



MICROGREENS AGRIPRENEURSHIP IN KERALA: A SYSTEMATIC REVIEW

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Article DOI: <https://doi.org/10.36713/epra28832>

DOI No: 10.36713/epra28832

ABSTRACT

Microgreens are young edible plants harvested at an early stage of growth and have gained increasing attention due to their high nutritional value, short production cycle, efficient resource utilisation, and suitability for controlled and urban farming systems. Their ability to be cultivated with limited land, water, and infrastructure makes them a promising enterprise opportunity for small farmers, urban growers, women entrepreneurs, and agricultural start-ups. Although existing research has extensively examined the nutritional composition, cultivation technologies, and functional food potential of microgreens, limited attention has been given to understanding their role as an agripreneurial opportunity, particularly in the Kerala context.

This study aims to synthesise the existing literature on microgreens cultivation by adopting a systematic narrative review approach. Relevant studies published between 2015 and 2025 were identified from major academic databases and institutional sources and analysed using thematic content analysis. The review integrates insights from agriculture, entrepreneurship, sustainability, consumer behaviour, and technology adoption perspectives. The findings indicate that microgreens cultivation possesses considerable potential for sustainable Agripreneurship due to its low land requirement, rapid production cycle, high-value market positioning, and compatibility with modern cultivation systems such as hydroponics, vertical farming, and controlled-environment agriculture. The literature highlights several factors influencing the success of microgreens-based enterprises, including market demand, entrepreneurial orientation, technology adoption, sustainability practices, consumer awareness, institutional support, and access to finance.

However, commercial expansion remains constrained by limited consumer awareness, inadequate market linkages, perishability, quality management issues, limited financial support, and insufficient institutional mechanisms. The study proposes a conceptual framework explaining the determinants influencing microgreens-based Agripreneurship development in Kerala. The review contributes to the emerging literature on sustainable agribusiness models by highlighting microgreens as a potential avenue for income generation, employment creation, urban food production, and entrepreneurial development.

KEYWORDS: Microgreens; Agripreneurship; Sustainable Agriculture; Urban Farming; Controlled Environment Agriculture; Kerala.

1. INTRODUCTION

Agriculture is undergoing significant changes due to rapid urbanisation, changing consumer preferences, technological advancements, climate change, and increasing concerns about food security and environmental sustainability (Food and Agriculture Organization [FAO], 2021; United Nations, 2015; Pretty, 2008). Conventional farming is facing several challenges, including shrinking agricultural land, labour shortages, rising production costs, and uncertain climatic conditions (FAO, 2021; Government of India, 2023). These challenges have created the need for innovative agricultural practices that can produce more with fewer resources. In this context, Agripreneurship has emerged as an important approach that combines agricultural production with entrepreneurial thinking to create sustainable and profitable business opportunities (Drucker, 1985; Lumpkin & Dess, 1996).

Among the various innovative agricultural enterprises, microgreens cultivation has gained considerable attention in recent years. Microgreens are young edible seedlings harvested within 7–21 days after germination and are considered an intermediate stage between sprouts and mature vegetables (Di Gioia et al., 2017; Xiao et al., 2016). Although harvested at an early stage of growth, they contain high levels of vitamins, minerals, antioxidants, and other bioactive compounds (Kyriacou et al., 2021; Xiao et al., 2016). Their nutritional value, attractive appearance, unique flavour, and short production cycle have increased their popularity among health-conscious consumers (Kyriacou et al., 2021; Mir et al., 2017). The increasing demand for functional foods has further enhanced the commercial importance of microgreens across many countries.

Apart from their nutritional benefits, microgreens offer several advantages from an entrepreneurial perspective. They require relatively less land, water, labour, and cultivation time compared to many conventional vegetable crops. They can be grown successfully on rooftops, balconies, terraces, greenhouses, and indoor production units using hydroponics, vertical farming, controlled-environment agriculture, and LED lighting (Benke & Tomkins, 2017; Brazaitytė et al., 2015; Kozai et al., 2019). These characteristics make microgreens cultivation suitable for urban farmers, women entrepreneurs, educated youth, self-help groups, start-ups, and small-scale agricultural enterprises seeking additional sources of income.



Kerala provides favourable conditions for promoting microgreens cultivation because of increasing health awareness, expanding urban markets, relatively small landholdings, and government support for sustainable agriculture (Kerala Agricultural University, 2021; Kerala State Planning Board, 2022; National Bank for Agriculture and Rural Development [NABARD], 2022). These factors indicate that microgreens cultivation has considerable potential to become a sustainable agribusiness activity in the state.

