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A brief assessment of kiwifruit cultivation status in Nepal

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Abstract. Kiwifruit farming has emerged as a promising high-value horticultural enterprise in Nepal over the past two decades. Initially introduced in the mid-hill regions in the early 2000s, kiwifruit cultivation has steadily expanded due to favorable agro-climatic conditions, strong market demand, and specific government policies such as subsidies, technical assistance, and market facilitation. This assessment examines the current status, economic viability, technological adoption, and social impacts of kiwifruit farming in Nepal. It highlights that districts like Kavrepalanchok, Dolakha, Makwanpur, and Solukhumbu have become key production hubs. Farmers have shifted from traditional cereals to kiwifruit, leading to increased incomes, reduced seasonal migration, and improved livelihoods. The report underscores the challenges facing the sector, including limited access to quality planting materials, inadequate technical knowledge among farmers, weak market linkages, and insufficient post-harvest infrastructure. However, the progress and potential of the sector are evident in the opportunities, such as rising domestic and export demand, favorable government policies, and organic production. These create a strong foundation for further growth. Notably, research and development efforts have been instrumental in this progress, focusing on varietal improvement, post-harvest management, farmer training, and the adoption of organic practices. Overall, kiwifruit farming in Nepal has significant potential to contribute to the transformation of rural economies, promote environmental sustainability, and support national fruit self-sufficiency. However, realizing this potential requires urgent and significant strategic investments in research, policy support, and market development. These investments are critically important for guaranteeing the long-term sustainability of the sector.

Keywords: *Kiwifruit, organic farming, cultivars, post-harvest, and Nepal*

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1. Introduction

Nepal, a landlocked country in the Himalayas, possesses diverse agro-ecological zones ranging from tropical to alpine climates, providing ample opportunities for horticultural crop diversification (MoALD, 2022). In recent decades, kiwifruit (Actinidia spp.) has emerged as a promising high-value fruit crop in Nepal due to its nutritional richness, market demand, and potential for import substitution (Shrestha et al., 2020a). The future of kiwifruit farming in Nepal is bright and promising. The introduction of kiwifruit cultivation in Nepal dates back to the late 1990s and early 2000s, initially through pilot projects and small-scale farmer trials in mid-hill districts such as Kavrepalanchok, Dolakha, and Makwanpur (Rai & Rai, 2024a, 2024b; Gairhe et al., 2020). Owing to favorable climatic conditions-especially in altitudes ranging from 1,200 to 2,500 meters above sea level—kiwifruit cultivation gradually expanded to other districts like Solukhumbu, Bhojpur, and Ramechhap (Pandey & Shrestha, 2018).

Kiwifruit, with its high vitamin C content, dietary fiber, antioxidants, and minerals, is a valuable addition to the global trend towards healthy diets (FAO, 2021). In Nepal, the heavy reliance on kiwifruit imports, primarily from China and New Zealand, contributes to a trade deficit in fresh fruit commodities (MoALD, 2022). This situation has sparked interest in local production to enhance self-sufficiency, improve farmers' income, and reduce imports. The shift to kiwifruit farming is not just a trend but a strategic move that aligns with the government's agricultural commercialization and diversification policy, which aims to transform subsistence agriculture into a market-oriented system (ADS, 2015). Farmers transitioning to kiwifruit cultivation have reported

increased profitability compared to traditional crops, such as maize and millet, particularly in hilly regions where traditional cereals are less productive (Paudel et al., 2021).

Despite its potential, kiwifruit farming in Nepal faces multiple challenges. These include limited access to quality planting materials, inadequate technical knowledge among growers, weak market linkages, insufficient post-harvest infrastructure, and inefficient plant protection measures (Rai & Rai, 2024c; Shrestha et al., 2020b; Paudel & Gairhe, 2019). For instance, the lack of high-quality planting materials hampers the establishment of healthy orchards, while the absence of post-harvest infrastructure leads to significant losses during storage and transportation. Moreover, issues such as climate variability, pest and disease incidence, and inadequate institutional support further constrain its development.

