructure, and encouraging farmer training on intercropping techniques and crop compatibility. Region-specific planning and support for high-value subsidiary crops can make the orchard system more resilient, sustainable and profitable.

In this context, the present study entitled “Impact of Subsidiary Horticultural Crop Cultivation Scheme for Financial Support to New Orchard Growers in Southern Rajasthan” was undertaken to assess how integrating subsidiary crops into newly established orchards contributes to financial sustainability, and to identify existing challenges and potential improvements for policy and practice. The manuscript has been thoughtfully crafted to clarify the following:

1. The primary constraints genuinely faced within the subsidiary cropping mechanism and by its beneficiaries.
2. The article’s significance to the scientific community, particularly in areas such as horticultural science, agricultural technology, extension education, integrated pest management and irrigation systems.

Materials and Methods

An Ex-Post-Facto research design was used in the present study. The present study was conducted in southern Rajasthan. At present southern Rajasthan comprise of seven districts namely Udaipur, Rajsamand, Banswara, Dungarpur, Chittorgarh, Pratapgarh and Bhilwara. Out of these, two districts *viz*., Udaipur and Banswara were purposively selected on the basis of highest number of orchard growers under NHM scheme. Three tehsils from each identified district were selected for study on the basis of maximum numbers of orchard benefited through NHM scheme. Therefore, a total of six tehsils were taken for the study. From each selected tehsil two villages were randomly selected. Thus, a total of twelve villages were included for the present study. From this list, 20 orchard-growing farmers were selected for each village the present study using a random selection technique. Thus, a total of 240 farmers were included in sample of study. Data were collected with the help of well constructed interview schedule by the face to face interview technique.The responses were recorded individually. Further mean per cent score was used to know the overall ranking.

**Results and Discussions**

**1. Aspect wise constraints perceived by orchard growers during and after adoption of subsidiary crops cultivation practices**

The analysis identified key constraints encountered by orchard growers in the process of adopting subsidiary crop cultivation practices. A total of 43 major constraints were categorized under seven key aspects: (i) input and services (ii) technical (iii) financial (iv) marketing, storage and post-harvest management (v) institutional/extension (vi) personal and (vii) ecological constraints.

The results reveal that “Marketing, storage and post-harvest management constraints” emerged as the most significant constraint, ranked first in Udaipur (MPS 84.41) and second in Banswara (MPS 85.94), with a combined MPS 84.41, thereby securing the first overall rank. This highlights the need for better infrastructure and support mechanisms for marketing and post-harvest handling to promote sustainable adoption of subsidiary crops.

The second most important constraint was “Input and services-related constraints,” which ranked first in Banswara (MPS 86.15) and second in Udaipur (MPS 77.33). The overall MPS 81.74 placed this category in second rank, indicating that timely availability and accessibility of quality seeds, fertilizers and plant protection materials remain a pressing issue across both districts.

\* MPS = (Mean Percent Score)

**Table 1.- Aspect wise constraints faced by the orchard grower in adapting of subsidiary crop cultivation practices**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Aspect-wise**  **constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total**  **n=240** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
| 1. | Input and services constraints | 77.33 | II | 86.15 | I | 81.74 | II |
| 2. | Technical constraints | 47.12 | V | 48.47 | IV | 47.80 | V |
| 3. | Financial constraints | 56.49 | IV | 58.06 | IV | 57.27 | IV |
| 4. | Marketing, Storage and post harvesting management constraints | 82.88 | I | 85.94 | II | 84.41 | I |
| 5. | Institutional constraints | 46.67 | VII | 48.61 | V | 47.64 | VII |
| 6. | Personal constraints | 57.01 | III | 59.24 | III | 58.13 | III |
| 7. | Ecological constraints | 46.91 | VI | 48.44 | VII | 47.67 | VI |

MPS = Mean Percent Score

“Personal constraints” were also considered major barriers by the respondents, ranking third in both districts with MPS values of 57.01 in Udaipur and 59.24 in Banswara, resulting in overall MPS of 58.13.

