



Microgreens – An Epitome of Nutritional Excellence

Dr. M. Dhivya¹ and Dr. J. Kabariel²

¹PGP College of Agricultural Sciences, Namakkal, Tamil Nadu

²MIT College of Agricultural Technology, Musiri, Tamil Nadu

<https://doi.org/10.5281/zenodo.10799808>

Introduction

Microgreens refer to the tiny and tender seedlings of various vegetables and herbs. These delicate greens are carefully harvested once their cotyledons, or seed leaves, have fully expanded and their first set of true leaves begin to emerge or partially expand. The size of microgreens typically ranges from 1 to 3 inches (2.5–7.6 cm) in height, which generally occurs around 7 to 14 days after the seeds have germinated. The timing of this growth can vary depending on the specific crop, variety, and environmental conditions.



Microgreens possess three fundamental components: a central stem, two cotyledon leaves, and usually the initial pair of young true leaves. Microgreens contain considerably higher levels of vitamins, carotenoids, polyphenols and antioxidants- about five times on an average - than their mature counterparts. Such soaring levels of nutrients helps to lower the risk of cancer, Alzheimer's, diabetes, osteoporosis and boost heart health.

Stages of growth of a plant

- i. Sprouts** Sprouts are the youngest and smallest. Their cotyledons are not opened or just opened, and they should be consumed within a week.
- ii. Microgreens** Microgreens are slightly larger and older. They are 2-3 inches tall and should be consumed within 7-21 days.
- iii. Baby greens** Baby greens are the oldest and largest, usually 3-5 inches tall. They should be consumed within 21-40 days.
- iv. Mature greens** They are completely grown and their harvesting is done after complete maturity of the crop.







Types of microgreens

Among the microgreens that are commonly cultivated, spinach stands out as a popular choice. Microgreens, also referred to as vegetable confetti, encompass a variety of vibrant and

flavorful crops such as radish, beetroot, celery, cilantro, basil, peas, spinach, cabbage, lettuce, kale, sunflower, watercress, arugula, fennel, chicory, broccoli, chicory, onion, leek, fenugreek, Amaranthus, mustard, buckwheat, melon, cucumber, squash etc.

When harvesting microgreens, they are delicately snipped with scissors, including both the stem and the attached cotyledons or seed leaves. Over time, if left unharvested, microgreens will rapidly elongate, losing both their vibrant color and distinctive flavor.

Difference between microgreens and sprouts

	MICROGREENS	SPROUTS
 Germination Time	Harvested after 7-21 days	2-5 days
 Parts Consumed	Cotyledonous leaves and couple of true leaves. Seeds and roots are not consumed	A sprout consists of the seed, root, stem. Seeds are also eaten along with other parts.
 Form of Consumption	Eaten raw	Slightly steamed
 Growing Medium	Microgreens are grown in soil or soil-like materials such as peat moss	Need to be soaked and rinsed with water. No soil medium required.
 Sunlight	Need good sunlight for growth, less humidity and good air circulation.	Grow in dark and moist conditions
 Growing/Plantation	Planted with low seed density	Large number of seeds put together

It is important to note that microgreens differ from sprouts, as sprouts are consumed with the embryonic root and seeds, while microgreens are harvested alongside their cotyledons. Furthermore, when compared to baby greens, microgreens are considerably smaller in size. Consequently, microgreens find

themselves positioned between the early germination phase of sprouts and the larger scale of baby greens.

Types of substrates and cultivation systems

Microgreens	Botanical name	Family	Substrate / Cultivation systems
Arugula	<i>Eruca vesicaria</i> L. Cav. subsp. <i>sativa</i>	Brassicaceae	Rockwool under greenhouse
Basil	<i>Ocimum basilicum</i> L.	Lamiaceae	Rockwool, vermiculite, cotton, and jute fiber
Beetroot	<i>Beta vulgaris</i> subsp. <i>vulgaris</i>	Amaranthaceae	Soil and mat cultivation
Beetroot	<i>Beta vulgaris</i> subsp. <i>vulgaris</i>	Amaranthaceae	Soil based
Cabbage	<i>Brassica oleracea</i> var. <i>capitata</i>	Brassicaceae	Soil based under greenhouse
Cabbage savoy	<i>Brassica oleracea</i> L. var. <i>capitata</i>	Brassicaceae	Soil based under growth chamber
Cauliflower	<i>Brassica oleracea</i> var. <i>botrytis</i>	Brassicaceae	Soil based under growth chamber



Microgreens	Botanical name	Family	Substrate / Cultivation systems
China rose radish	<i>Raphanus sativus</i> L.	Brassicaceae	Hydroponics system
Chinese cabbage	<i>Brassica pekinensis</i>	Brassicaceae	Soil based under greenhouse
Chinese spinach and Joseph's coat	<i>Amaranthus tricolor</i>	Amaranthaceae	Soil based under greenhouse
Cucumber	<i>Cucumis sativus</i>	Cucurbitaceae	Soil based
Fenugreek	<i>Trigonella foenum-graecum</i>	Fabaceae	Cocopeat
Field mustard	<i>Brassica rapa</i> L.	Brassicaceae	Rockwool under green house
Green gram	<i>Vigna radiata</i> L.	Fabaceae	Soil based cultivation
Lettuce	<i>Lactuca sativa</i>	Compositae	Sphagnum moss
popcorn shoots	<i>Zea mays</i> L.	Poaceae	Soil based cultivation
Radish	<i>Raphanus sativus</i> L.	Cruciferae	Rockwool, White sphagnum peat, Coco coir
Turnip	<i>Brassica rapa</i> L. var. <i>rapa</i>	Brassicaceae	Soil and mat cultivation under growth chamber
Vine Spinach	<i>Basella alba</i>	Basellaceae	Soil and mat cultivation under growth chamber