This assessment aims to comprehensively analyze the current status of kiwifruit farming in Nepal by examining production trends, varietal adoption, economic viability, technological gaps, and policy environment. It also identifies opportunities for future expansion and potential threats, such as climate change and emerging pests and diseases, that need to be addressed to scale up kiwifruit production sustainably. The study's findings are expected to support policymakers, researchers, extension agents, and farmers in developing informed strategies for the growth of the kiwifruit sector in Nepal.

2. Rationale of the study

Kiwifruit farming has rapidly emerged as a promising high-value horticultural enterprise in Nepal over the past two decades. Initially introduced in the mid-hill regions as a niche crop, kiwifruit cultivation is now expanding to several districts, driven by favorable agro-climatic conditions and rising domestic demand. This sector not only offers a high-value crop but also provides potential for income diversification and rural development. However, systematic research, production efficiency, market potential, and socioeconomic impacts in this emerging sector remain underexplored.

Despite its potential, kiwifruit farming in Nepal faces numerous challenges, including limited technical know-how among farmers, lack of quality planting materials, inadequate post-harvest infrastructure, weak market linkages, and policy gaps. Furthermore, precise data on production volumes, regional suitability, value chains, and profitability are scarce, which hinders evidence-based decision-making and targeted support from governments and development organizations. Conducting a comprehensive assessment of kiwifruit farming is crucial for several reasons:

2.1. Understanding current production status and trends

An assessment helps document the historical growth, present scale, and geographical distribution of kiwifruit cultivation. This knowledge is vital to identify production hotspots, emerging areas, and potential zones for future expansion.

2.2. Identifying opportunities and constraints

A systematic evaluation can reveal key opportunities for scaling up, such as high export potential, niche organic markets, and income diversification for rural farmers. At the same time, it can uncover constraints related to pests and diseases, post-harvest losses, limited access to finance, and market volatility.

2.3. Informing policy and program design

Reliable data and insights gained from an assessment provide evidence for designing supportive policies, subsidies, extension programs, and research priorities. This is essential for creating a conducive environment that fosters growth in the kiwifruit sector and ensures that the benefits of this growth are distributed fairly among all stakeholders, particularly smallholder farmers.

2.4. Enhancing value chain efficiency

Mapping the value chain-from production and input supply to marketing and export-can help identify inefficiencies and suggest targeted interventions to improve quality, reduce costs, and increase farmer incomes.

2.5. Promoting environmental and social sustainability

As kiwifruit farming expands, it is crucial to evaluate its ecological and social implications, including water use, soil health, biodiversity, labor dynamics, and gender roles. This supports the design of farming systems that are environmentally sustainable and socially inclusive.

2.6. Supporting future research and development

An assessment provides a foundation for future scientific studies on cultivar improvement, pest and disease management, post-harvest technology, and market development.

In conclusion, a comprehensive assessment of kiwifruit farming in Nepal is a critical step toward maximizing the crop's economic, social, and environmental benefits while minimizing risks. It will empower stakeholders—including farmers, cooperatives, policymakers, private sector actors, and development agencies-to make informed decisions and strengthen Nepal's position as a potential kiwifruit-producing nation.

3. Methodology

A cross-sectional and exploratory study design was adopted to capture the current status, trends, and challenges of kiwifruit farming across major production areas. The study aimed to understand production practices, economic viability, environmental impacts, and socio-economic contributions. The assessment focused on key kiwifruit-growing regions in Nepal, selected based on production volume, area coverage, and the representativeness of different agro-ecological zones. The central districts included in our study are Kavrepalanchok, Dolakha, Solukhumbu, Makwanpur, Ramechhap, and Ilam. These areas were chosen because they are recognized as primary hubs for commercial kiwifruit cultivation (Shrestha et al., 2021; MoALD, 2022). Then conducted a comprehensive review of statistical data from the Ministry of Agriculture, publications from the Nepal Agricultural Research Council (NARC), and district-level agricultural records. Additionally, thoroughly examined previous studies (Paudel & Regmi, 2020; Ghimire et al., 2022) and policy documents to ensure a comprehensive understanding of the subject.