“Financial constraints” ranked fourth overall, with MPS of 56.49 in Udaipur and 58.06 in Banswara and a combined MPS of 57.27, suggesting limited access to credit or financial resources as a barrier to adoption.

“Technical constraints” were placed in the fifth rank overall, with nearly similar MPS in both districts (47.12 in Udaipur and 48.47 in Banswara), resulting in a combined MPS 47.80. This indicates a moderate level of difficulty associated with the technical know-how of subsidiary crop practices.

“Ecological constraints” were ranked sixth, slightly higher in Banswara (MPS 48.44) than in Udaipur (MPS 46.91), with a combined MPS of 47.67. This category reflects climate and environment-related challenges such as erratic rainfall, pests and soil issues.

Lastly, “Institutional constraints”received the lowest overall rank seventh, with MPS 46.67 in Udaipur and 48.61 in Banswara and a combined MPS of 47.64. This indicates the need to improve institutional support, extension services and timely delivery of information to orchard growers.

**A.- Input and Services-Related Constraints**

The data presented in Table 2 input and services-related constraints perceived by orchard growers in Udaipur and Banswara districts. Among the listed constraints, the “Lack of availability of high-yielding variety seeds and planting material at the village level” emerged as the most critical issue. This constraint was ranked first in Banswara (MPS 96.94) and second in Udaipur (MPS 79.17), resulting in a high combined MPS 88.06. The second most significant constraint reported was the “Lack of labour during peak periods,” ranked first in Udaipur (MPS 81.39) and second in Banswara (MPS 90.56). The combined MPS 85.97 demonstrates the severity of labour shortages during critical cultivation and harvesting periods.Similarly, the “Unavailability of quality and adequate quantity of manures and fertilizers at the village level” was reported as a major challenge by orchard growers. This constraint received MPS of 78.33 in Udaipur and 89.44 in Banswara, with overall MPS 83.89, placing it third in ranking. This emphasizes growers’ difficulty in accessing essential agricultural inputs at the local level.

The “High cost of plant protection chemicals and weedicides” was another major concern, ranking fourth in Udaipur (MPS 77.50) and fifth in Banswara (MPS 87.50). The combined MPS 82.50 placed this constraint at fourth overall.“Irregular electricity supply” affected farm operations, especially irrigation. This issue was ranked seventh in Udaipur (MPS 75.28) and fourth in Banswara (MPS 88.61), with overall MPS 81.94, earning it the fifth rank among input-related constraints.

Further, “High labour wages” was perceived as a constraint by many respondents. It ranked sixth in Udaipur (MPS 75.83) and seventh in Banswara (MPS 78.33), with a combined MPS 77.08, ranking seventh overall.Lastly, the “High cost of seeds, fertilizers and manures” was also reported as a constraint.

**Table 2: Input and services related constraints perceived by orchard growers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Input and services constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total**  **n=240** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
| 1. | Lack of availability of high yielding variety seeds and planting material at village level | 79.17 | II | 96.94 | I | 88.06 | I |
| 2. | Lack of labour during peak period | 81.39 | I | 90.56 | II | 85.97 | II |
| 3. | Unavailability of quality manures and fertilizers at village level | 78.33 | III | 89.44 | III | 83.89 | III |
| 4. | Unavailability of plant protection measures | 74.72 | VIII | 81.67 | VI | 78.19 | VI |
| 5. | Irregular supply of electricity | 75.28 | VII | 88.61 | IV | 81.94 | V |
| 6. | High cost for seeds, fertilizer and manures | 76.39 | V | 76.11 | VIII | 76.25 | VIII |
| 7. | High cost of plant protection chemicals and weedicides | 77.50 | IV | 87.50 | V | 82.50 | IV |
| 8. | High labour wages | 75.83 | VI | 78.33 | VII | 77.08 | VII |

MPS= mean per cent score

It was ranked fifth in Udaipur (MPS 76.39) and eighth in Banswara (MPS 76.11), with a combined MPS 76.25, ranking it eighth overall. These costs contribute to the financial burden on orchard growers, particularly in regions where input prices fluctuate frequently.

