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R Raja

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Jagadish

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Suryaprakash

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Rishana

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Niranjan T

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Kiran Raj

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Theophilus Deena Dayal

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Corresponding Author:

R Raja

Department of Botany,
Government First Grade
College, Raichur, Karnataka,
India

Diversified Horticulture-Based Farming as a Livelihood Strategy: A Case Study of Suresh Gouda's 40-Acre Farm in Timmapur H, Raichur District, Karnataka

R Raja, Jagadish, Suryaprakash, Rishana, Niranjan T, Kiran Raj and Theophilus Deena Dayal

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Abstract

This case-study research paper examines the diversified farming model practised by Suresh Gouda, a progressive farmer from Timmapur H, Raichur District, Karnataka. Based on primary interview data, the study analyses how a 40-acre black-soil farm combines horticultural crops, commercial crops, pulses, and millets to generate a self-reported annual income of approximately ₹1 crore. The farm cultivates *Psidium guajava* L. (Guava), *Syzygium cumini* (L.) Skeels. (Jamun), *Capsicum annuum* L. (Chilli), *Gossypium hirsutum* L. (Cotton), *Cajanus cajan* (L.) Huth (Red Gram), *Sorghum bicolor* (L.) Moench (Jowar), and experimental dragon fruit. Findings show that crop diversification, drip irrigation, rainwater harvesting, permanent labour, market grading, and adaptive field management are central to the farm's productivity and risk management. However, the farm also faces challenges such as fruit diseases, climatic variability, price fluctuation, dependence on bank loans, and limited digital technology use. The study concludes that horticulture-led diversification can strengthen income stability in semi-arid regions when supported by irrigation, market access, extension services, and disease-management systems.

Keywords: Diversified farming, Horticulture, Guava, Jamun, Drip irrigation, Raichur, Semi-arid agriculture

1. Introduction

Agricultural diversification has emerged as an important strategy for improving farm income, reducing production risk, and strengthening the resilience of farmers, particularly in semi-arid regions. Crop diversification enables farmers to distribute economic and climatic risks across multiple crops instead of depending on a single crop or market season. Semi-arid regions are highly vulnerable to climate change because changing rainfall patterns, rising temperatures, and frequent extreme weather events directly affect agricultural productivity and rural livelihoods (Kumar *et al.*, 2025). In this context, diversified farming systems involving fruit crops, vegetables, pulses, cereals, and commercial crops have become increasingly relevant for sustainable farm development. In India, horticulture has become a major component of agricultural transformation due to its contribution to value addition, rural employment, nutritional security, and income diversification. Guava (*Psidium guajava* L.), one of India's most promising fruit crops, is highly valued for its nutritional benefits and financial returns (Sahu *et al.*, 2025) ^[16]. Previous studies have reported substantial variability among guava genotypes, with MPUAT S-1 and MPUAT S-2 identified as superior genotypes for yield and fruit quality (Shukla *et al.*, 2012) ^[22]. Similarly, crop-regulation studies in guava have shown that plant growth regulators such as NAA and GA can improve fruit weight and yield, while other treatments may influence fruit quality parameters (Yadav *et al.*, 2001) ^[25]. The use of fertilizers and bioinoculants has also been reported to enhance fruit growth, fruit weight, fruit volume, and yield in guava (Rai *et al.*, 2024) ^[15]. Jamun (*Syzygium cumini* L.) is another important underexploited indigenous fruit crop belonging to the family Myrtaceae.

It is valued for its nutritional, therapeutic, postharvest, and industrial importance, and its wide distribution reflects its adaptability to diverse climatic conditions (Sanjay *et al.*, 2019) ^[20]. Jamun fruits are rich in iron, minerals, sugars, protein, and carbohydrates, while the seeds contain bioactive compounds associated with hypoglycemic properties, making the crop important for both fresh consumption and value-added products (Sanjay *et al.*, 2009) ^[19]. In addition, dragon fruit (*Hylocereus undatus*), a climbing cactus native to Central America, has gained global recognition as both an ornamental and fruit crop due to its market acceptability and future production potential (Pushpakumara *et al.*, 2005) ^[13].