4. An assessment of kiwifruit farming in Nepal

4.1 Historical growth of kiwifruit farming and prospects for future growth in terms of volume and value of production

4.1.1. Historical growth of kiwifruit farming in Nepal

Kiwifruit farming in Nepal, a relatively recent agricultural venture that gained momentum in the early 2000s, brought a new dimension to the historically traditional horticulture sector. The unique characteristics of kiwifruit, such as its high market demand and nutritional value, sparked interest and opened new opportunities in a landscape dominated by apples, oranges, and mandarins.

***(a) Initial introduction and experimentation (2000-2010)*:** The introduction of kiwifruit in Nepal started around 2000, primarily in research stations and experimental orchards, notably in mid-hill districts such as Kavre, Makwanpur, Dolakha, and Ramechhap. The initial planting focused on small-scale pilot projects by government agricultural research centers and some progressive farmers. Early challenges included a lack of awareness, limited access to quality planting material, and inadequate technical knowledge about orchard management (Shrestha et al., 2013).

(b) Expansion phase (2010-2018): During this period, kiwifruit farming expanded steadily due to growing market demand domestically and from neighboring countries, especially India and China. Crucially, government subsidies on planting materials and extension services played a significant role in supporting this expansion. Farmers began to recognize kiwifruit as a profitable alternative crop due to its higher returns compared to traditional cereals and lower land requirement. The total area under kiwifruit cultivation grew from a few hectares to around 200 hectares by 2018 (MoALD, 2019).

(c) Recent growth (2018-present): The past five years have witnessed a surge in kiwifruit farming in Nepal, with more commercial orchards being established. This recent growth can be attributed to improved access to high-quality planting material through nurseries, enhanced orchard management practices, and increased training programs for farmers. The current estimates indicate that the kiwifruit cultivation area has expanded to approximately 500 hectares, with production volumes of around 1,500 metric tons per year. This growth has been further fueled by emerging local market demand, increasing consumer awareness, and initial export attempts.

4.1.2. Prospects for future growth in terms of volume and value of production

(a) Volume growth prospects: The future outlook for kiwifruit production volume in Nepal is promising, driven by increasing farmer interest, favorable agro-climatic conditions, and government initiatives promoting horticulture diversification. The cultivation area is expected to expand to 1,000 hectares by 2030, thanks to improved orchard management and the adoption of high-yielding varieties. With the adoption of improved agronomic practices and disease management, the average

yield is expected to increase from the current 5–7 MT/ha to 15–20 MT/ha, thereby closing the gap with international productivity levels.

(b) Value growth prospects: The value of kiwifruit production is projected to increase substantially, driven by both volume growth and price appreciation resulting from improvements in quality. Currently, the farm gate price for kiwifruit in Nepal ranges from NPR 150 to NPR 250 per kilogram, depending on quality and seasons. With growing demand from urban centers and export markets, prices are expected to stabilize or increase. By 2030, the total production value could reach NPR 500 million annually or more, significantly contributing to rural incomes and the national horticulture GDP.

(c) Market development and export potential: Nepal's kiwifruit has potential for niche markets, including organic and high-altitude specialty fruit segments. With efforts to improve post-harvest handling, cold storage facilities, and certification processes, Nepal's kiwifruit could become a sought-after product in India, China, and potentially Southeast Asian markets. The prospect of substantial export revenue could provide exciting incentives for farmers and investors.

(d) Challenges to address for growth realization: To fully realize volume and value growth, challenges such as poor access to quality planting materials, insufficient technical support, limited cold chain infrastructure, and fragmented market linkages need to be addressed. Strengthening farmer cooperatives, establishing quality standards, and policy support will be essential.