**B. - Technical Constraints Perceived by Orchard Growers**

The data presented in Table 3 outline the technical constraints perceived by orchard growers in Udaipur and Banswara districts during and after the adoption of subsidiary crop cultivation practices.The most critical constraint identified was the “Over-application of fertilizers,” which ranked first in Udaipur (MPS 77.22) and third in Banswara (MPS 78.06), with a combined MPS 78.89, placing it first overall. This suggests that many growers apply excessive amounts of fertilizers, likely due to a lack of appropriate technical guidance. Such practices can degrade soil health, reduce input efficiency and negatively affect crop quality.

The second most important constraint was the “Lack of timely technical advice,” ranked second in both Udaipur (MPS 76.94) and Banswara (MPS 79.17), resulting in a combined MPS 77.50. This finding highlights the growers’ demand for accessible, prompt and practical support to effectively implement improved cultivation techniques.

The “Indiscriminate use of plant protection chemicals” ranked third overall, with an MPS of 75.28 in Udaipur and first in Banswara with an MPS of 80.56. The combined MPS of 77.22 suggests a significant knowledge gap in the correct usage of pesticides and weedicides, which may pose environmental risks and reduce crop productivity if not properly managed.

Another constraint identified was “Improper seed and soil treatment techniques,” which ranked fourth overall, with an MPS of 74.17 in Udaipur and 74.72 in Banswara, yielding a combined MPS of 74.44. This indicates that growers may not be following recommended practices for seed and soil preparation, potentially leading to poor germination and suboptimal crop establishment.

Finally, “Poor identification of diseases and pests” was perceived as the least significant among the listed technical constraints, though still relevant. It was ranked fifth in both districts with MPS of 73.33 in Udaipur and 75.28 in Banswara, resulting in a combined MPS of 74.31. This reflects the growers’ difficulties in diagnosing and managing pest and disease issues effectively, which can severely impact plant health and overall productivity.

**Table 3: Technical constraints perceived by orchard growers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Technical constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total**  **n=240** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
| 1. | Improper seed and soil treatment techniques | 74.17 | IV | 74.72 | V | 74.44 | IV |
| 2. | Lack of timely technical advice | 76.94 | II | 79.17 | II | 77.50 | II |
| 3. | Over-application of fertilizers | 77.22 | I | 78.06 | III | 78.89 | I |
| 4. | Indiscriminate use of plant protection chemicals | 75.28 | III | 80.56 | I | 77.22 | III |
| 5. | Poor identification of disease and pest | 73.33 | V | 75.28 | IV | 74.31 | V |

MPS= mean per cent score

**C. - Financial Constraints Perceived by Orchard Growers**

The most critical financial constraint reported was the “Delay in loan disbursement procedures,” which ranked first in both Udaipur (MPS 78.06) and Banswara (MPS 82.78). The combined MPS 80.42 underscores the widespread concern that delays in accessing credit hinder growers’ ability to procure agricultural inputs in a timely manner, thereby adversely affecting productivity and the successful implementation of improved practices.

The second most significant constraint was the “High interest rate on loans,” with MPS 77.78in Udaipur and 81.39 in Banswara, resulting in a combined MPS 79.58. The high cost of borrowing increases the financial burden on orchard growers, limiting their capacity to invest in quality inputs, adopt new technologies, and expand their operations.

The “Inadequate support from financial institutions” was ranked third, with MPS 75.83 in Udaipur and 77.78 in Banswara, yielding a combined MPS 76.81.

Further, the “Lack of awareness of financial institutions” was identified as the fourth major constraint, with MPS 75.83 in Udaipur and 74.72 in Banswara, leading to a combined MPS of 75.28. This suggests that many orchard growers are not adequately informed about the services and options available through formal financial systems, which limits their ability to access credit or financial support effectively.