Although a large number of studies have examined the nutritional composition, cultivation techniques, food safety, and production technologies of microgreens, comparatively fewer studies have investigated their entrepreneurial and commercial potential. Existing research is largely fragmented and mainly focuses on individual aspects such as production, nutrition, or technology. Limited attention has been given to understanding how market demand, technology adoption, entrepreneurial capability, institutional support, consumer awareness, sustainability practices, and access to finance together influence the development of microgreens-based enterprises. Furthermore, review studies that integrate these dimensions with specific reference to Kerala remain scarce.

The present study attempts to address this gap by systematically reviewing the available literature on microgreens cultivation from an Agripreneurship perspective. The review synthesises evidence from agriculture, entrepreneurship, sustainability, consumer behaviour, and technological innovation to identify the major determinants influencing the growth of microgreens-based enterprises. Based on the reviewed literature, the study develops a conceptual framework explaining these determinants and discusses their relevance in the Kerala context. The findings are expected to provide useful insights for researchers, entrepreneurs, policymakers, agricultural institutions, and other stakeholders interested in promoting microgreens cultivation as a sustainable and commercially viable Agripreneurship opportunity.

2. OBJECTIVES OF THE STUDY

The present study aims to examine the potential of microgreens cultivation as an emerging Agripreneurship opportunity in Kerala through a systematic review of existing literature. The specific objectives of the study are:

1. To review the existing literature on microgreens cultivation with reference to its nutritional, technological, commercial, and sustainability dimensions.
2. To identify the major determinants influencing the development and success of microgreens-based Agripreneurship.
3. To identify the research gaps in the existing literature and propose a conceptual framework based on the findings of the review.
4. To suggest practical, policy, and future research directions for promoting microgreens cultivation as a sustainable Agripreneurship opportunity in Kerala.

3. RESEARCH METHODOLOGY

3.1 Research Design

This study adopts a systematic narrative review by integrating systematic search procedures with narrative synthesis to provide a comprehensive understanding of the available evidence (Snyder, 2019; Tranfield et al., 2003). This approach combines the structured search process of a systematic review with the flexibility of a narrative review, making it suitable for synthesising evidence from agriculture, entrepreneurship, sustainability, and innovation. As a review study, it relies entirely on published literature rather than primary data.

3.2 Data Sources

The review is based on secondary data collected from peer-reviewed journal articles, books, conference proceedings, government reports, and institutional publications. Literature was retrieved from major academic databases, including Scopus, Web of Science, ScienceDirect, SpringerLink, Emerald Insight, Taylor & Francis Online, Wiley Online Library, and Google Scholar. Additional information was obtained from publications of FAO, ICAR, Kerala Agricultural University (KAU), NABARD, and the Ministry of Agriculture and Farmers' Welfare, Government of India.

3.3 Search Strategy

Relevant studies were identified using keyword searches with Boolean operators (AND, OR). The main search terms included Microgreens, Agripreneurship, Agricultural Entrepreneurship, Urban Agriculture, Vertical Farming, Controlled Environment Agriculture, Hydroponics, Sustainable Agriculture, Consumer Behaviour, and Kerala Agriculture. Representative search strings included "Microgreens AND Agripreneurship", "Microgreens AND Urban Agriculture", and "Microgreens AND Kerala".

3.4 Inclusion and Exclusion Criteria

Only English-language publications relevant to the objectives of the study were considered. The review included peer-reviewed journal articles, books, book chapters, conference proceedings, and government reports published between 2015 and 2025, along with a few important earlier theoretical studies where necessary. Duplicate records, non-English publications, editorials, blogs, opinion articles, and studies unrelated to the research objectives were excluded.