Vegetable and spice crops also play a significant role in diversified farming systems. Chilli (*Capsicum annuum* L.) is an important spice-cum-vegetable crop, and recent crop-improvement research emphasizes the assessment of genetic variability for developing high-yielding and quality varieties (Komala *et al.*, 2023) ^[9]. Growth-regulator studies in Byadagi chilli have shown that NAA application as a pre-flowering spray can significantly improve plant height, fruit set, number of fruits, fruit length, fruit thickness, and yield (Doddamani & Panchal, 1989) ^[5]. Such findings indicate the importance of improved crop-management practices in enhancing productivity under diversified farming conditions. Commercial and field crops such as cotton, sorghum, and redgram further strengthen the economic base of farmers in semi-arid regions. Bt cotton under drip irrigation has shown improved growth and yield attributes when topping at 100 days after sowing is combined with higher nitrogen levels (Chaudhari *et al.*, 2021) ^[4]. However, long-term studies have also raised concerns regarding the sustainability of Bt cotton, as recent evidence shows yield stagnation, no significant profit improvement, and increased sensitivity to pest pressure (Subramanian, 2023) ^[24]. Sorghum remains a vital dryland crop in India, used mainly as animal feed during the rainy season and for human consumption during the post-rainy season (Sanjana Reddy, 2017) ^[18]. In Karnataka, declining sorghum production has been linked mainly to reduction in cultivated area, while yield gaps may be addressed through improved input use, particularly balanced fertilizer application (Kumar *et al.*, 2016). Redgram (*Cajanus cajan* L.) is largely cultivated in northern Karnataka, especially in Kalaburgi district, which is known as the “pulse bowl” of the state. Redgram processing units in Kalaburgi and Vijayapura districts handle significant quantities of raw material annually, highlighting the crop’s economic importance in the region (Sajjan *et al.*, 2021) ^[17]. Improved cultivation practices such as the dibbling method have been reported to increase redgram yield and farm income, particularly among small and marginal farmers (Aditya *et al.*, 2018) ^[1]. Therefore, integrating horticultural crops, vegetables, pulses, cereals, and commercial crops within a diversified farming system can enhance farm income, improve resource-use efficiency, and reduce production risks in semi-arid agricultural regions.

Overall, the literature indicates that diversified farming is not merely a crop-selection strategy but a broader approach to sustainable agricultural development. The integration of fruit crops such as guava, jamun, and dragon fruit with chilli, cotton, sorghum, and redgram can improve income stability, nutritional security, and resilience against climatic

and market uncertainties. Hence, the present study focuses on diversified crop cultivation as a practical model for improving farm productivity, profitability, and sustainability in semi-arid farming conditions.

Against this background, the present study documents and analyses the farming model of Suresh Gouda, a farmer cultivating 40 acres in Timmapur H, Raichur District. The case is significant because it combines fruit crops, commercial crops, pulses, and millets with rainwater harvesting, drip irrigation, permanent labour management, and market-oriented production. The study does not treat the farm as a statistically representative sample; rather, it presents it as an explanatory case of diversified, horticulture-oriented farming in a semi-arid agrarian setting.

2. Objectives of the Study

The study has the following objectives:

- To document the crop-diversification strategy followed by Suresh Gouda on his 40-acre farm.
- To analyse the role of horticulture crops in farm income and production stability.
- To examine farm-management practices related to irrigation, soil conservation, labour, pest management, and marketing.
- To identify the major risks faced by the farmer, including climate, disease, market, and financial risks.
- To assess the future potential of horticulture-led diversified farming in semi-arid regions such as Raichur.

3. Methodology

This study uses a qualitative case-study design based on primary interview data collected from farmer Suresh Gouda. A structured interview schedule was used to collect information on farm size, crop pattern, farming experience, irrigation, market linkages, labour, financial management, challenges, technology use, sustainability practices, and future plans.

The study is descriptive and interpretive in nature. The farmer’s responses were organised into thematic categories, including crop diversification, farm management, market linkage, financial management, risk management, social impact, sustainability, and technology use.

Scope and Limitation of Data

The farmer reported an annual income of approximately ₹1 crore. However, crop-wise income and crop-wise land allocation were not provided. Therefore, this paper does **not** create artificial crop-wise income estimates. All income-related analysis is presented as self-reported aggregate annual farm income.