The “Non-availability of credit at marginal rates” was ranked fifth overall, with MPS 74.17in Udaipur and 75.56 in Banswara, resulting in a combined MPS 74.86. The lack of affordable credit options poses significant challenges, particularly for small and marginal orchard growers, by restricting their operational flexibility.

Lastly, the “Lack of knowledge about government schemes and subsidies” was the least ranked constraint, with MPS 70.28 in Udaipur and 72.22 in Banswara and overall MPS of 71.25.

**Table 4: Financial constraints perceived by orchard growers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Financial constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total**  **n=240** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
| 1. | Lack of awareness of financial institution | 75.83 | III | 74.72 | V | 75.28 | IV |
| 2. | Delay in loan disbursement | 78.06 | I | 82.78 | I | 80.42 | I |
| 3. | High interest rate | 77.78 | II | 81.39 | II | 79.58 | II |
| 4. | Inadequate support from financial institution | 75.80 | IV | 77.78 | III | 76.81 | III |
| 5. | Non availability of credit at marginal rate | 74.17 | V | 75.56 | IV | 74.86 | V |
| 6. | Lack of knowledge on govt. scheme and subsidies | 70.28 | VI | 72.22 | VI | 71.25 | VI |

MPS= mean per cent score

**D. -Marketing, Storage and Post-Harvest Management Constraints Perceived by Orchard Growers.**

The data presented in Table 5 reveals the marketing, storage and post-harvest management-related constraints encountered by orchard growers in Udaipur and Banswara districts during and after the adoption of subsidiary crop cultivation practices.The most critical constraint identified was the “Lack of knowledge about current market prices,” ranked first in both Udaipur (MPS 91.67) and Banswara (MPS 96.11), resulting in a combined MPS 93.89. The second major constraint was “Fluctuation in market prices,” ranked second in Udaipur (MPS 87.50) and third in Banswara (MPS 90.00), with overall MPS 88.75. This constraint reflects the unpredictability and volatility of market rates, which can disrupt planning and profitability, especially for small-scale orchard growers.

The “Lack of remunerative prices” was also a prominent issue, ranked third in Udaipur (MPS 84.72) and second in Banswara (MPS 90.56). The combined MPS of 87.64 placed it at third overall, indicating that many growers are dissatisfied with the returns they receive, even after investing considerable resources and effort in cultivation.

The “High transportation cost” ranked fourth in both districts, with MPS of 84.17 in Udaipur and 88.33 in Banswara, and a combined MPS of 86.25.

**Table 5: Marketing, storage and post harvesting management related constraints perceived by orchard growers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Marketing, Storage and post harvesting management constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
|  | Lack of knowledge about current market price | 91.67 | I | 96.11 | I | 93.89 | I |
|  | Lack of remunerative prices | 84.72 | III | 90.56 | II | 87.64 | III |
|  | Fluctuation in market prices | 87.50 | II | 90.00 | III | 88.75 | II |
|  | Exploitation by middle-men | 78.33 | VI | 80.00 | VIII | 79.17 | VII |
|  | High transportation cost | 84.17 | IV | 88.33 | IV | 86.25 | IV |
|  | Lack of awareness on e-platforms | 75.56 | VIII | 80.28 | VII | 77.92 | VIII |
|  | Lack of proper marketing channels and strategies | 82.78 | V | 80.83 | VI | 81.81 | V |
|  | Lack of post-harvest technology | 78.33 | VI | 81.39 | V | 79.86 | VI |

MPS= mean per cent score

Further, the “Lack of proper marketing channels and strategies” was ranked fifthoverall, with MPS 82.78 in Udaipur and 80.83 in Banswara, yielding a combined MPS of 81.81. The constraint “Lack of knowledge about post-harvest technology” was also reported, ranking sixth in Udaipur (MPS 78.33) and fifth in Banswara (MPS 81.39). The combined MPS 79.86 indicates a knowledge gap in handling, processing and storage practices post-harvest, which can lead to losses in quantity and quality of produce.

