

Microgreens: The Future Superfood of Sustainable Diets

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Microgreens are young, tender seedlings of vegetables, herbs, and grains that are harvested at an early stage of development, usually between 7 to 21 days after germination. They are larger than sprouts but smaller than baby greens, occupying a unique niche in the plant growth cycle. These miniature plants have gained immense popularity over the past few decades because of their high nutritional value, vibrant colors, unique flavors, and versatile culinary uses. Microgreens are often described as “functional foods” because they provide health benefits beyond basic nutrition, offering concentrated doses of vitamins, minerals, and bioactive compounds. Their ease of production, short growth cycle, and adaptability to small spaces make them an attractive choice for urban farming, home gardeners, and commercial growers.



History and Origin

Although microgreens may seem like a modern trend, their roots can be traced back to ancient times when young shoots and tender leaves were consumed for medicinal and nutritional purposes. Ancient civilizations in China, India, and the Middle East used young plants, sprouts, and seedlings as part of their traditional diets and herbal medicine. However, the concept of microgreens as we know them today first gained recognition in the United States in the 1980s. Chefs in San Francisco introduced microgreens in fine dining restaurants to enhance both the visual appeal and taste of gourmet dishes. By the early 2000s, their popularity spread across Europe and Asia, eventually becoming a global phenomenon. Today, microgreens are considered both a culinary delicacy and a nutritional powerhouse, embraced by health-conscious consumers, urban farmers, and the food industry alike.

Definition and Characteristics

Microgreens are defined as edible seedlings of vegetables, herbs, or cereals harvested shortly after germination when the first set of true leaves emerges. They are typically 2.5–7.5 cm (1–3 inches) tall at the time of harvest. Unlike sprouts, which are consumed along with roots and seeds, microgreens are harvested above the soil line, providing only the stem and leaves.



Characteristics

- Short growth duration: 7–21 days depending on crop type.
- High nutrient concentration: Contain elevated levels of vitamins, antioxidants, and minerals compared to mature plants.



- Variety of flavors: Ranging from sweet, tangy, nutty, and earthy to spicy and pungent.
- Aesthetic appeal: Bright and varied colors such as deep purple, red, yellow, and green make them visually attractive.

Nutritional Value

The nutritional profile of microgreens has been a subject of extensive research. Studies show that microgreens can contain 4 to 40 times higher concentrations of nutrients than their mature counterparts. For example, red cabbage microgreens provide high levels of vitamin C, vitamin K, and antioxidants, while broccoli microgreens are rich in sulforaphane, a compound associated with cancer prevention.

Nutritional highlights include:

- Vitamins: A, B-complex, C, E, and K.
- Minerals: Calcium, magnesium, potassium, iron, zinc, and manganese.
- Antioxidants: Flavonoids, carotenoids, anthocyanins, and phenolic compounds.
- Chlorophyll: Supports detoxification and oxygen transport.
- Protein: Some varieties like pea shoots and sunflower microgreens are protein-rich.

Varieties of Microgreens

A wide range of crops can be cultivated as microgreens, each offering distinct flavors, textures, and nutrients. Common categories include:

- Cruciferous Vegetables: Broccoli, kale, cabbage, mustard, radish.
- Leafy Vegetables: Spinach, lettuce, beetroot, and Swiss chard.
- Herbs: Basil, cilantro, parsley, dill, fennel, and mint.
- Cereals and Legumes: Wheatgrass, barley, oats, peas, lentils.
- Specialty Crops: Amaranth and sunflower