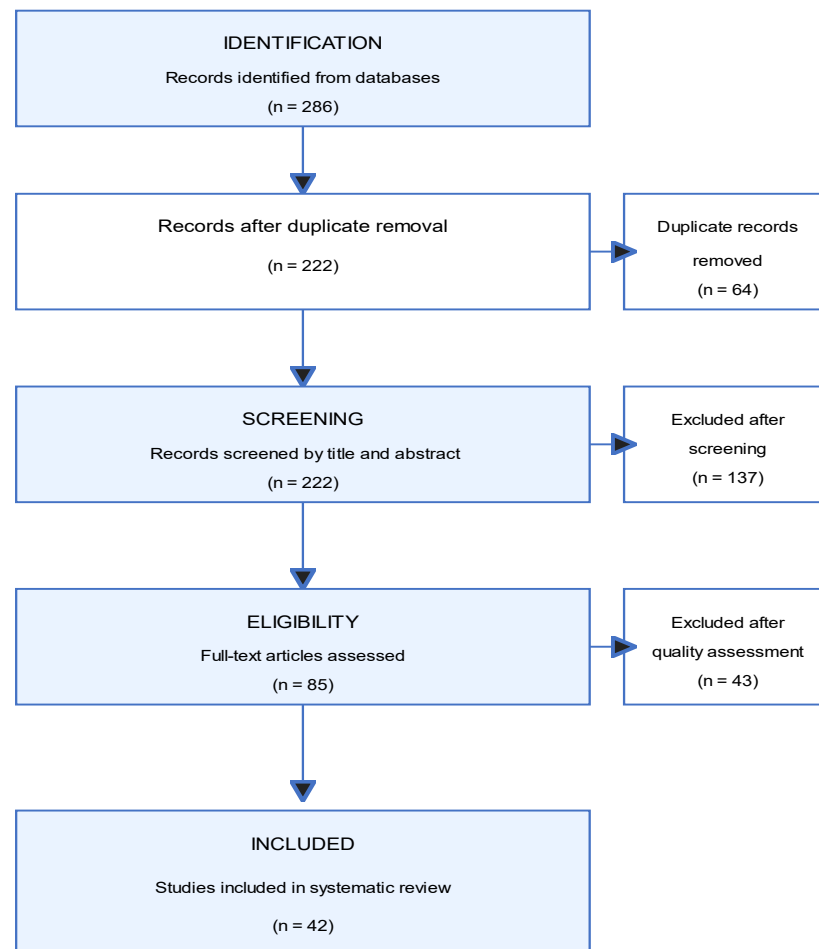
3.5 Literature Selection

The selection of studies followed the PRISMA framework to ensure transparency and systematic reporting of the review process (Moher et al., 2009; Page et al., 2021). An initial search of the selected databases identified 286 records. After removing 64 duplicate

records, 222 studies were screened based on their titles and abstracts. Subsequently, 85 full-text articles were assessed for eligibility, of which 43 were excluded because they did not meet the inclusion criteria or were not sufficiently aligned with the objectives of the review. Finally, 42 studies were included in the thematic synthesis.

Figure 1. Prisma Flow Diagram

PRISMA Flow Diagram: Microgreens Agripreneurship Literature Review



Final Evidence Base

Microgreens | Agripreneurship | Sustainability | Market Potential

The reviewed literature was analysed using thematic content analysis, and the findings were grouped into six major themes: nutritional and commercial significance, technological advancements, market potential and consumer behaviour, sustainability benefits, Agripreneurship and institutional support, and challenges affecting commercialisation. These themes represent the major factors identified from previous studies that influence the development of microgreens cultivation as a sustainable Agripreneurship opportunity.

3.6 Data Extraction

Information from the selected studies was organised using a review matrix. The extracted details included the author, publication year, study location, research objectives, methodology, key findings, limitations, and contribution to the present review. Greater emphasis was placed on studies published in recognised peer-reviewed journals and authoritative institutional reports.

3.7 Data Analysis

By comparing the objectives, findings, and contributions of the selected studies, the literature was organised into six broad themes: (i) nutritional significance and commercial value, (ii) technological advancements, (iii) market potential and consumer behaviour, (iv) sustainability and environmental benefits, (v) Agripreneurship and institutional support, and (vi) challenges and future research directions. These themes were subsequently integrated through a thematic synthesis to develop the proposed conceptual framework.



Table 1. Summary of Selected Studies Included in the Review

AUTHOR & YEAR	FOCUS OF THE STUDY	METHODOLOGY AND APPROACH	MAJOR FINDINGS	CONTRIBUTION TO THE PRESENT STUDY
Shapero & Sokol (1982)	Entrepreneurial Event Model	Entrepreneurship theory	Entrepreneurial action is influenced by perceived desirability, feasibility, and opportunity recognition.	Explains the transition from opportunity recognition to enterprise creation.
Ajzen (1991)	Theory of Planned Behaviour	Entrepreneurship behaviour theory	Attitudes, subjective norms, and perceived behavioural control influence intention formation.	Explains entrepreneurial intention towards microgreens enterprises.
Elkington (1997)	Triple Bottom Line Theory	Theoretical framework	Sustainable enterprises should balance economic, environmental, and social objectives.	Provides the theoretical basis for sustainable Agripreneurship.
Specht et al. (2014)	Urban agriculture sustainability	Conceptual review	Urban agriculture contributes to sustainability, food security, and local production.	Supports the sustainability dimension of microgreens cultivation.
Xiao et al. (2016)	Nutritional composition and antioxidant capacity of microgreens	Experimental analysis of <i>Brassicaceae</i> microgreens	Microgreens contained high concentrations of minerals, vitamins, antioxidants, and bioactive compounds compared with mature plants.	Establishes the nutritional and commercial value of microgreens as a premium food product.
Benke & Tomkins (2017)	Vertical farming and controlled-environment agriculture	Conceptual review	Controlled-environment systems improve resource efficiency and enable urban food production.	Provides the technological foundation for urban microgreens enterprises.
Di Gioia et al. (2017)	Physicochemical, nutritional, and sensory characteristics of sprouts and microgreens	Laboratory-based comparative analysis	Nutritional quality varied according to species and cultivation conditions; microgreens showed strong sensory and functional properties.	Highlights the importance of crop selection and production practices for commercial success.
Riggio et al. (2019)	Food safety considerations in microgreens production	Review study	Microbial contamination risks require proper hygiene practices and controlled production systems.	Highlights food safety as a factor influencing enterprise sustainability.
Goodman & Minner (2019)	Urban agriculture and controlled-environment farming	Case study approach	Urban farming models can contribute to local food systems but face economic and operational barriers.	Provides relevance to Kerala's urban agriculture context.
Kozai et al. (2019)	Indoor vertical farming systems	Book-based synthesis of plant factory research	Plant factories enable year-round production using controlled environmental conditions.	Supports technology adoption as a determinant of agripreneurial success.
Renna & Paradiso (2020)	Production systems, nutritional properties, and shelf life of microgreens	Review study	Microgreens have potential as innovative crops but require improvements in production management, packaging, and post-harvest handling.	Identifies operational challenges affecting commercialisation.