4. Study Area and Farm Profile

Suresh Gouda’s farm is located in Timmapur H, Raichur District, Karnataka. The farm covers 40 acres and is situated in a semi-arid agricultural region where water management is critical. The soil type reported by the farmer is black soil, which is generally suitable for crops such as cotton, chilli, pulses, millets, and some horticultural crops when supported by appropriate irrigation and nutrient management.

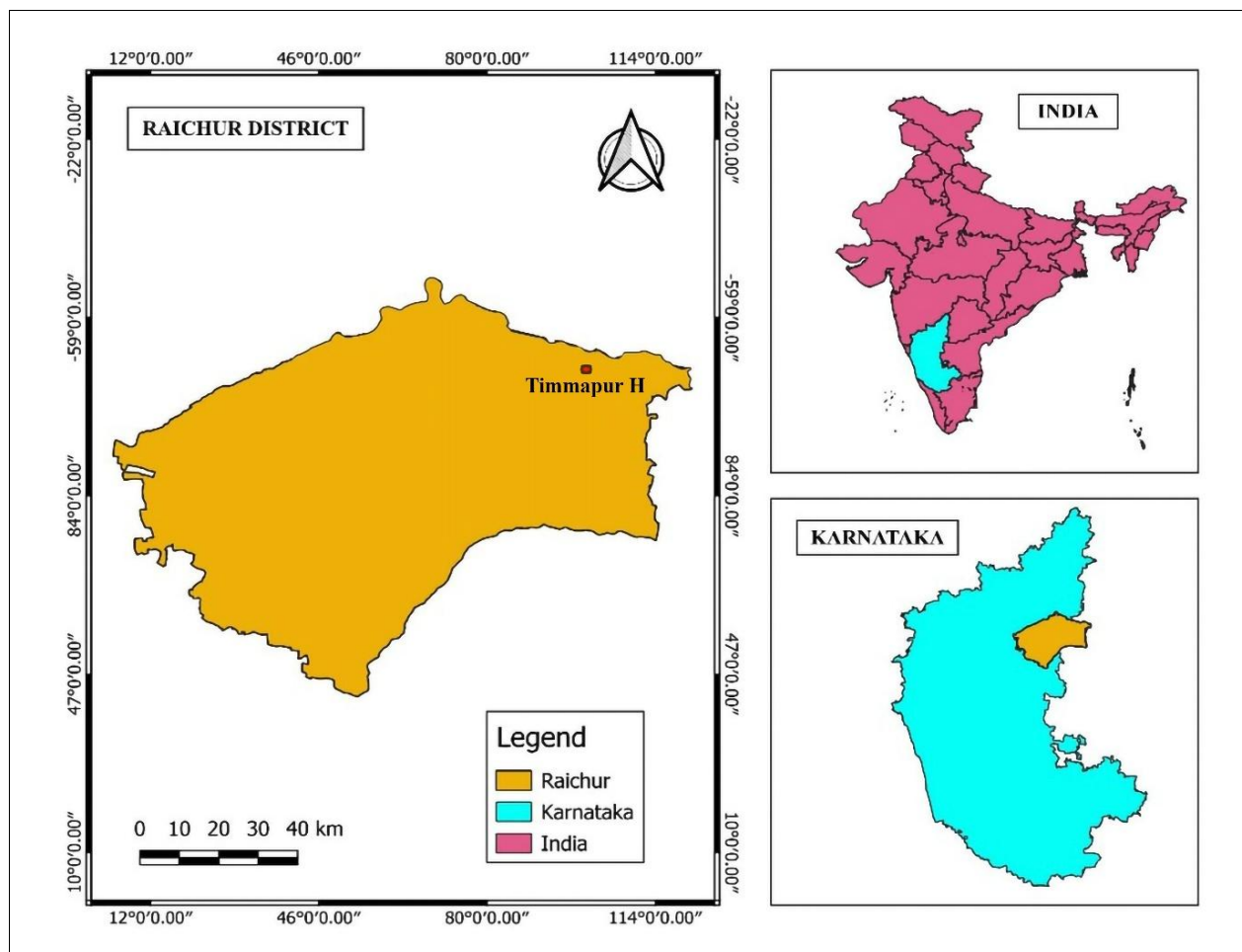


Fig 1: Study Area Timmapur H, Raichur District

Table 1: Basic Farm Profile

Parameter	Details
Farmer name	Suresh Gouda
Location	Timmapur H, Raichur District, Karnataka
Total cultivated land	40 acres
Soil type	Black soil
Major farming system	Diversified farming / integrated farming
Reported annual income	Approximately ₹1 crore
Irrigation method	Drip irrigation/trickle irrigation
Water source	Rainwater harvesting pond and Krishna River water during summer
Labour system	Permanent workers on a monthly salary
Market channel	75% local market, 25% direct consumers
Future plan	Convert all 40 acres gradually toward horticulture crops