Nutritional and phytochemical components in microgreens

Micro-green crops	Nutritional components	Phytochemical components
Amaranthus, Bottle gourd, cucumber, palak, radish, pumpkin, and water spinach	Minerals (K, Fe, Mn, Zn and Cu)	Phenolics, flavonoids and ascorbic acid
Buckwheat	Vitamins (B1, B2, B6, and E), proteins, minerals (Zn, Cu, Mn, Se, K, Na, Ca, Mg), starch and dietary fibre	Flavonoids, Fagopyrins, carotenoids, α -tocopherol and ascorbic acid
Broccoli, mustard, rocket salad, and watercress	Vitamins (E, A, K), minerals (N, K, Ca, Fe) and contents	Carotenoid, Isothiocyanates polyphenols, anthocyanin, monoterpene hydrocarbons, phytol and ascorbic acid
Radish	Vitamin (E), carbohydrates, protein and minerals (Ca, K and P)	Carotenoid, ascorbic acid, amino acid content, total phenols, flavonoid and anthocyanins



Micro-green crops	Nutritional components	Phytochemical components
Lettuce	Minerals (Ca, Mg, Fe, Mn, Zn, Se and Mo)	Polyphenols, carotenoids and chlorophyll
Coriander	Vitamins A and minerals	Carotenoids, phenols, vitamin C and flavonoids
Oriental mustard	Minerals (K, Ca, Na, Mg, Fe, Mn and Zn)	Phenolic compounds and carotenoids
Chickpea	Carbohydrates, proteins, fat, fiber, pantothenic acid (B ₅) and pyridoxine (B ₆)	Carotenoids, lutein, isoflavones
Fenugreek	Potassium, and minerals (K, Ca, Na, Na, Cu, Fe and Cu)	Phenolic and flavonoids
Foxtail amaranth	Dietary fiber, proteins, carbohydrates, vitamin and minerals (Fe, Mn, Cu, Zn, Na, Mo, B, K, Ca, Mg, P and S)	Ascorbic acid, carotenoids and flavonoids polyphenols
Arugula	Phylloquinone, and β -carotene	Glucosinolates, ascorbic acid and total carotenoids
Chicory	Minerals (Mg, Zn), protein, vitamins (A) and minerals (K, Ca and P)	Total flavonoids, total phenolic, Ascorbic acid

Health benefits of Microgreens

Microgreens have gained significant attention in the health and wellness community due to their exceptional nutritional value. These tiny greens, harvested just after sprouting, offer a multitude of health benefits that can contribute to overall well-being. Let's explore the various ways in which microgreens can positively impact our health.

1. **Rich in Nutrients:** Microgreens are packed with essential nutrients such as vitamins, minerals, and antioxidants. Despite their small size, they contain concentrated levels of nutrients, making them a potent addition to any diet. Consuming microgreens regularly can help provide the body with valuable vitamins like vitamin C, E, and K, along with minerals like iron, magnesium, and potassium.
2. **Boosts Immunity:** The high levels of antioxidants found in microgreens help strengthen the immune system. Antioxidants protect the body from harmful free radicals, which can lead to various diseases and accelerate aging. Including microgreens in your meals can help enhance your body's ability to fight off infections and diseases.



3. **Supports Digestive Health:** Microgreens are a natural source of dietary fiber, which promotes a healthy digestive system. Adequate fiber intake aids digestion, prevents constipation, and supports the growth of beneficial gut bacteria. Incorporating microgreens into your meals can help improve overall digestive health and ensure proper nutrient absorption.
4. **Reduces the Risk of Chronic Diseases:** Regular consumption of microgreens has been linked to a reduced risk of chronic diseases. The powerful antioxidants present in microgreens help combat inflammation in the body, which is often associated with conditions like heart disease, diabetes, and certain types of cancer. By incorporating microgreens into your diet, you can take a proactive step towards reducing the risk of these health concerns.
5. **Supports Eye Health:** Some microgreens, such as those from the brassica family (broccoli, kale, cabbage), contain high levels of carotenoids like lutein and zeaxanthin. These compounds have been shown to promote healthy vision and protect against age-related macular degeneration. Including these microgreens in your diet can contribute to maintaining good eye health.
6. **Enhances Weight Management:** Microgreens are low in calories and high in nutrients, making them a valuable food choice for weight management. The abundance of vitamins, minerals, and phytochemicals present in microgreens can help provide necessary nutrients while maintaining a balanced calorie intake. Adding microgreens to your meals can assist in maintaining a healthy weight.

Incorporating microgreens into daily diet is a simple and effective way to boost the nutritional intake and support overall health. Their versatility allows for easy inclusion in various dishes, such as salads, sandwiches, and smoothies. By embracing the health benefits of microgreens, you can take a proactive approach to nourishing your body and promoting optimal well-being.

Conclusion

In conclusion, the benefits of microgreens are numerous and captivating. Their superior nutritional value, diverse flavors, visual appeal, ease of cultivation, and positive impact on the environment make them an invaluable addition to a well-balanced, wholesome lifestyle.

References:

- Charlebois, S. 2019. Microgreens with big potential. Wilton Consulting Group. pp. 1-12
- Berba, K.J. and M.E. Uchanski. 2012. Postharvest physiology of microgreens. *Journal of Young Investigators*, 24. pp. 1-5.
- Ebert, A.W. 2022. Sprouts and microgreens-novel food sources for healthy diets. *Plants*, 11 (4).p. 571

