JUST AGRICULTURE™
multidisciplinary e-Newsletter

Microgreens - The Super Food of Next Generation

Deepika[1*], Netravati[2], Gandikota Brahmani[1] and Nikhil B.K.[3]
[1]University of Horticultural Sciences, Bagalkot, Karnataka (587 104), India
[2]University of Agricultural Sciences, Raichur, Karnataka (584 104), India
[3]IARI Mega University, Hyderabad Hub, Telangana (500 030), India

ARTICLE ID: 09

Abstract

Microgreens are a new type of unique foods that are becoming even more popular. These are very delicate, young cotyledon leafy greens with remarkable range of flavors, textures and colors. A new class of edible vegetables known as microgreens is collected after the initial cotyledon leaves have fully developed. Microgreens are gaining important as an innovative culinary element. Mustard, cabbage, radish, spinach and lettuce mainly used as microgreens as they are having very delicate structure and colours. They can be used as edible garnishes or added to salads. Microgreens containes nutrients, including as vitamins, minerals, and antioxidants, that are necessary for human health are included in them.

Keywords: Antioxidant, Cotyledon leaf, Microgreens, Superfood

Introduction

In the fast-paced society, poor diets are causing a number of mental and physical health problems for people. So, now everyone is getting aware regarding health habits especially after COVID-19 pandemic and then incorporation of fresh, nutritious and healthy food habits in the diet system which includes sprouts, microgreens etc., which are not only nutritious but also meeting the need of various consumer demands viz., taste, flavor etc.. They also can reach their maximum usage in a relatively short period of time and have cheap production costs. The dietary guidelines of the USDA and the U.S. Department of Health and Human Services varies in the humans based on the various criteria i.e., age, sex, health status etc. For example male and female can consume 1-4 and 1-3 cup of vegetables per day respectively. However, the individual's average vegetable consumption falls below of the suggested amounts. Microgreens are the finest substitutes to meet the average vegetable diet need for each individual. These are tiny, but they feature a variety of nutrients, unique flavors and delicate textures. Microgreens are best choices which contribute to maintaine the physical and mental health of participants in a space mission. The production of microgreens is easy due to it can

JUST AGRICULTURE™
multidisciplinary e-Newsletter

be cultivated on static and shallow substrates, while the supplementation of nutrients is less required. Moreover, microgreens can be harvested directly by crew members, thus ensuring a high quality and freshness and meeting the dietary needs of fresh and nutritional foods for astronauts. Harvesting occurs 7-21 days after germination and includes the precise section of the delicate plant's growing stem, cotyledon leaves and likely true leaves. These useful micro-vegetables are typically 2-8 cm tall and despite their small size, offer strong sensory qualities like flavor, texture, scent, look and unique colors. They also include an abundance of different phytonutrients, which vary depending on the type of plant chosen to make the microgreens. These have been added to people's diets in the age of global health consciousness because of its capacity to cover nutritional gaps and support overall health. They are regarded as the next generation of "super foods" or "functional foods" since they contain a variety of phytonutrients, including antioxidants, vitamins, minerals, phenolic compounds and many more which are essential for maintaining the human health. These are referred to as "vegetable confetti" it gives a variety of foods unexpectedly strong flavors, vibrant hues and crisp textures (Nayak et al., 2021).

Differences between Sprouts vs. Microgreens vs. Baby Greens vs. Mature Plants

Sprouts and microgreens can be produced very quickly, easily and cost-effectively due to simple requirements for equipment and supplies and they develop quickly varying around a few days (sprouts) to approximately two weeks (microgreens). Baby greens development process varying from 20 to 40 days while mature plants took several months. Some of the important differences between the sprouts, microgreens, babygreens and mature plants are listed in table 1.

Table 1: Comparison of sprouts, microgreens, baby greens and mature plants (Bhaswant *et al.*, 2023)

Features	**Sprouts**	**Microgreens**	**Baby Greens**	**Mature Plants**
Height	5-8 cm	3-10 cm	10-15 cm	Few cm
Production time	3-10 days	7-21 days	20-40 days	Few months

JUST AGRICULTURE™
multidisciplinary e-Newsletter

Production system	Don't need a growing medium or soil.	Able to be grown in the soil or in the media.	Need a medium in order to grow.	Cultivated in fields of soil. Require a growing medium.
Root appearance	Very tiny roots with the absence of root hairs.	They have tiny root and root hairs.	They have root and root hairs.	They have developed root system
Plant growth during harvesting stage	Germinated seeds with the little development of cotyledons	Cotyledons growth with 2-3 leaves	Young seedlings possessed true leaves	Mature plant that is fully grown and capable of producing fruits or vegetable.

Commonly Used Microgreens

Usually, taxa in the Brassicaceae family are utilized more for the production of microgreens. *Beta vulgaris* and *Brassica juncea* are the most commonly used vegetables for production of microgreens. A phytochemical composition, nutritional value, intensity of aroma, astringency, bitterness, grassiness, heat sourness, sweetness, texture and acceptability of appearance, flavor and texture are all considered important characteristics for microgreen production. In general, the astringent, bitter, sour and pungent flavors commonly encountered among glucosinolate rich brassicaceae vegetables, such as mustard, radish and cress. Microgreens are often derived from the chenopodiaceae and amaranthaceae families. Humans favor colored microgreens, such as beet and amaranth, for their diet.