SharathKumar et al. (2020)	Vertical farming and environmental control technologies	Review article	Advanced technologies improve productivity but require investment and technical expertise.	Explains technology adoption challenges among entrepreneurs.
Treadwell et al. (2020)	Microgreens as a specialty crop	Extension-based research	Microgreens provide opportunities for small-scale producers due to short production cycles and high-value markets.	Supports microgreens as an entrepreneurial crop.
Kyriacou et al. (2021)	Functional quality of novel food crops including microgreens	Review of scientific evidence	Microgreens possess high functional food potential due to bioactive compounds and health-promoting properties.	Supports consumer awareness and market demand dimensions.
Zhang et al. (2021)	Nutritional value, health benefits, and food safety of microgreens	Comprehensive literature review	Microgreens offer nutritional benefits but require attention to food safety and quality control.	Supports the importance of quality management and consumer confidence.
FAO (2023)	Sustainable agrifood systems	Institutional report	Future food systems require resource-efficient, innovative, and sustainable production models.	Supports the policy relevance of microgreens cultivation.

The reviewed literature was analysed using thematic content analysis to identify recurring themes and relationships across the selected studies (Snyder, 2019). The literature suggests that successful commercialisation of microgreens depends on the interaction between market opportunities, technological capability, entrepreneurial orientation, sustainability practices, consumer acceptance, institutional support, and financial accessibility. These themes form the basis for developing the conceptual framework proposed in this study.

1. LITERATURE REVIEW

The selected studies were examined using thematic content analysis to identify the key themes and recurring patterns related to microgreens cultivation as an Agripreneurship opportunity. The review shows that previous research has largely concentrated on the nutritional and commercial value of microgreens, cultivation technologies, sustainability, market potential, consumer behaviour, and entrepreneurial aspects. By comparing the objectives, findings, and contributions of the selected studies, the literature was organised into six broad themes: nutritional significance and commercial value, technological advancements, market potential and consumer behaviour, sustainability and environmental benefits, Agripreneurship and institutional support, challenges and future research directions, and an overall thematic synthesis. These themes provide a comprehensive understanding of the factors influencing the development of microgreens-based Agripreneurship and form the basis for the discussion presented in the following sections.

4.1 Nutritional Significance and Commercial Value of Microgreens

Microgreens are young edible plants harvested within 7-21 days after germination. They are considered a stage between sprouts and mature vegetables. Studies show that microgreens contain high levels of vitamins, minerals, antioxidants, and other beneficial compounds (Xiao et al., 2016; Di Gioia et al., 2017). Due to their nutritional value, they are increasingly recognised as functional foods.

Apart from health benefits, microgreens have good commercial value because of their colour, taste, texture, and attractive appearance. Their increasing demand among health-conscious consumers, restaurants, hotels, and premium food markets creates new business opportunities. Therefore, microgreens are not only a nutritious food product but also a potential high-value agricultural enterprise.

4.2 Technological Advancements in Microgreens Cultivation

Technological innovations have significantly improved the production and management of microgreens cultivation (Benke & Tomkins, 2017; Kozai et al., 2019). Technologies such as LED lighting, automated irrigation, and monitoring systems help maintain suitable growing conditions and improve product quality. These methods also allow cultivation in urban areas where land availability is limited. However, high initial investment, technical expertise, and maintenance costs remain major barriers to technology adoption (Benke & Tomkins, 2017; Kozai et al., 2019).

