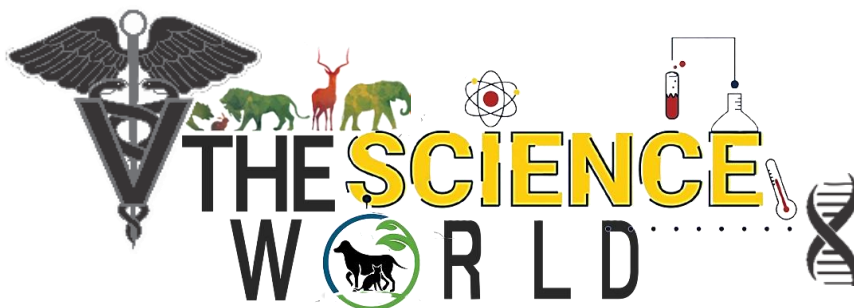




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Microgreens: Nutrient-Rich Greens For Health And Sustainable Cultivation

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Abstract

Microgreens are young, edible vegetable greens and herbs harvested shortly after the emergence of their first true leaves. They have gained increasing popularity because of their attractive appearance, distinctive flavours, and high nutritional value. Microgreens such as broccoli, radish, sunflower, pea shoots, mustard, and beetroot provide vitamins, minerals, antioxidants, and dietary fibre, making them a valuable addition to a balanced diet. Their potential benefits include supporting immunity, digestion, heart health, and healthy weight management. Microgreens can be cultivated in trays using soil, coco peat, or suitable growing media and require relatively little space, making them suitable for home cultivation, urban agriculture, and small-scale entrepreneurship. However, production is associated with challenges such as fungal and mold growth, short shelf life, temperature and humidity management, water requirements, seed availability, labour intensity, pest problems, and contamination risks. Proper seed selection, growing-medium preparation, watering, lighting, ventilation, hygiene, harvesting, and post-harvest handling are essential for successful production. With increasing consumer interest in fresh and nutrient-rich foods, microgreens offer promising opportunities for sustainable food production, urban farming, and agricultural entrepreneurship.

Introduction

Microgreens are young vegetable greens and herbs harvested soon after the emergence of the first true leaves. These small, tender plants are widely used to enhance the colour, texture, flavour, and visual appeal of salads and various main dishes. Commonly cultivated microgreens include mustard, cabbage, radish, buckwheat, lettuce, spinach, and several other vegetable and herb species.

In recent years, the consumption of microgreens has increased because they contain high concentrations of bioactive components, including vitamins, minerals, and antioxidants. These nutritional characteristics make microgreens an attractive addition to a healthy diet.



Benefits of Microgreens

1. Extremely Nutrient-Rich

Microgreens can contain higher concentrations of certain vitamins and minerals than mature vegetables. They are particularly rich in:

- Vitamin C
- Vitamin E
- Vitamin K
- Beta-carotene
- Antioxidants

2. Supports Heart Health

Microgreens are packed with antioxidants that may help reduce inflammation. Certain varieties, such as broccoli microgreens, may also contribute to maintaining healthy cholesterol levels.

3. Boosts Immunity

The high vitamin C content of microgreens can support normal immune function, while their antioxidants help protect cells from oxidative damage.

4. Helps with Digestion

Microgreens provide dietary fibre and contain enzymes that may contribute to improved nutrient absorption.

5. Supports Weight Management

Microgreens are:

- Low in calories
- High in nutrients

Their nutrient density makes them a useful addition to balanced diets and healthy meal plans.

Popular Types of Microgreens

Some commonly grown and consumed microgreens include:

- Broccoli
- Radish
- Sunflower
- Pea shoots
- Mustard
- Beetroot



Challenges in Microgreen Production

Although microgreens can be cultivated on a small scale, their production involves several challenges.

1. High Initial Investment

Indoor microgreen farming may require LED lights, growing trays, racks, and irrigation systems. Establishing a controlled production environment can therefore involve considerable initial expenditure.

2. Fungal and Mold Growth

High humidity and dense planting can encourage the development of fungi and mold. Poor air circulation can further increase this problem.

3. Short Shelf Life

Microgreens generally have a short post-harvest life of approximately 5–10 days. Proper storage, handling, and rapid marketing are therefore important.

4. Temperature and Humidity Control

Microgreens generally grow well at approximately 18–24°C under moderate humidity. Extreme temperatures can adversely affect their growth and quality.

5. Water Management

Both excessive and inadequate watering can affect microgreen production.

- Overwatering can cause root rot and promote mold growth.
- Underwatering can slow plant growth.
- High-quality, untreated seeds are required for successful production.
- Good-quality seeds may sometimes be expensive or difficult to source.

6. Labour Intensive

Activities such as seed sowing, watering, harvesting, and packaging require regular manual labour.

7. Market Demand and Awareness

In many areas, consumers are not yet fully aware of microgreens and their potential benefits. Consequently, market demand may remain limited.

8. Pest Problems

Although pest problems are generally less common in indoor production systems, pests such as aphids and fungus gnats can still occur.

9. Hygiene and Contamination Risk

Since microgreens are commonly consumed raw, strict hygiene and sanitation are essential throughout production, harvesting, handling, and packaging.

Steps of Cultivation of Microgreens

1. Selection of Seeds

Choose good-quality seeds of suitable crops such as radish, mustard, fenugreek, sunflower, pea, or broccoli.

2. Preparation of Growing Medium

Use trays containing soil, coco peat, or a suitable mixture of soil and compost to provide an appropriate growing medium.

3. Seed Soaking

Some seeds, particularly peas and sunflower seeds, can be soaked in water for approximately 6–12 hours to improve germination.

4. Sowing of Seeds

Spread the seeds evenly over the surface of the growing medium in the tray.

5. Watering

Gently spray water using a spray bottle to maintain adequate moisture. The growing medium should remain moist but should not become excessively wet.

6. Providing Light

Place the trays where they receive indirect sunlight or provide suitable artificial lighting.

7. Growth and Care

Maintain appropriate moisture and adequate ventilation throughout the growing period. Microgreens generally reach harvestable size within approximately 7–14 days.

8. Harvesting

Harvest the microgreens when the plants develop their first true leaves. Cut the plants just above the surface of the growing medium.

Conclusion

Microgreens represent a unique category of functional food containing a range of nutrients that can contribute to a healthy diet. They are relatively affordable and can be grown easily at home, making them an attractive addition to everyday meals.

Their nutritional value, culinary appeal, and visual characteristics make microgreens increasingly popular among consumers. They are particularly noted for their nutrient content, including minerals such as potassium, iron, and zinc. Microgreen cultivation is gaining



importance in both urban and rural production systems and has considerable potential as a small-scale food production and entrepreneurial activity.