The issue of “Exploitation by middlemen” was perceived by many growers, ranking sixth in Udaipur (MPS 78.33) and eighth in Banswara (MPS 80.00), with a total MPS 79.17 and an overall rank of seventh. This suggests that growers often receive lower prices due to the dominant role played by intermediaries, who take a significant portion of the profit. Strengthening direct market linkages and reducing intermediary involvement could help address this issue.

Lastly, the “Lack of awareness on e-platforms” was ranked lowest, with MPS 75.56 in Udaipur and 80.28 in Banswara, resulting in a combined MPS 77.92. This indicates that most orchard growers are not familiar with digital marketing platforms or lack the technical skills to utilize such platforms effectively. Enhancing digital literacy and access to e-marketing could improve market opportunities for these farmers.

**E. Institutional Constraints Perceived by Orchard Growers**

The data presented in Table 6 illustrate the institutional constraints perceived by orchard growers in Udaipur and Banswara districts during and after the adoption of subsidiary crop cultivation practices.The most critical institutional constraint reported by the respondents was the “Lack of timely visits by extension personnel,” which ranked first in both Udaipur (MPS 79.44) and Banswara (MPS 83.33), resulting in a combined MPS 81.39. The second major constraint was the “Lack of capacity-building and need-based training programmes**”** with MPS 75.83 in Udaipur and 79.44 in Banswara, yielding a combined MPS 77.64.

**Table 6: Institutional constraints perceived by orchard growers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Institutional constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
| 1. | Lack of timely visit by extension personnel | 79.44 | I | 83.33 | I | 81.39 | I |
| 2. | Lack of adequate extension contact | 72.78 | IV | 73.89 | V | 73.33 | IV |
| 3. | Lack of information disseminate about plant protection measures | 75.56 | III | 76.94 | III | 76.25 | III |
| 4. | Lack of capacity- building programme/ need based training programme | 75.83 | II | 79.44 | II | 77.64 | II |
| 5. | Lack of coordination among the farmers | 69.72 | V | 75.28 | IV | 72.50 | V |

MPS= mean per cent score

Similarly, the “Inadequate dissemination of plant protection information” emerged as the third most important institutional constraint, with MPS 75.56 in Udaipur and 76.94 in Banswara, leading to a combined MPS 76.25. This constraint indicates that growers often lack timely and practical knowledge about managing pests and diseases, which may hinder effective crop protection measures and reduce productivity.

The constraint “Lack of adequate extension contact” was ranked fourth, with MPS of 72.78 in Udaipur and 73.89 in Banswara, resulting in an overall MPS of 73.33.

Lastly, the “Lack of coordination among farmers” was the lowest-ranked constraint, placed fifth overall, with MPS 69.72 in Udaipur and 75.28 in Banswara, yielding a combined MPS 72.50.

**F. Personal Constraints Perceived by Orchard Growers**

Table 7 presents the personal constraints encountered by orchard growers regard to the adoption and implementation of subsidiary crop cultivation practices.The most prominent constraint identified was the “Lack of decision-making ability,” which was ranked first in both Udaipur (MPS 78.61) and Banswara (MPS 81.39), resulting in a combined MPS 80.00. The second most important constraint was the “Lack of proper education,” which received MPS 76.11 in Udaipur and 80.28 in Banswara, with a combined MPS 78.19, securing the second overall rank.