5. Crop Diversification Pattern

The farmer cultivates both horticultural and field crops. Horticulture crops include guava and jamun, while dragon

fruit is under trial in 2026. Commercial crops include chilli and cotton. Food and field crops include red gram and jowar.

Table 2: Crop Portfolio of the Farm

Crop	Scientific Name	Crop Category	Reported Role in Farm System
Guava	<i>Psidium guajava</i> L.	Fruit/horticulture	High-profit fruit crop; harvested twice a year
Jamun	<i>Syzygium cumini</i> (L.) Skeels.	Fruit/horticulture	Long-term horticulture crop
Chilli	<i>Capsicum annuum</i> L.	Commercial crop	Cash crop with market value
Cotton	<i>Gossypium hirsutum</i> L.	Commercial crop	Traditional commercial crop
Red gram	<i>Cajanus cajan</i> (L.) Huth	Pulse crop	Annual field crop
Jowar	<i>Sorghum bicolor</i> (L.) Moench	Millet/cereal crop	Food and dryland crops
Dragon fruit	<i>Selenicereus</i> spp.	Fruit/horticulture	Trial crop introduced in 2026

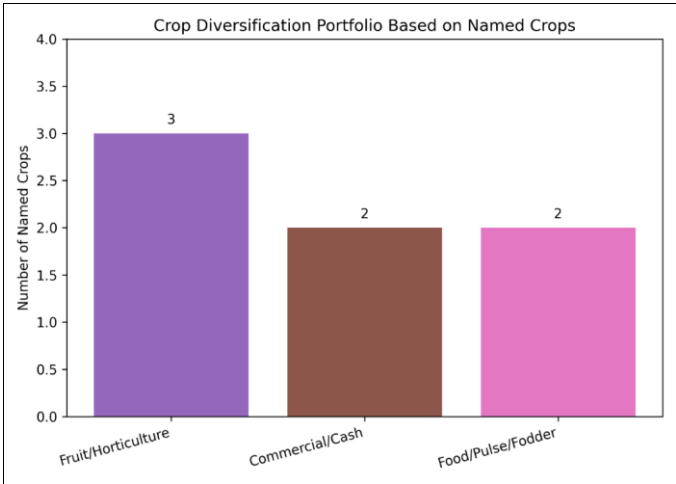


Fig. 2: Crop diversification portfolio

The farmer has cultivated horticulture crops for the past 5 years, while other crops have been cultivated for approximately 28 years. This indicates a gradual transition from conventional field crops toward high-value horticulture.

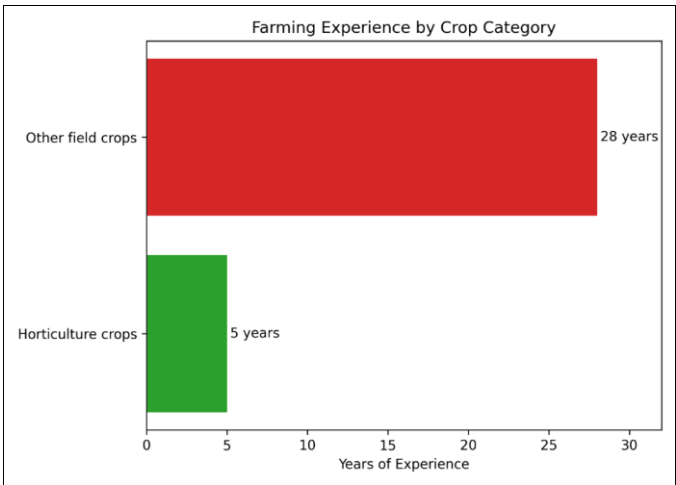


Fig 3: Farming experience by crop category

6. Results and Discussion

6.1 Diversification as an Integrated Farming Strategy

The farmer describes his approach as “integrated farming” or “holistic farming.” In practice, this means that he does not depend on a single crop. Instead, he combines horticulture crops, commercial crops, pulses, and millets. This system improves income security because different crops mature at different times and respond differently to climate, disease, and market conditions.