4.3 Market Potential, Consumer Behaviour, and Agripreneurship Opportunities

Growing consumer interest in healthy lifestyles and functional foods has substantially increased demand for microgreens (Annunziata & Vecchio, 2011; Grunert, 2005; Kyriacou et al., 2021). From an Agripreneurship perspective, microgreens offer several advantages such as low space requirement, short cultivation period, and quick returns. These features make them suitable



for youth entrepreneurs, women entrepreneurs, self-help groups, and small-scale farmers. Commercial success depends on effective marketing, consumer awareness, branding, and reliable supply-chain networks (Grunert, 2005; Verbeke, 2005).

4.4 Sustainability and Environmental Benefits

Microgreens cultivation supports sustainable agricultural practices because it requires less land, water, and time than many conventional crops (Elkington, 1997; FAO, 2021; Pretty, 2008). Microgreens also support local food production by reducing transportation requirements while improving resource efficiency and food security (Eigenbrod & Gruda, 2015; Elkington, 1997).

4.5 Agripreneurship and Institutional Support

Agripreneurship combines agricultural activities with entrepreneurial skills, innovation, and opportunity recognition to establish sustainable business ventures (Drucker, 1985; Lumpkin & Dess, 1996). Institutional support from government agencies, agricultural universities, financial institutions, and entrepreneurship development organisations plays an important role in promoting microgreens cultivation. Training programmes, technical guidance, financial assistance, and market support can encourage more people to enter this field. The Theory of Planned Behaviour (Ajzen, 1991) and Entrepreneurial Event Model (Shapero & Sokol, 1982) explain that entrepreneurial decisions are influenced by personal attitudes, perceived opportunities, and confidence in starting a business.

4.6 Challenges and Future Research Directions

Although microgreens have significant potential, several challenges affect their commercial growth. The short shelf life of microgreens creates difficulties in storage, packaging, and transportation. Maintaining food safety and product quality is also important for gaining consumer trust. Other challenges include limited consumer awareness, lack of organised markets, limited financial support, and insufficient technical knowledge among new entrepreneurs. In Kerala, research on microgreens enterprises is still limited. Future studies should focus on consumer acceptance, business models, profitability, technology adoption, and policy support for developing sustainable microgreens enterprises.

4.7 Thematic Synthesis of Literature

The reviewed literature indicates that microgreens cultivation has potential beyond being a simple horticultural activity. It can develop into a sustainable Agripreneurship opportunity when supported by proper market conditions, entrepreneurial skills, technology, and institutional support.

The findings suggest that market demand encourages entrepreneurs to identify opportunities, while technology adoption improves production efficiency. Sustainability practices enhance long-term business performance, and factors such as consumer awareness, government support, and access to finance strengthen enterprise development.

Based on the literature review, the study identifies seven important factors influencing microgreens Agripreneurship: market demand, entrepreneurial orientation, technology adoption, sustainability practices, consumer awareness, institutional support, and access to finance. These factors provide the foundation for developing the conceptual framework of the study.

2. RESEARCH GAP

Although the literature on microgreens has expanded considerably in recent years, most studies focus on nutritional composition, cultivation techniques, controlled-environment agriculture, and health benefits. Comparatively little attention has been given to examining microgreens as an Agripreneurship opportunity. Studies that integrate entrepreneurship, technology adoption, sustainability, market demand, consumer awareness, institutional support, and access to finance remain limited.

Research focusing specifically on Kerala is particularly scarce despite the state's favourable conditions for urban agriculture, entrepreneurship, and premium horticultural production. Furthermore, there is a lack of comprehensive review studies that combine evidence from agriculture, entrepreneurship, sustainability, consumer behaviour, and innovation management. The present review addresses these gaps by synthesising multidisciplinary literature and proposing a conceptual framework explaining the factors that influence the success of microgreens-based enterprises in Kerala.

3. CONCEPTUAL FOUNDATION OF THE STUDY

The conceptual framework is supported by theories of entrepreneurship, innovation diffusion, technology adoption, and sustainability (Ajzen, 1991; Davis, 1989; Elkington, 1997; Rogers, 2003). The review indicates that the success of microgreens-based Agripreneurship depends on the interaction of market, technological, entrepreneurial, institutional, and financial factors rather than on a single determinant. Based on recurring findings across the selected studies, seven major determinants were identified: market demand, entrepreneurial orientation, technology adoption, sustainability practices, consumer awareness, institutional support, and access to finance.

6.1 Proposed Conceptual Framework

The framework suggests that increasing market demand for healthy and nutritious foods encourages entrepreneurial orientation among prospective entrepreneurs. Entrepreneurial orientation facilitates the adoption of modern cultivation technologies such as hydroponics, vertical farming, and controlled-environment agriculture. Technology adoption promotes sustainable production practices through efficient use of land, water, and other resources, ultimately contributing to the success of microgreens-based Agripreneurship. Throughout this process, consumer awareness, institutional support, and access to finance function as enabling factors by strengthening enterprise development, technology adoption, and market expansion.