Important vegetable crops as microgreens

- **Red Amaranth:** Red Amaranth microgreens have gorgeous magenta leaves and a sweet, tangy flavor that makes them visually appealing and delicious. They are rich in vitamins A, C, and K, as well as essential minerals like calcium and iron, making them an excellent choice for boosting overall nutrition.
- **Beetroot:** Beetroot microgreens feature deep reddish-purple leaves with a mild, spinach-like flavor that is both tasty and versatile. They are packed with vitamins A, B, and K, providing essential nutrients that support energy metabolism and overall health.
- **Broccoli:** Broccoli microgreens are highly nutritious and recognized for their immune-boosting properties. They are abundant in vitamins A and C, minerals such as calcium and iron, protein, and chlorophyll. As a cruciferous, sulfur-containing powerhouse, broccoli microgreens offer antioxidant and detoxification benefits. Broccoli is a cruciferous (sulfur-containing) powerhouse.
- **Cress:** Cress is a traditional microgreen with finely curled leaves and a pleasantly peppery flavor. It is an excellent source of vitamins A and C, sulfur, and dietary fiber, which supports digestion and overall health.
- **Dill:** Dill microgreens have fine, feathery foliage and a distinctive, aromatic flavor that complements eggs, cucumbers, cheese, and cabbage. Beyond taste, they provide micronutrients that contribute to a balanced diet.
- **Fenugreek:** Fenugreek microgreens are rich in protein, vitamins A, B, and E, and essential minerals. They help stimulate appetite and are effective in combating anemia and fatigue due to their high nutrient density.
- **Kale:** Kale microgreens have a mild, cabbage-like flavor and are a powerhouse of vitamin C. They are loaded with antioxidants that help prevent age-related macular degeneration and support overall health.



- **Linseed:** Linseed microgreens are tender with a mildly spicy taste. They are highly nutritious, particularly rich in Omega-3 fatty acids, which support heart and brain health.
- **Radish:** Radish microgreens are spicy and vibrant, containing calcium, iron, potassium, zinc, vitamins A, B, C, K, and folic acid. Their nutrient profile helps stimulate the immune system and supports overall vitality.
- **Red Cabbage:** Red cabbage microgreens have a mild, sweet cabbage flavor with striking red-purple leaves. They are rich in vitamins A, B, C, E, and K, as well as minerals like calcium and magnesium, and chlorophyll, which together help boost the immune system.
- **Fennel:** Fennel microgreens have light, delicate leaves and a subtle licorice flavor. They are high in potassium, vitamins B and C, and help reduce the risk of heart disease while adding unique flavor to meals.



Growing Requirements and Techniques

Microgreens are easy to cultivate and require minimal resources, making them ideal for both small-scale and commercial production.

- **Growing Medium:** They can be grown in soil, cocopeat, vermicompost, or soilless hydroponic systems. A medium that retains moisture while allowing aeration is ideal.
- **Containers:** Shallow trays with drainage holes are commonly used.
- **Seed Selection:** High-quality, untreated, and preferably organic seeds are recommended to avoid contamination.
- **Sowing:** Seeds are spread evenly on the medium surface and lightly pressed. Some larger seeds may require pre-soaking.
- **Watering:** Gentle misting is essential to maintain moisture without waterlogging.
- **Light:** Adequate natural sunlight or LED grow lights ensure healthy growth and strong pigmentation.
- **Temperature and Humidity:** Optimal conditions range from 18–24°C with 40–60% humidity.



Harvesting and Post-Harvest Handling

Microgreens are harvested when they reach about 2.5–7.5 cm in height and the first true leaves appear. Harvesting is done using sharp scissors or knives by cutting just above the soil line. Post-harvest handling is critical as microgreens are delicate and highly perishable. They should be:

- ✓ Handled gently to avoid bruising.
- ✓ Washed carefully in cool water to remove debris.
- ✓ Dried thoroughly to prevent microbial growth.
- ✓ Packed in breathable containers or clamshell boxes.
- ✓ Stored at 4–8°C to extend shelf life.
- ✓ Despite these measures, their shelf life is generally short (5–10 days), making efficient supply chains essential.



Homestead utility

Microgreens are not only nutrient-rich but also valued for their ability to enhance the sensory qualities of food. Chefs use them for:

- Garnishing: Adding visual appeal to gourmet dishes.
- Salads: Providing fresh flavors and textures.
- Smoothies and Juices: Boosting nutrient content.
- Sandwiches and Wraps: Adding crunch and flavor.
- Soups and Stir-fries: Offering aroma and nutrition.



Health Benefits

Microgreens contribute to health in multiple ways:

1. Immune Support: High vitamin C and antioxidants enhance resistance against infections.
2. Heart Health: Potassium and flavonoids help regulate blood pressure and cholesterol.
3. Cancer Prevention: Compounds like sulforaphane (in broccoli microgreens) inhibit cancer cell growth.
4. Eye Health: Vitamin A and carotenoids support vision and protect against degeneration.
5. Digestive Health: Fiber and enzymes aid digestion and improve gut microbiota.
6. Detoxification: Chlorophyll in green microgreens supports liver function and toxin elimination.