The most important shift is toward horticulture. Guava and jamun are treated as profitable crops, and dragon fruit is being tested as a future crop. Guava is especially important because it is harvested twice a year, unlike most annual field crops. The application of 100% recommended dose of fertilizer (RDF) combined with Biofertilisol significantly enhanced fruit growth and yield in guava, with the highest

number of fruits, fruit size, and weight observed in this treatment (Rai *et al.*, 2024) ^[15].

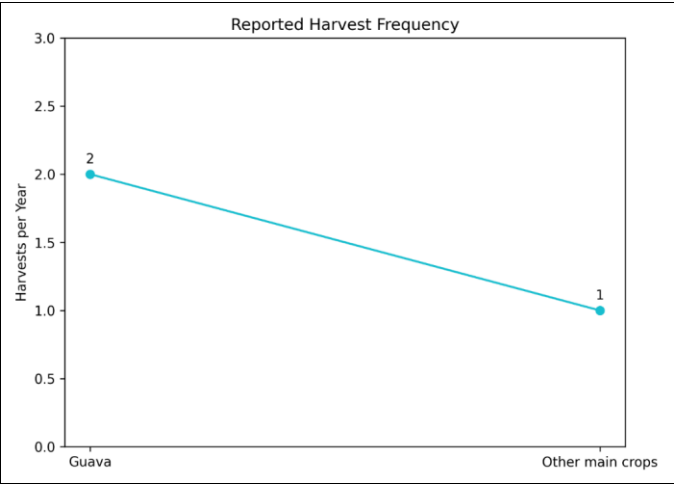


Fig 4: Reported harvest frequency

Table 3: Advantages and Limitations of the Diversified Model

Aspect	Advantages	Limitations / Risks
Horticulture crops	Higher profit potential; repeated harvest from the guava	Disease risk, especially pink disease in guava
Commercial crops	Chilli and cotton provide cash income	Price fluctuation and pest/disease risk
Pulses and millets	Support crop diversity and food security	Annual returns may be lower than those of fruit crops
Water management	Drip irrigation improves water-use efficiency	Requires investment and maintenance
Market access	Combination of local and direct sales	Prices fall during a market glut
Labour	Permanent labour improves continuity	A monthly salary creates a fixed cost

6.2 Water Management and Irrigation

Water is one of the strongest features of this farm model. The farmer uses drip irrigation and has also created a rainwater harvesting pond. During the summer, water is also accessed through the Krishna River. The reported water pH is 7, which is neutral and generally favourable for irrigation. Drip irrigation is particularly suitable for horticulture crops because it supplies water directly to the root zone, reduces wastage, and supports efficient nutrient application. In a semi-arid region such as Raichur, this becomes a critical climate-resilience strategy.

Table 4: Water-Management Practices

Practice	Purpose
Drip irrigation/trickle irrigation	Efficient water delivery to crops
Rainwater harvesting pond	Storage of rainwater for later use
Krishna River water in summer	Supplemental water source
Raised beds during heavy rainfall	Drainage and protection from waterlogging
Field bunds and check dams	Soil and water conservation

6.3 Soil and Field Management

The farmer uses ridge construction, bund construction, field borders, and check dams. These practices help conserve soil, reduce runoff, and manage excess rainfall. In heavy rainfall situations, the farmer raises the agricultural field bed to remove excess water and protect the crops.

These practices are important because semi-arid regions face both drought and sudden heavy rainfall. Therefore, the farm requires a dual strategy: water conservation during dry periods and drainage management during heavy rainfall.

6.4 Nutrient and Pest Management

The farmer uses both organic and inorganic inputs depending on crop requirements. He reported the use of NPK, micronutrients, and biofertilizers. Pest and disease management is mainly chemical-based, although organic inputs are also used.

The major disease problem reported is pink disease in guava, which reduces fruit yield. Fruit diseases are identified as one of the most serious risks in the farm system. This indicates the need for stronger integrated pest and disease management, especially for horticulture crops.