Table 1. Historical growth and future projection of kiwifruit farming in Nepal

Parameter	2000-2010	2010-2018	2018-Present	Projection 2030
Area under cultivation	<10 ha	~200 ha	~500 ha	~1,000 ha
Annual production volume	<100 MT	~500 MT	~1,500 MT	~15,000 MT
Average yield (MT/ha)	3-4	4-6	5-7	15-20
Farm gate price (NPR/kg)	100-150	120-180	150-250	200-300
Production value (NPR)	<5 million	~60 million	~300 million	~500+ million

4.2. Evolution of the variety of Kiwifruit in Nepal

The cultivation of kiwifruit (*Actinidia deliciosa* and *Actinidia chinensis*) in Nepal is a relatively recent development. However, it has shown remarkable growth due to favorable agro-climatic conditions, increasing farmer interest, and government support. The evolution of kiwifruit varieties in Nepal reflects a journey from introduction to diversification, adaptation, and gradual development of region-specific cultivars to meet market demands and environmental challenges.

4.2.1. Early introduction and initial varieties

The introduction of kiwifruit in Nepal began in the late 1990s to early 2000s, mainly through agricultural research centers and horticultural development projects initiated by the government and NGOs. Initially, the most commonly planted variety was the Hayward variety of green kiwifruit (*Actinidia deliciosa*), the globally dominant commercial cultivar known for its large, fuzzy, and green-skinned fruits with a sweet-tart flavor. This variety was favored due to:

(a) It has proven to be a commercial success worldwide.

(b) Planting materials are readily available through imports from countries such as India, China, and New Zealand.

(c) The variety exhibits adaptability to the mid-hill climates of Nepal, which range from 1,000 to 2,000 meters above sea level.

Farmers primarily grew this variety in districts such as Makwanpur, Kavre, and Dolakha, where the temperate climate was favorable for kiwifruit growth.

4.2.2. Diversification of varieties

As kiwifruit farming expanded and farmers gained experience, there was a growing demand for varieties with distinct qualities to capture niche markets and improve profitability. This led to the introduction and experimentation with different varieties, including

Green kiwifruit varieties: In addition to Hayward, other green varieties, such as Monty and Bruno, were tested, offering variations in fruit size, yield, and disease resistance.

Golden kiwifruit (Actinidia chinensis): The golden kiwifruit varieties, known for their smooth skin, yellow flesh, and sweeter taste, such as Hort16A and Jintao, were introduced around the 2010s. These varieties showed promise in terms of market value and consumer preference, although they required more careful management in terms of pest and disease control.

Farmers began planting mixed orchards, combining green and golden varieties to diversify production and reduce market risks. This practice spreads the risk of market fluctuations and allows farmers to cater to different consumer preferences, thereby potentially increasing their market share and profitability.

4.2.3. Adaptation and local selection

Given the diverse agro-ecological zones in Nepal, kiwifruit varieties underwent natural and farmer-guided selection for adaptability to local conditions, including variations in temperature, rainfall, and soil types. This process led to:

(a) This process resulted in the identification of clones and selections that demonstrated enhanced resistance to cold and disease pressures.

(b) Research institutions, such as the Nepal Agricultural Research Council (NARC) and regional horticultural offices, played a key role in evaluating and recommending suitable varieties for different regions.

(c) Locally preferred varieties emerged, balancing yield, taste, and resistance traits.

Research institutions, such as the Nepal Agricultural Research Council (NARC) and regional horticultural offices, played a key role in evaluating and recommending suitable varieties for different regions. They conducted extensive field trials, monitored the performance of different varieties in various agro-climatic conditions, and provided valuable data and recommendations to farmers and policymakers.

4.2.4. Recent trends and breeding efforts

Recently, the kiwifruit sector in Nepal has witnessed growing interest in breeding and propagation to improve existing varieties and introduce new cultivars. Key developments include:

***(a) Micropropagation and tissue culture*:** To ensure disease-free and true-to-type planting materials, tissue culture techniques have been increasingly employed, allowing mass propagation of superior varieties.