6.2 Significance of the Framework

The proposed framework provides a theoretical basis for understanding the factors influencing the development of microgreens enterprises in Kerala. It integrates evidence from entrepreneurship, sustainable agriculture, and innovation literature and serves as a foundation for future empirical studies that may validate these relationships using quantitative or mixed-method approaches.

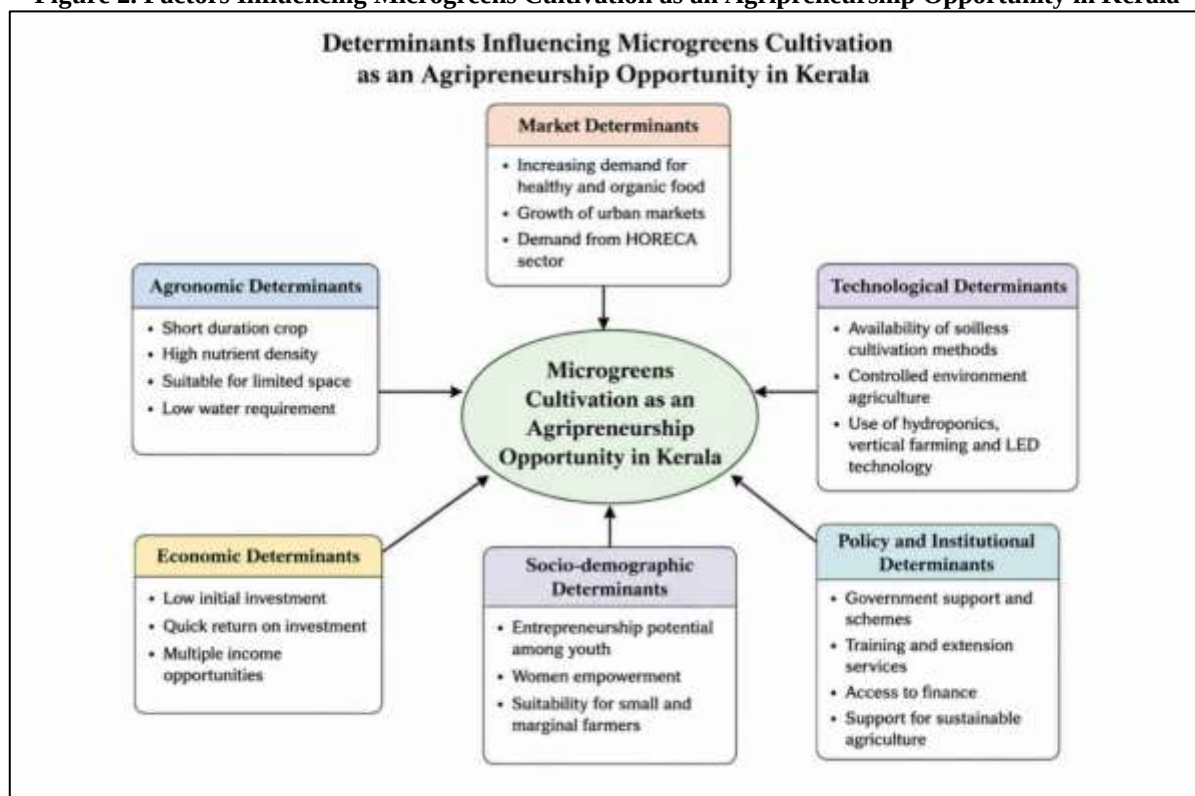
6.3 Discussion of the Proposed Framework

The review of literature shows that microgreens cultivation has good potential as an Agripreneurship opportunity, especially in states like Kerala. Most of the studies reviewed agree that microgreens are rich in nutrients, require only a small area for cultivation, use less water, and can be harvested within a short period. These features make them suitable for urban farming as well as for small-scale agricultural enterprises. The growing use of hydroponics, vertical farming, and controlled-environment agriculture has further improved the feasibility of commercial microgreens cultivation.

Although the potential is promising, the review also identifies several challenges. Low consumer awareness, limited marketing opportunities, poor market linkages, short shelf life, and lack of organised supply chains continue to affect the growth of microgreens enterprises. Many studies point out that technology alone cannot ensure business success because entrepreneurial capability, market access, institutional support, and finance are equally important (Drucker, 1985; Lumpkin & Dess, 1996; Rogers, 2003). In the Kerala context, the available literature suggests favourable conditions for the growth of this sector. Rising health consciousness, increasing urbanisation, expansion of the hospitality industry, and growing interest in entrepreneurship provide a supportive environment for commercial microgreens cultivation. In addition, Government initiatives promoting sustainable agriculture and entrepreneurship create favourable conditions for commercial microgreens cultivation in Kerala (Government of India, 2023; Kerala State Planning Board, 2022; NABARD, 2022).