**Table 7: Personal constraints perceived by orchard growers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Personal constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
| 1. | Lack of proper education | 76.11 | IV | 80.28 | II | 78.19 | II |
| 2. | Lack of decision making ability | 78.61 | I | 81.39 | I | 80.00 | I |
| 3. | Lack of self-confidence and risk taking ability | 76.90 | II | 79.44 | III | 78.15 | III |
| 4. | Lack of innovativeness | 75.83 | V | 77.78 | V | 76.81 | V |
| 5. | Laggard behaviour | 76.39 | III | 78.06 | IV | 77.22 | IV |
| 6. | Low social participation | 72.22 | VI | 76.94 | VI | 74.58 | VI |

MPS= mean per cent score

Additionally, the constraint “Lack of self-confidence and risk-taking ability” was ranked second in Udaipur (MPS 76.90) and third in Banswara (MPS 79.44), resulting in a combined MPS 78.15 and ranking third overall. The constraint “Laggard behaviour” was ranked third in Udaipur (MPS 76.39) and fourth in Banswara (MPS 78.06), with a total MPS 77.22, ranking fourth overall.

Similarly, “Lack of innovativeness” was ranked fifth in both districts, with MPS 75.83 in Udaipur and 77.78 in Banswara, producing a combined MPS 76.81. Lastly, “Low social participation” was the least ranked constraint, placed sixth overall, with MPS 72.22 in Udaipur and 76.94 in Banswara and a combined MPS 74.58.

**G. Ecological Constraints Perceived by Orchard Growers**

Table 8. presents the ecological constraints as perceived by orchard growers. The data indicated that “Delay in onset of monsoon/erratic rainfall” emerged as the most critical constraint, securing the highest rank in both Udaipur (78.06 MPS) and Banswara (81.94 MPS), with overall MPS 80.00. This highlights the adverse impact of delayed and unpredictable rainfall patterns on orchard farming, as they hinder timely planting, disrupt crop growth cycles, and increase dependence on already scarce water resources, ultimately reducing productivity.

The second most significant constraint was “Soil fertility and problematic soils,” with MPS 77.78 in Udaipur (ranked II) and 76.11 in Banswara (ranked IV), yielding a combined MPS 76.94 and securing the second rank overall. “Water logging” ranked third overall, with MPS 72.78 in Udaipur (ranked V) and 78.33 in Banswara (ranked II), resulting in a combined MPS of 75.56. The constraint was perceived as more severe in Banswara, possibly due to the differences in topography and drainage conditions.

**Table 8: Ecological constraints perceived by orchard growers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Ecological constraints** | **Udaipur district**  **n=120** | | **Banswara district**  **n=120** | | **Total**  **n=240** | |
| **MPS** | **RANK** | **MPS** | **RANK** | **MPS** | **RANK** |
| 1. | Soil Fertility and problematic soils | 77.78 | II | 76.11 | IV | 76.94 | II |
| 2. | Delay in onset of monsoon/erratic rainfall | 78.06 | I | 81.94 | I | 80.00 | I |
| 3. | Increased incidence of pests and diseases | 73.61 | III | 76.67 | III | 75.14 | IV |
| 4. | Water logging | 72.78 | V | 78.33 | II | 75.56 | III |
| 5. | Frost injury | 73.06 | IV | 74.44 | V | 73.75 | V |

MPS= mean per cent score

The constraint “Increased incidence of pests and diseases” was ranked fourth, with MPS of 73.61 in Udaipur and 76.67 in Banswara, leading to a combined MPS 75.14. The slightly higher rating in Banswara suggests greater vulnerability or exposure to biotic stress factors in that region.

Lastly, “Frost injury” was perceived as the least severe among the listed ecological constraints, with MPS 73.06 in Udaipur (ranked IV) and 74.44 in Banswara (ranked V), resulting in overall MPS of 73.75 and securing the fifth rank. Despite its lower ranking, frost events pose a significant threat during critical growth stages, potentially leading to yield losses in both districts.

**3. Suggestions offered by orchard growers for enhancing adoption of subsidiary crop cultivation practices**

Each orchard grower provided their own suggestions on preference to improve the adoption of technology for further development. These suggestions were considered as feedback to overcome the constraints. To gather insights, the farmers were asked to rank the possible suggestions.