(b) Hybridization and breeding trials: Experimental breeding programs have begun focusing on creating hybrids with better disease resistance, yield, and fruit quality tailored to Nepal's environment.

(c) Introduction of red-fleshed varieties: There is interest in introducing red-fleshed kiwifruit varieties, which possess high antioxidant properties and are in line with the growing global demand, although they are still at an experimental stage.

4.2.5. Challenges and future prospects

Despite the progress in variety evolution, several challenges remain:

(a) The limited availability of certified and high-quality planting material restricts rapid expansion.

(b) Pest and disease management issues, especially with golden varieties, require ongoing varietal improvement.

(c) Comprehensive breeding programs that are tailored to Nepal's specific climatic conditions are lacking.

However, the future looks promising due to increasing farmer adoption, government support, and international collaboration. Continuous efforts in variety improvement, propagation technology, and value addition are expected to enhance kiwifruit diversity and production in Nepal, thereby contributing to rural livelihoods and increasing export potential.

4.3. Research & development (R&D) related to kiwifruit

4.3.1. Varietal research and selection:

The Horticulture Research Division at Khumaltar, Lalitpur, has played a crucial role in introducing and recommending suitable kiwi varieties for Nepal's diverse agro-climatic zones. Research by Krishna P. Paudyal and colleagues characterized

cultivars such as Hayward, Bruno, Monty, Abbott, and Allison, as well as the red-fleshed variety Soyou, which showed exceptional promise in mid-hill regions. These findings enable farmers to select varieties based on fruit quality and harvest periods, thereby optimizing production and profitability (Paudyal, 2013; Horticulture Research Division, 2022; ICIMOD, 2022).

4.3.2. Post-harvest management:

A study in the Dolakha district has demonstrated the practical benefits of using ethephon, a plant growth regulator, on the Monty kiwi variety. This research has shown that ethephon can improve post-harvest shelf life and market readiness, providing helpful advice regarding harvest timing and storage methods to minimize losses and meet consumer preferences (Adhikari et al., 2021).

4.3.3. Farmer training and extension services:

The Agriculture and Forestry University (AFU) and District Agriculture Knowledge Centers have been instrumental in supporting farmer capacity-building programs across various districts, including Doti. Under the 'winter fruit farming expansion' program, farmers receive comprehensive training on pruning, pest control, and post-harvest techniques. This initiative, as reported by Rising Nepal (2021) and Nepal Ekhabar (2022a), has significantly contributed to improved adoption and productivity, garnering support and engagement from all stakeholders.

4.3.4. Government support and subsidies:

Government support, such as Belkotgadhi Municipality's subsidy program, has played a crucial role in motivating farmers to adopt kiwi cultivation. This program, which covers 75% of sapling costs, has been particularly effective in climate-suitable areas, demonstrating the significant impact of policy on the agricultural sector (Nepal Ekhabar, 2022b).

4.3.5. Challenges and areas for further research:

A case study in Solukhumbu revealed challenges, including a lack of farmer training, inadequate soil testing, limited quality planting material, poor transportation, and the absence of cold storage facilities, which limit commercialization. To overcome these barriers for sustainable growth, we need further targeted R&D (Shrestha & Rai, 2023).

R&D in kiwifruit farming in Nepal has made significant strides in varietal development, post-harvest management, farmer education, and government support. Continued efforts to address existing challenges and expand research into areas such as pest management, climate resilience, and market development will be crucial for the long-term success and sustainability of kiwi farming in Nepal (Nepal et al., 2025).

4.4. Organic kiwifruit farming in Nepal

Organic kiwifarming in Nepal has been gaining attention as farmers seek sustainable agricultural practices that improve soil health, enhance fruit quality, and reduce environmental impacts. Nepal's unique agro-climatic zones, especially in hilly and mountainous regions such as Makwanpur, Kavrepalanchok, and Dolakha, provide favorable conditions for kiwifruit cultivation under organic standards.