Economic Importance

Microgreens have become a profitable niche in modern agriculture. Their short growth cycle allows multiple harvests within a year, making them suitable for small-scale farmers and entrepreneurs. Key economic aspects include:

- High Market Value: Microgreens are sold at premium prices due to their gourmet status and nutritional value.
- Urban Farming Opportunities: They can be grown in small indoor spaces, rooftops, or vertical farms.
- Export Potential: Demand in international markets for organic and fresh produce is rising.
- Employment Generation: Cultivation, packaging, and distribution create job opportunities.
- For small and medium farmers, microgreens present a low-investment, high-return business model.

Challenges in Production

Despite their potential, microgreen cultivation faces several challenges:

- Pest and Disease Management: Fungal infections and damping-off are common under high humidity.
- Post-Harvest Losses: Poor storage conditions reduce freshness and market value.
- Market Access: Farmers need reliable buyers and distribution channels.
- Knowledge Gaps: Many growers lack awareness of modern cultivation and hygiene practices.
- High Input Costs: Quality seeds, trays, and controlled environments require initial investment.

Production cost of microgreens

Cost Category	Estimated Cost (INR)	Notes
Seeds	₹10–₹30	Varies by variety; e.g., radish seeds are more affordable than basil.
Growing Medium	₹15–₹25	Cocopeat or organic compost; sufficient for multiple trays.
Trays/Containers	₹20–₹50	Reusable plastic or shallow trays; cost amortized over multiple uses.

Water & Nutrients	₹5–₹10	Minimal; includes water and occasional organic nutrients.
Labor	₹10–₹20	Includes sowing, watering, harvesting, and cleaning.
Electricity (if indoor)	₹5–₹10	For LED lights; varies with usage and local rates.
Packaging	₹5–₹10	Clamshells or eco-friendly packaging.
Miscellaneous	₹5–₹10	Includes labels, disposal, and other small expenses.
Total Estimated Cost	₹70–₹155	Per tray; varies based on scale and efficiency.

Success stories

Ravindra G of Mu Greens and Greens

Ravindra G, an innovative entrepreneur from Karnataka, founded Mu Greens and Greens by transforming a modest 200 sq. ft. rooftop into a thriving microgreens cultivation unit. With an initial investment of just around ₹25,000, he purchased essential materials such as seed trays, high-quality seeds, grow lights, and a simple hydroponic setup. Despite starting small, Ravindra strategically focused on cultivating more than 15 varieties of nutrient-rich microgreens, catering to the growing demand among health-conscious consumers, fitness enthusiasts, and chefs in urban areas. His venture emphasized pesticide-free and freshly harvested produce, which quickly built trust and loyalty among customers.

Within just three to four months of starting, he began generating a steady monthly profit of ₹20,000–₹30,000, proving the viability of microgreens as a profitable agribusiness. Over time, his ability to maintain consistent quality, diversify his offerings, and ensure timely supply allowed him to expand his customer base, including restaurants, local markets, and direct household buyers. Today, Ravindra's model of rooftop farming stands as an inspiring example of how urban spaces, even with limited area, can be effectively utilized for sustainable food production. His journey highlights how microgreens farming can be both a low-cost entry point for beginners and a high-profit venture for those who are passionate about urban agriculture.

Future Prospects

Microgreens hold bright prospects for the future of agriculture, health, and entrepreneurship. Growing urbanization and lifestyle changes have increased the demand for functional foods. Vertical farming, hydroponics, and aeroponics are expected to expand microgreen production globally. In developing countries like India, they can play a crucial role in combating malnutrition by providing nutrient-dense food within short cycles. Moreover, microgreens are being studied for use in space missions due to their fast growth and high nutritional yield. With innovations in packaging, storage, and distribution, microgreens are likely to become a staple in household diets as well as commercial markets.



Conclusion

Microgreens represent a fascinating intersection of nutrition, gastronomy, and sustainable agriculture. These small but mighty plants pack remarkable health benefits, offering concentrated doses of vitamins, minerals, and antioxidants. Their culinary versatility, economic potential, and ease of cultivation make them a valuable addition to modern food systems. While challenges such as short shelf life and market awareness persist, technological advancements and increasing consumer demand will continue to drive the microgreens industry forward. In the years to come, microgreens are poised to play a significant role in promoting healthier diets, supporting urban agriculture, and ensuring sustainable food security.

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