Varieties of Microgreens:

Microgreens can be grown from many different types of seeds. The most popular varieties are produced using seeds from the following plant families

Asteraceae family: Lettuce, endive, chicory

Brassicaceae family: Cauliflower, broccoli, cabbage, watercress, radish and arugula

Apiacea efamily: Dill, carrot, fennel and celery Amaryllidaceaefamily: Garlic, onion, leek

Amaranthaceae family: Amaranth, quinoa swiss chard, beet and spinach

Cucurbitaceae family: Melon, cucumber and squash

JUST AGRICULTURE™
multidisciplinary e-Newsletter

Cereals such as rice, oats, wheat, corn and barley, as well as legumes like chickpeas, beans and lentils, are also sometimes grown into microgreens.

Health Benefits

Microgreens that require little horticultural input can have harvest indices of nearly 90 pcent, which indicates crop efficiency per unit area, whether on or off soil, as well as time and volume**.** As compared to seeds, sprouts, baby greens and mature plants, microgreens are superior due to their delicate textures, vibrant colors, distinctive aromas and high nutrient density, especially minerals, amino acids, enzymes, pigments, vitamins, polyphenols and overall antioxidant capacity. These microgreens possessed 9 times higher in the nutrition aspects as compared to mature greens. Red cabbage, cilantro, garnet amaranth and green daikon radish microgreens have the highest levels of ascorbic acid, carotenoids, phylloquinone and tocopherols, respectively. Due to their nutritional content they can be serving as good food sources and nutrients supplement for human being as well as for space life researches (astronauts). The microgreens benefits are mainly linked with their high levels of antioxidant activity due to presence of abundance of bioactive compounds, such as pigments, polyphenols and ascorbic acid. Microgreens can cure hemolytic anemia and lower the chance of long-term disorders like cancer, heart diseases, skin ailments and age-related eye disorders *etc.* Microgreens contain oleic acid, linolenic acid, alpha linolenic and fatty acid which are essential for good health of kidney. An alpha tocopherol also present in the microgreens which is involved in many body functions like muscle movements, nerve impulses, boosting immune system and also involved in many different body functions. They are rich in fiber, phenols and amino acid so that helps in reduce the obesity in humans (as mentioned in Figure 1).

JUST AGRICULTURE™
multidisciplinary e-Newsletter

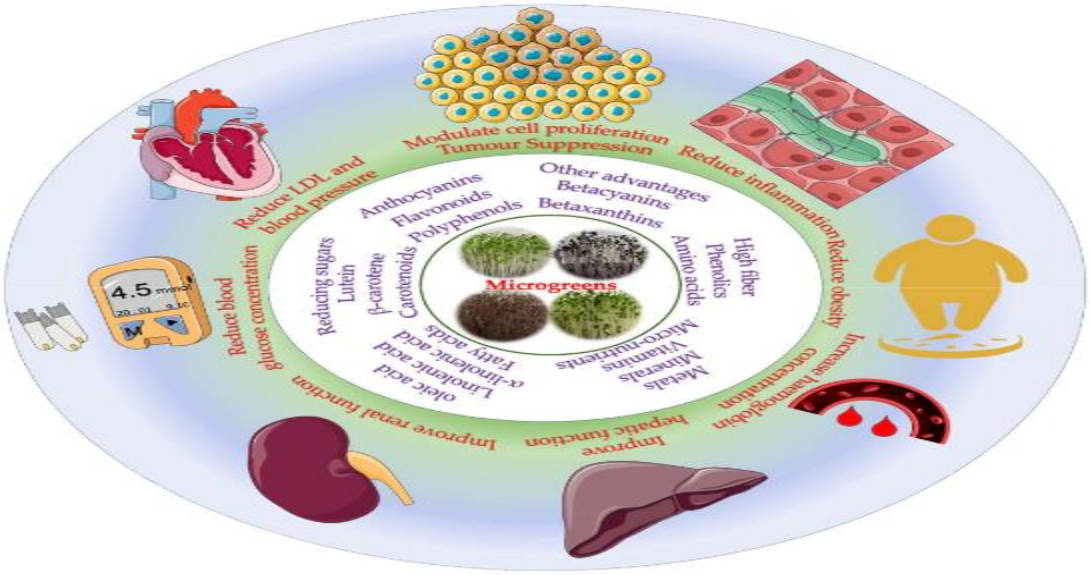

Figure 1: Overview of health benefits of microgreens (Bhaswant *et al.*, 2023)

Conclusion

Microgreens are emerging plant-based functional food which can be harvested within a short span of a week or two weeks. They are an excellent source of phytochemicals like chlorophyll, vital minerals, polyphenols and carotenoids. It is regarded as a useful food that may help or lessen chronic diseases because of its high antioxidant, anti-inflammatory and anti-diabetic properties, which include anthocyanins, glucosinolates, *etc*. The variety of microgreen species provides consumers with a multitude of health advantages.

References

Bhaswant, M., Shanmugam, D.K., Miyazawa, T., Abe, C., and Miyazawa, T. (2023). Microgreens - A comprehensive review of bioactive molecules and health benefits. *Molecules* 28(2), 867.

Nayak, S.L., Dhami, K.S., and Sahu, D. (2021). Microgreens: A potential source of energy. *Biotica Research Today* 3(2), 098-099.