

Vegetable Micro Greens: The Gleam of Next Generation Super Foods

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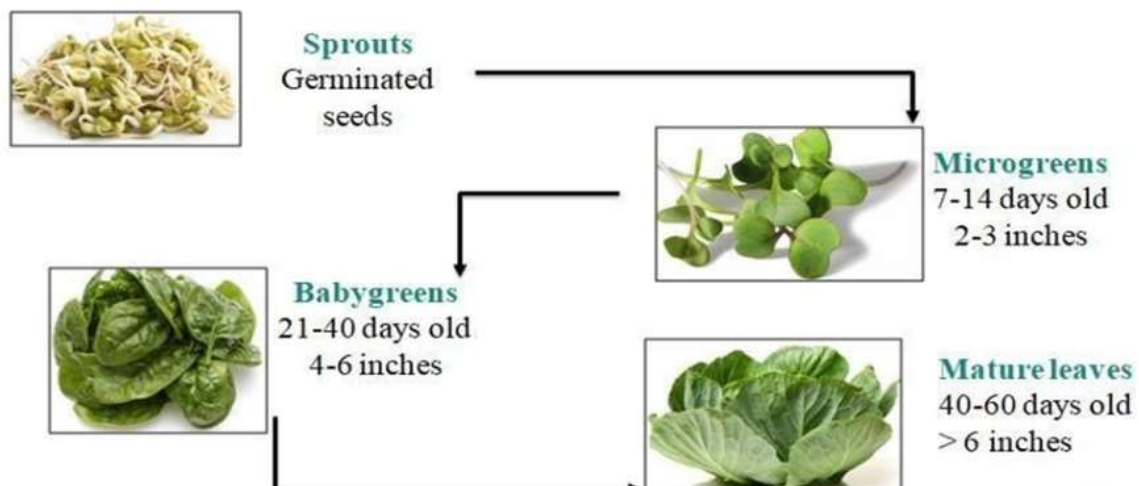
SUMMARY

Microgreens, often referred to as "vegetable confetti," are young, nutrient-packed shoots harvested at the first true leaf stage. They are typically 1-2 inches tall and can be grown from a variety of vegetables, herbs, and grains. Microgreens are consumed for their vibrant colors, intense flavors, and high concentrations of vitamins, minerals, and antioxidants, which are often higher than those found in mature plants. These tiny plants are widely regarded as functional foods and are used in salads, garnishes, soups, and even in the production of juices and powders.

INTRODUCTION

Microgreens offer various health benefits, including the potential to reduce the risk of heart disease, Alzheimer's, diabetes, and some cancers. They are easy to grow, quick to harvest (within 7-21 days), and thrive in controlled environments like greenhouses and hydroponic systems. However, they have a short shelf life, typically lasting 3 to 5 days, unless preserved under optimized conditions like pre-cooling and modified atmospheric packaging. The growing interest in microgreens has led to innovations in production techniques, such as vertical farming and hydroponics, which ensure better yield and quality.

- Microgreens, also called 'Vegetable Confetti', are immature shoots germinated from seeds of herbs, vegetables or grains which are generally 1-2 inch in height.
- These are eaten raw along with their true leaves and stem, used as garnishes or salad dressings.
- Microgreens gained their importance due to their unique color, texture and taste which can be either sweet or spicy.
- Microgreens consist of three parts which are stem, cotyledons and true type leaves. Some examples of common microgreens include kale, celery, beetroot, lettuce, fenugreek, linseed etc.
- Greens can be divided into 3 categories depending on their age or size. Sprouts are smallest followed by microgreens that are larger and older and then comes the baby greens which are largest among all (Tan *et al.*, 2020).
- The difference between microgreens and sprouts is that microgreens are harvested without root whereas sprouts contain stem, leaves and root.
- Immature seedlings contain more vitamins, minerals than the mature seedlings.
- Microgreens have shorter shelf life even if they are stored in the refrigerator.
- They can be grown in variety of places like greenhouses or the buildings in which climate can be controlled (Ebert *et al.*, 2014).