4.4.1. Current status and practices:

Organic kiwifruit farming in Nepal is still in its early stages but shows promising growth due to rising domestic and international demand for chemical-free fruits. Farmers primarily follow traditional organic practices, including the use of compost, farmyard manure (FYM), and biofertilizers to maintain soil fertility. The use of synthetic fertilizers and pesticides is avoided, aligning with global organic certification standards.

In regions like Makwanpur and Panchkhal (Kavre), farmer cooperatives and NGOs have played a crucial role in promoting organic kiwifarming by providing training on organic pest management, soil health improvement, and certification processes (Shrestha et al., 2020c).

4.4.2. Benefits of organic kiwifruit farming:

Environmental sustainability: Organic farming helps maintain soil biodiversity, reduces chemical runoff, and promotes ecological balance (Thapa et al., 2019).

Improved fruit quality: Organic kiwifruits often have better taste, higher nutrient density, and longer shelf life due to the absence of synthetic chemicals (Gurung & Lama, 2021).

Economic prospects: Although initial yields may be lower than those of conventional farming, organic kiwifruits fetch premium prices in niche markets, thereby benefiting farmers economically. The higher prices compensate for the lower yields, making organic kiwifarming a financially viable option for farmers. This economic advantage is a key driver for the growth of organic kiwifarming in Nepal (Bhattarai et al., 2022).

4.4.3. Challenges faced:

Lack of technical knowledge: Many farmers lack sufficient training on organic certification and management practices (KC & Manandhar, 2018).

Pest and disease management: Controlling pests organically, such as bacterial canker and fruit fly infestations, remains challenging without chemical inputs (Pandey et al., 2021a).

Certification barriers: Obtaining organic certification is costly and complicated, limiting market access for many smallholder farmers (Shrestha et al., 2020c).

4.4.4. Government and NGO support:

The Nepalese government, through the Ministry of Agriculture and Livestock Development (MoALD), has initiated organic agriculture promotion programs, including kiwifruit, with an emphasis on capacity building and certification support (MoALD, 2021). NGOs like LI-BIRD (Local Initiatives for Biodiversity, Research and Development) play a significant role in this process. They assist farmers with organic farming techniques, provide training on pest management and soil health improvement, and facilitate market linkages, thereby contributing to the growth of organic kiwifarming.

4.4.5. Future prospects:

Growing consumer awareness and demand for organic produce are driving the expansion of organic kiwifarming in Nepal. The future of organic kiwifarming is promising, with opportunities for growth and innovation. Integrating modern organic farming technologies such as biopesticides, organic mulching, and drip irrigation could further enhance productivity and sustainability. These advancements, coupled with the growing market for organic produce, make the future of organic kiwifarming in Nepal exciting and full of potential (Sharma & Koirala, 2023).

4.5. Opportunities and threats for expansion of kiwifruit farming

4.5.1. Opportunities:

Favorable agro-climatic conditions: Nepal's mid-hill regions, particularly districts like Kavre, Makwanpur, and Dolakha, offer an ideal climate for kiwifruit cultivation. The temperate climate, characterized by moderate rainfall and well-drained soils, supports vigorous kiwifruit growth and fruit quality (Shrestha et al., 2020b). Elevations between 800 and 1500 meters provide suitable chilling hours essential for flowering and fruit set (Tiwari et al., 2019).

Increasing domestic and export market demand: Growing health awareness among Nepalese consumers has led to an increased demand for nutrient-rich fruits, such as kiwifruit, which is rich in vitamin C and antioxidants (Ghimire & Thapa, 2018). Additionally, Nepal's proximity to large markets, such as India and China, creates export potential, especially under organic certification, which fetches premium prices (Koirala et al., 2021).

Government support and policy initiatives: The Government of Nepal, through the Ministry of Agriculture and Livestock Development, has promoted kiwifruit as a high-value crop in its horticulture development programs (MoALD, 2020). Subsidies on planting materials, technical training, and support for cooperative groups have enhanced adoption among farmers (Adhikari et al., 2022).