**Table 9: Suggestions offered by orchard growers for enhancing adoption of subsidiary crop cultivation practices**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No.** | **Suggestions** | **Frequency** | **Percentage** | **Rank** |
| 1 | Village level workers should be frequently contact the farmers to make them aware about the new farm technology | 177 | 73.75 | IV |
| 2 | unawareness remunerative prices/ MSP regulated by government | 187 | 77.92 | III |
| 3 | Provide credit at low rate of interest in rural areas | 170 | 70.83 | VII |
| 4 | Training should be given to the farmers on new farm technology and plant protection measures at village level | 167 | 69.58 | IX |
| 5 | Technical knowledge about plant protection measures and nutrients management required | 162 | 67.50 | XI |
| 6 | Provide timely weather forecast and market information | 161 | 67.08 | XII |
| 7 | Provision for suitable market infrastructure  (transportation facilities, storage, weightment facilities) | 164 | 68.33 | X |
| 8 | Subsidies and schemes from the government should be started | 171 | 71.25 | VI |
| 9 | Inputs should be made available at subsidized rate | 188 | 78.33 | II |
| 10 | Reduce the labour problems by provide mechanized agril. implements/ equipments | 168 | 70.00 | VIII |
| 11 | Provide quality seed, other inputs and ensuring availability at local trader | 198 | 82.50 | I |
| 12 | Loan procedure should made easy | 155 | 64.58 | XIII |
| 13 | Reduce the middle men’s interfere in marketing | 174 | 72.50 | V |

As per the table above, among the various suggestions, providing quality seeds and other inputs and ensuring their availability at local traders was the most important suggestion expressed by orchard growers, ranked 1st. Inputs should be made available at subsidized rates was ranked 2nd, followed by Unawareness about remunerative prices or Minimum Support Prices (MSP) regulated by the government as 3rd. Frequent contact by village-level workers ranked 4th, and Reducing middlemen's interference in marketing was ranked 5th. Subsidies and schemes from the government should be started was ranked 6th, while providing credit at a low rate of interest in rural areas ranked 7th. Reducing labour problems by providing mechanized agricultural implements/equipment was ranked 8th, and Training farmers on new farm technology and plant protection measures at the village level was ranked 9th. Provision for suitable market infrastructure, such as transportation and storage was ranked 10th, followed by Technical knowledge about plant protection measures and nutrient management at 11th. Finally, Providing timely weather forecasts and market information was ranked 12th, and Loan procedures should be made easier was ranked last at 13th.

**Significance of the Study**

This manuscript provides important information by highlighting the constraints faced by orchard producers. Adopting secondary cultivation practices can have several benefits throughout the production cycle. The suggestions listed in this manuscript help warn producers of certain risks.

1. The article’s significance to the scientific community, particularly in areas such as horticultural science, agricultural technology, extension education, integrated pest management, and irrigation systems.
2. A coherent line of reasoning that aligns effectively with the perspectives of decision makers.

**Conclusion**

The findings of this study indicate that orchard growers face several constraints in adopting subsidiary crop cultivation practices, with marketing, storage, and post-harvest management being the most critical issues. Key constraints include the fluctuating market prices, a lack of knowledge about remunerative prices, and the unavailability of quality seeds and fertilizers at the village level. To overcome these constraints and improve the adoption of technology, orchard growers provided several suggestions.  
A coherent line of reasoning that aligns effectively with the perspectives of decision makers.  
Practical approaches that contribute to mitigating the adverse effects of climate change, thereby supporting the sustainable development of orchard-based farming systems.

**RECOMMENDATIONS**

The most prioritized recommendation was ensuring the availability of quality seeds and other inputs through local traders, followed by providing subsidized inputs and addressing the lack of awareness about the Minimum Support Prices (MSP).

Implementing these recommendations would not only promote the adoption of new technologies but also help mitigate the adverse effects of climate change, ultimately contributing to the sustainable development of orchard farming. The insights gathered from orchard growers in this study provide valuable guidance for policymakers, extension services, and agricultural institutions to develop targeted interventions that can improve productivity and livelihoods in the region.

Disclaimer (Artificial intelligence)

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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1.

2.

3.

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