Microgreens vs Sprouts:

- Microgreens might be generally misconcepted for grown seeds (sprouts), which have been regularly concerned in food-borne disease although, microgreens possess some characteristic similarities with freshly herbs (e.g., basil, thyme, and cilantro), petite greens (e.g., baby spinach and spring mix) and sprouts.
- Many research studies discussed about nutrition and physiological properties of microgreens but since 2009 a very few have reports particularly examined the food safety hazards of microgreens whereas worldwide studies have been carried out in order to explore leafy green and sprout safety.
- Microgreens and sprouts are consumed in immature condition however they are distinct with each other.
- Sprouts are mainly grown-up in dark environment of moisture where ready to microbial proliferation and their use different from of micro and baby-greens has been applied in outbreaks of food borne epidemics.
- Also, micro greens are having wide range of leaf color, shape and varieties and greater taste increasing properties than sprouts.
- Many recent reports suggested that the nitrate content in microgreens is lower than that in fully grown vegetable leaves, further they also have higher amounts of minerals (Ca, Mg, Fe, Mn, Zn, Se and Mo) and phytonutrients (ascorbic acid, beta-carotene, alpha-tocopherol and phylloquinone) (Xiao *et al.*, 2016).

Importance of Microgreens:

Easy to Grow: Microgreens are incredibly easy to grow due since they are harvested at the first true leaf stage and can be grown effortlessly on a sunny windowsill.

Quick to harvest: Microgreens get ready to eat in just two weeks.

Packed with flavours: Though microgreens are tiny, the concentration of flavours makes them a favourite of chefs and food lovers around the world.

Loaded with nutrients: Microgreens have a higher concentration of nutrients than mature vegetables and herbs. Some microgreen varieties are having up to 40 times more nutrition than grown vegetables.

Nutritional and Health Benefits:

- Nutrients in microgreens vary according to the variety but most of them are rich in potassium.
- They also contain vitamins, minerals and have some antioxidant properties.
- Microgreens of green daikon radish and red Amaranth contain the highest amount of vitamin K, vitamin C and vitamin E.
- Nutrients present in microgreens are beneficial for skin and eyes. There has been a great reduction in the number of cancer patients due to utilization of these microgreens in the diet.
- Moreover, consumption of these, help in improving the overall hormonal balance of the body.
- The crystalline compounds present in microgreens pose a wide range of health benefits. Estrogen stabilizer present in microgreens is beneficial to both men and women. Therefore, microgreens are known as functional foods (Barillari *et al.*, 2005).

Health Benefits of Microgreens:

Eating vegetables is linked to a lower risk of many diseases as they contain high amounts of vitamins, minerals and beneficial plant compounds which may reduce the risk of the following diseases:

Heart disease: Microgreens are a rich source of polyphenols, a class of antioxidants linked to a lower risk of heart disease. Studies show that microgreens may lower triglyceride and “bad” LDL cholesterol levels.

Alzheimer’s disease: Antioxidant-rich foods, including those containing high amounts of polyphenols, may be linked to a lower risk of Alzheimer’s disease.

Diabetes: Antioxidants may help reduce the type of stress that can prevent sugar from properly entering cells. In lab studies, fenugreek microgreens appeared to enhance cellular sugar uptake by 25–44%.

Certain cancers: Antioxidant-rich fruits and vegetables, especially those rich in polyphenols, may lower the risk of various types of cancer. Polyphenol-rich microgreens may be expected to have similar effects.

Chronic Disease: Inflammation is a major indicator of diseases in the body. Microgreens and vegetable intake in general is shown to reduce inflammation markers as well as lower the risk of several types of cancer (Sharma *et al.*, 2020).

Crop	Health benefits
Broccoli	Stimulate immune system
Cress	Good source of fibre
Fenugreek	Effective against anaemia
Kale	Rich in anti-oxidants
Linseed	Rich in Omega- 3 fatty acids
Fennel	Decrease risk of heart attack
Mustard	Effective against fever and cold

Micro green name	Germination time	Estimated time to harvest
Amarantha red desi	3-5 days	9-12 days
Amarantha red granet	2-3 days	7-10 days
Alfa alfa	1-2 days	7-9 days
Carrot	3-5 days	10-12 days
Chia	2-3 days	8-10 days
Flax	2-3 days	8-10 days
Garden cress	2-3 days	8-12 days
Lettuce green	1-2 days	7-9 days
Mustard yellow	1-2 days	7-9 days
Red onion desi	2-3 days	8-12 days
Pakchoi/ bak choy	1-2 days	8-12 days
Radish daikon	1-2 days	7-10 days
Radish desi	1-2 days	7-10 days

Harvesting:

When they reach the first true leaf stage, usually at about 2 inch tall. Time from seeding to harvest can vary greatly by crop from 7 to 21 days. Using scissors stems are cut along with the stem. Few microgreens show regrowth (Kyriacou *et al.*, 2016).

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