Table 5: Input and Disease-Management Practices

Component	Farmer's Practice
Fertilizers	NPK and micronutrients
Bio-inputs	Biofertilizers
Pest management	Chemical use based on crop needs
Organic practice	Used along with inorganic inputs
Major disease issue	Pink disease in guava
Major risk category	Fruit diseases

6.5 Labour Management

The farmer employs permanent workers on a monthly salary. This is important because horticulture requires continuous care, including irrigation, pruning, pest monitoring, harvesting, grading, and marketing preparation. Permanent labour reduces the risk of labour shortage during peak periods.

However, permanent labour also increases fixed monthly costs. The advantage is that it ensures continuous farm supervision, especially because fruit crops require regular field attention.

6.6 Farm Mechanisation and Technology Use

The farmer reported using equipment such as a tiller, hammer radiator mixing equipment, and other implements locally described as curling and brush curling. These tools support field preparation, soil work, mixing, and farm operations.

However, the use of digital technology is limited. The farmer does not currently use mobile apps, farm-management software, online platforms, drones, soil sensors, or automated irrigation systems. Market intelligence is mainly gathered through experience, friends, and field visits.

Table 6: Technology Use on the Farm

Technology Area	Current Status
Drip irrigation	Adopted
Farm machinery	Adopted
Mobile apps	Not used
Farm-management software	Not used
Online market platforms	Not used
Drones/sensors	Not clearly adopted
Farmer networks	Informal friend-based network

This shows that the farm is technically progressive in irrigation and mechanisation, but still traditional in digital agriculture and market intelligence.

6.7 Market Linkages

The farmer sells approximately 75% of the produce in the local market and 25% directly to consumers. He also sells in different states when better prices are available. There are no fixed long-term contracts or formal buyer agreements. The farmer's main marketing principle is to sell to buyers who offer the best price.

Table 7: Marketing Pattern

Marketing Channel	Share
Local market	75%
Direct consumers	25%
Formal contract farming	Not adopted
FPO/cooperative role	Not involved
Value addition	Not adopted
Quality practice	Grading

The farmer does not currently practice value addition, such as guava juice, jam, jamun products, or processed chilli products. This is a major future opportunity because value addition can reduce distress sales during periods of low market prices.

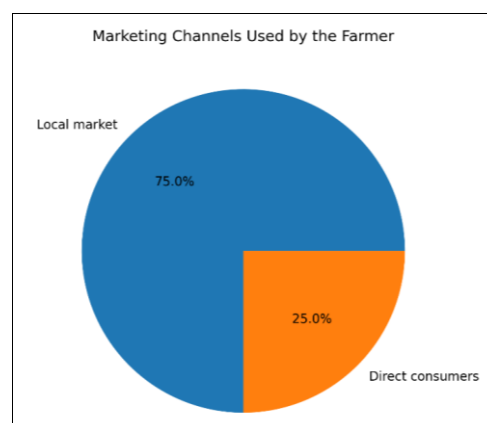


Fig 5: Marketing channels used by the farmer

6.8 Financial Management

The farmer depends on bank loans for investment and financial support. He also maintains written financial records. Profits are calculated year-wise. During financial difficulty, he again approaches the bank for loans.

The self-reported annual income is approximately ₹1 crore. However, crop-wise income was not provided. Therefore, the study treats this as a total farm-level income figure rather than crop-wise income.

Table 8: Financial Management Profile

Financial Aspect	Farmer's Response
Initial investment source	Bank loans
Government subsidy/support	Bank loans reported; schemes not specified
Record keeping	Yes, written records are maintained
Profit calculation	Year-wise
Financial challenge response	Additional bank loan when needed
Annual income	Approximately ₹1 crore, self-reported

6.9 Risk Management

The major risks reported by the farmer are climate and disease. Heavy rainfall is managed by raising field beds and

draining excess water. Hot summer conditions are managed through drip irrigation. Market risk is managed by selling to buyers who offer better prices.

Table 9: Risk-Management Matrix

Risk Type	Specific Problem	Farmer's Management Strategy
Climate risk	Hot summer	Drip irrigation
Climate risk	Heavy rainfall	Raised beds and drainage
Disease risk	Fruit diseases	Chemical management
Guava disease	Pink disease	Disease control measures, though details are not specified
Market risk	Price fall	Sell where a better rate is available
Labour risk	Labour shortage/cost fluctuation	Permanent monthly workers
Financial risk	Seasonal investment needs	Bank loans

6.10 Social and Community Impact

The farmer reported that farm income has improved children's education. He also shares farming knowledge with other farmers through phone calls and helps fellow farmers when needed. His learning system is informal and peer-based. He updates himself by visiting friends' agricultural fields and discussing farming practices with other farmers.