The review indicates that microgreens cultivation should be considered not only as an innovative farming practice but also as a sustainable agribusiness opportunity. Its success depends on the combined influence of market demand, technology adoption, entrepreneurial capability, institutional support, consumer awareness, and access to finance. Strengthening these areas can improve the long-term growth and sustainability of microgreens enterprises in Kerala.

Figure 2. Factors Influencing Microgreens Cultivation as an Agripreneurship Opportunity in Kerala





4. IMPLICATIONS OF THE STUDY

The present study has several important implications for theory, practice, policy, and future research. By synthesising existing literature on microgreens cultivation, the study extends the understanding of microgreens beyond their nutritional and technological aspects and highlights their potential as an emerging Agripreneurship opportunity. The findings provide insights into the factors that influence the development and sustainability of microgreens-based enterprises, particularly in the context of Kerala.

7.1 Theoretical Implications

This review adds to the existing literature on Agripreneurship, sustainable agriculture, and urban farming by bringing together studies from different disciplines. While earlier research has mainly focused on the nutritional value and cultivation practices of microgreens, the present study highlights their entrepreneurial and business potential. The review also explains how factors such as market demand, entrepreneurial orientation, technology adoption, sustainability practices, institutional support, consumer awareness, and access to finance work together to influence the success of microgreens-based enterprises. The conceptual framework developed in this study can serve as a foundation for future empirical research in this area.

7.2 Practical Implications

The findings of the review provide useful guidance for farmers, entrepreneurs, startups, self-help groups, and agricultural practitioners interested in microgreens cultivation. The review shows that microgreens can be produced with limited investment, less space, and fewer natural resources while offering quick returns. However, successful commercialisation requires proper production methods, quality maintenance, effective marketing, and strong market linkages. The study also suggests that microgreens cultivation can become an additional source of income for women, educated youth, and small-scale farmers who are looking for sustainable business opportunities.

7.3 Policy Implications

The review highlights the important role of government and supporting institutions in promoting microgreens-based Agripreneurship. Training programmes, technical guidance, financial assistance, incubation support, and entrepreneurship development initiatives can encourage more people to enter this sector. Access to subsidies, startup assistance, and affordable credit can help entrepreneurs adopt modern production technologies such as hydroponics and vertical farming. At the same time, awareness campaigns, better marketing facilities, and improved market linkages can increase consumer acceptance and demand. Such policy measures can contribute to employment generation, income diversification, and sustainable agricultural development in Kerala.

8. CONCLUSION

Microgreens cultivation has considerable potential to become a sustainable and profitable Agripreneurship opportunity in Kerala. The crop requires relatively low investment, limited space, less water, and has a short production cycle, making it suitable for farmers, youth, women entrepreneurs, and urban growers. The review also shows that increasing consumer demand for healthy food, together with technological developments and government support, creates favourable conditions for the expansion of microgreens enterprises. The long-term success of this sector depends on more than production technology. Improving consumer awareness, strengthening market infrastructure, enhancing entrepreneurial skills, increasing institutional support, and providing better access to finance are equally important. If these areas receive adequate attention, microgreens cultivation can contribute to employment generation, higher farm income, sustainable agriculture, and the growth of Agripreneurship in Kerala. The proposed conceptual framework can also provide a useful basis for future empirical studies on microgreens-based enterprises.

REFERENCES

1. Brazaitytė, A., Sakalauskaitė, J., Samuolienė, G., Jankauskienė, J., Viršilė, A., Novičkovas, A., Dabašinskas, L., & Duchovskis, P. (2015). The effects of LED illumination spectra on cucumber microgreens. *Acta Horticulturae*, 1097, 87-94. <https://doi.org/10.17660/ActaHortic.2015.1097.10>
2. Di Gioia, F., Renna, M., & Santamaria, P. (2017). Sprouts, microgreens and "baby leaf" vegetables: A review of nutritional quality and production practices. *Agriculture*, 7(7), 56. <https://doi.org/10.3390/agriculture7070056>
3. Kyriacou, M. C., El-Nakhel, C., Pannico, A., Graziani, G., Soteriou, G. A., Giordano, M., & Rouphael, Y. (2019). Genotypic and environmental effects on fresh and secondary metabolite composition of microgreens. *Food Chemistry*, 277, 480-490. <https://doi.org/10.1016/j.foodchem.2018.10.136>
4. Kyriacou, M. C., Rouphael, Y., Di Gioia, F., Kyrtzis, A., Serio, F., Renna, M., De Pascale, S., & Santamaria, P. (2021). Micro-scale vegetable production and the nutritional value of microgreens. *Trends in Food Science & Technology*, 110, 112-124.
5. Mir, S. A., Shah, M. A., & Mir, M. M. (2017). Microgreens: Production, shelf life, and bioactive components. *Critical Reviews in Food Science and Nutrition*, 57(12), 2730-2736.
6. Pinto, E., Almeida, A. A., Aguiar, A. A., & Ferreira, I. M. P. L. V. O. (2015). Comparison between the mineral profile and nitrate content of microgreens and mature lettuces. *Journal of Food Composition and Analysis*, 37, 38-43.
7. Xiao, Z., Lester, G. E., Luo, Y., & Wang, Q. (2012). Assessment of vitamin and carotenoid concentrations of emerging food products: Edible microgreens. *Journal of Agricultural and Food Chemistry*, 60(31), 7644-7651.
8. Xiao, Z., Codling, E. E., Luo, Y., Nou, X., Lester, G. E., & Wang, Q. (2016). Microgreens: Assessment of nutrient concentrations, shelf life, and food safety. *Journal of Agricultural and Food Chemistry*, 64(36), 6742-6750.
9. Weber, C. F. (2017). Broccoli microgreens: A mineral-rich crop that can diversify food systems. *Frontiers in Nutrition*, 4, 7.