Diversification and income generation: Kiwifruit farming offers an alternative livelihood to traditional crops like maize and millet, which often yield low returns (Rai et al., 2019). Kiwifruit's higher market price and potential for value-added products (such as juice, jam, and dried fruit) can enhance rural incomes and reduce poverty (Dhakal & Bhandari, 2021).

Development of value chain and agro-processing: Improved post-harvest handling, cold storage facilities, and processing units for kiwifruit products can reduce losses and increase farmer profitability (Sharma et al., 2020a). Private sector involvement and cooperative marketing can strengthen value chains.

Availability of improved cultivars and propagation techniques: Recent advancements in micropropagation and tissue culture of kiwifruit have facilitated the availability of quality planting materials, reducing reliance on wild plants and improving yield potential (Pandey et al., 2021b).

4.5.2. Threats:

Pest and disease risks: Kiwifruit cultivation is vulnerable to diseases such as bacterial canker (Pseudomonas syringae) and powdery mildew, as well as pests like leaf rollers and scale insects (Gautam et al., 2019). A lack of integrated pest management knowledge among farmers can result in outbreaks that severely reduce yields.

Climate change and weather extremes: Erratic rainfall, droughts, and unseasonal frost due to climate change threaten kiwifruit orchards. Insufficient chilling hours or extreme weather events can impair flowering and fruit sets (Shrestha & Bhattarai, 2020).

Limited access to quality planting material and inputs: Despite progress, many farmers still rely on low-quality or uncertified planting stock, which reduces productivity and increases disease risk (Khadka et al., 2022). Moreover, the limited availability of fertilizers and plant protection chemicals in remote areas is a bottleneck.

Inadequate technical knowledge and extension services: Many smallholder farmers lack proper training in kiwifruit management practices, such as pruning, irrigation, fertilization, and pest control, which negatively impacts productivity (Adhikari & Pokharel, 2019). Extension services remain insufficient in some kiwifruit-growing districts.

Post-harvest losses and market access challenges: Poor infrastructure, including a lack of cold storage and transportation, leads to high post-harvest losses (estimated at 20-30%) (Sharma et al., 2020). Farmers face challenges in accessing distant markets and dealing with fluctuating prices due to a lack of contract farming or organized marketing.

Financial constraints and investment risks: Kiwifruit farming requires initial investment in land preparation, trellis construction, and inputs. Limited access to affordable credit and risk aversion among farmers hinder the large-scale adoption of this technology (Rai et al., 2019).

Table 2. Summary of the opportunities and threats of expansion of kiwifruit farming in Nepal

Opportunities	Threats
Favorable agro-climatic conditions in mid-hill regions	Vulnerability to pests and diseases
Growing domestic and export market demand	Climate change impacts and extreme weather
Government support through policies and subsidies	Limited access to quality planting materials and inputs
Potential for income diversification and poverty reduction	Insufficient farmer knowledge and extension services
Development of value chain and agro-processing sectors	Post-harvest losses and poor market access
Availability of improved cultivars via tissue culture	Financial constraints and investment risks

5. Conclusions

Kiwifruit farming in Nepal is a promising agricultural innovation with socio-economic and environmental benefits. It diversifies local agricultural systems, improves livelihoods, and reduces seasonal migration. Nepal's favorable agro-climatic conditions make it a favorable crop for commercial production. However, challenges include limited access to quality planting material, inadequate technical knowledge, poor market infrastructure, and fluctuating prices. Despite these, the rapid increase in kiwifruit plantation areas, rising domestic demand, and potential export opportunities indicate a strong foundation for future growth. Government support, subsidies, R&D initiatives, and farmer training programs have played a crucial role in this progress. Strengthening the value chain, encouraging cooperatives, improving access to finance, and developing cold storage and transportation infrastructure are essential steps forward. In conclusion, kiwifruit farming in Nepal holds significant promise for rural economic transformation, environmental sustainability, and national fruit self-sufficiency.

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