This indicates that the farm has both economic and social significance. It is not only a source of income but also a site of knowledge sharing, family improvement, and community-level agricultural learning.

6.11 Sustainability and Future Plans

The farmer's long-term goal is to increase production and gradually convert all 40 acres into horticultural crops. He believes that horticulture crops have strong potential for the future of agriculture in his region. His advice to other farmers is that horticulture should be adopted according to soil type.

He also believes farmers need better loans, modern farming practices, and new technology support from the government, NGOs, and institutions. His final message is that educated youth should come into agriculture and apply knowledge-based farming practices.

7. Key Findings

Table 10: Summary of Major Findings

Theme	Finding
Farm size	40 acres under diversified cultivation
Soil type	Black soil
Farming system	Integrated/holistic farming
Major income-based	Horticulture and commercial crops
Annual income	Approximately ₹1 crore, self-reported
Irrigation	Drip irrigation and rainwater harvesting
Labour	Permanent workers on a monthly salary
Market	75% local market, 25% direct consumers
Major risk	Climate variability and fruit diseases
Technology gap	Limited use of mobile apps, digital platforms, sensors, or automated systems
Future plan	Expansion of horticulture crops across 40 acres

In chilli landraces, environmental factors were found to

significantly influence the expression of traits, and high heritability and genetic advance for traits like the number of fruits and green fruit yield suggest their suitability for breeding programs (Singh *et al.*, 2022). Regarding Bt cotton, while initial years showed higher yields and profits, the most recent decade has seen stagnation in yields, no improvement in profits, and increased vulnerability to pest pressure, raising concerns about the sustainability of GM technology (Subramanian, 2023) ^[24]. In Chamarajanagara district, the decline in sorghum production was mainly attributed to a decrease in cultivated area, underscoring the need for improved input usage, particularly fertilizers, to bridge the yield gap and enhance economic viability (Kumar *et al.*, 2016). Lastly, the dibbling method of redgram cultivation, widely adopted by small and marginal farmers, significantly increased yield and farm income, with farmers earning an additional Rs. 10,170 per acre (Aditya *et al.*, 2018) ^[1].

8. Recommendations

Based on the findings of this study, it is recommended that the farmer focuses on improving crop-wise financial record-keeping to accurately track profits, costs, and net returns for each crop, facilitating better decision-making. Enhanced disease management strategies, particularly for guava's pink disease, should be implemented by consulting with horticultural experts and incorporating integrated pest management practices. The farm should explore value addition for its horticultural crops, such as producing guava juice, jam, and other products, to mitigate losses during market price fluctuations. Additionally, forming or joining a Farmer Producer Organization (FPO) could improve collective bargaining power, access to better markets, and input purchasing. Digital technologies for farm management and market intelligence, such as mobile apps and online price tracking platforms, should be adopted to improve market decision-making and risk management. Soil and water testing should be done regularly to optimize fertilizer use and water application, while expanding the use of drip irrigation to further increase water-use efficiency. Lastly, the farm's long-term goal of transitioning to a fully horticulture-based model should be approached gradually, based on soil suitability, water availability, and market demand, ensuring a sustainable and profitable future for the farm.

9. Conclusion

The case of Suresh Gouda demonstrates how diversified farming can become a strong livelihood model in a semi-arid region. The farm combines horticulture crops, commercial crops, pulses, and millets with drip irrigation, rainwater harvesting, permanent labour, and market grading. The reported annual income of ₹1 crore suggests that high-value horticulture, especially guava and jamun, plays an important role in improving farm profitability. At the same time, the farm faces important risks. These include fruit diseases, climate variability, market price fluctuations, dependence on bank loans, and limited digital technology use. The future success of the farm will depend on scientific disease management, better financial records, digital market access, value addition, and institutional support. Overall, the study shows that horticulture-led diversification can be a promising model for farmers in Raichur and similar semi-

arid regions, provided it is supported by water-efficient irrigation, soil-based crop planning, market linkage, extension guidance, and climate-resilient practices.

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