10. Benke, K., & Tomkins, B. (2017). *Future food-production systems: Vertical farming and controlled-environment agriculture. Sustainability: Science, Practice and Policy*, 13(1), 13-26.
11. Despommier, D. (2013). *The vertical farm: Feeding the world in the 21st century*. Thomas Dunne Books.
12. Kozai, T., Niu, G., & Takagaki, M. (2019). *Plant factory: An indoor vertical farming system for efficient quality food production (2nd ed.)*. Academic Press.
13. Al-Kodmany, K. (2018). *The vertical farm: A review of developments and implications for the future*. *Buildings*, 8(1), 12.
14. Toulaitos, D., Dodd, I. C., & McAinsh, M. (2016). Vertical farming increases lettuce yield per unit area compared to conventional horizontal hydroponics. *Food and Energy Security*, 5(3), 184-191.
15. Eigenbrod, C., & Gruda, N. (2015). Urban vegetable for food security in cities: A review. *Agronomy for Sustainable Development*, 35, 483-498.
16. Elkington, J. (1997). *Cannibals with forks: The triple bottom line of 21st century business*. Capstone Publishing.
17. Food and Agriculture Organization. (2019). *The state of food and agriculture 2019: Moving forward on food loss and waste reduction*. FAO.
18. Food and Agriculture Organization. (2021). *The state of food and agriculture 2021: Making agrifood systems more resilient*. FAO.
19. United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
20. Pretty, J. (2008). Agricultural sustainability: Concepts, principles and evidence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 363(1491), 447-465.
21. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.
22. Shapero, A., & Sokol, L. (1982). The social dimensions of entrepreneurship. In C. Kent, D. Sexton, & K. Vesper (Eds.), *The encyclopedia of entrepreneurship* (pp. 72-90). Prentice Hall.
23. Miller, D. (1983). The correlates of entrepreneurship in three types of firms. *Management Science*, 29(7), 770-791.
24. Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21(1), 135-172.
25. Drucker, P. F. (1985). *Innovation and entrepreneurship: Practice and principles*. Harper & Row.
26. Rogers, E. M. (2003). *Diffusion of innovations (5th ed.)*. Free Press.
27. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
28. Grunert, K. G. (2005). Food quality and safety: Consumer perception and demand. *European Review of Agricultural Economics*, 32(3), 369-391.
29. Verbeke, W. (2005). Agriculture and the food industry in the information age. *European Review of Agricultural Economics*, 32(3), 347-368.
30. Annunziata, A., & Vecchio, R. (2011). Functional foods development in the European market: A consumer perspective. *Journal of Functional Foods*, 3(3), 223-228.
31. Krystallis, A., Maglaras, G., & Mamalis, S. (2008). Motivations and cognitive structures of consumers purchasing organic food. *British Food Journal*, 110(9), 940-960.
32. Government of India. (2020). *Agricultural statistics at a glance 2020*. Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare.
33. Government of India. (2023). *Annual report 2022-2023: Ministry of Agriculture and Farmers Welfare*. Government of India.
34. Kerala State Planning Board. (2022). *Economic review 2022*. Government of Kerala.
35. Kerala Agricultural University. (2021). *Package of practices recommendations: Crops*. Kerala Agricultural University.
36. National Bank for Agriculture and Rural Development. (2022). *State focus paper Kerala 2022-23*. NABARD.
37. Ministry of Micro, Small & Medium Enterprises. (2023). *Annual report 2022-23*. Government of India.
38. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71.
39. Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ*, 339, b2535.
40. Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333-339.
41. Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge. *British Journal of Management*, 14(3), 207-222.
42. Kitchenham, B., & Charters, S. (2007). *Guidelines for performing systematic literature reviews in software engineering*. Keele University.