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Microgreens: Nutrient Rich Crop That Can Diversify Food System

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Microgreens are young, delicate greens that are added to salads and major courses to improve their color, flavor, or texture. They can be cultivated indoors and on a small scale, which has led to their widespread adoption by controlled-environment agriculture, an indoor farming method that is crucial for feeding growing urban populations. In addition, microgreens are becoming increasingly popular among consumers because of their superior nutritional content and distinctive sensory qualities. Microgreens are a good source of phytochemicals like carotenoids and phenolic compounds, which function as antioxidants in the human body, as well as vitamins (including VC) and minerals (such as copper and zinc).

Introduction

Microgreens are young, delicate greens that are added to salads and major courses to improve their color, flavor, or Vegetable greens that have not yet grown cotyledonary leaves are called microgreens. Microgreens have been grown in Southern California since the 1990s, and over the past ten years, they have become more and more popular due to their crisp flavor and nutritional advantages (Lenzi *et al.*, 2019). Since microgreens have a higher nutritional value and a more potent flavor and taste than sprouts, they might be thought of as superior replacements. Compared to their mature counterparts, microgreens may also have greater concentrations of phytochemicals, minerals, and vitamins. Therefore, including microgreens in diets may enhance nutritional value and help consumers achieve better health results. Microgreens are exceedingly sensitive and often have a limited shelf life; therefore, they have also brought several issues to producers and the supply chain (Puccinelli *et al.*, 2019).

Crops Commonly Used for Microscale Vegetable Production

The seeds of several crops, including legumes, cereals, vegetables, pseudocereals, and herbs, are used to grow microgreens (Verlinden, 2020). Consumers are particularly interested in sprouts and microgreens' appearance, texture, flavor, phytochemical makeup, and nutritional value. With the exception of beans and a few kinds of oilseed trees, most crops are cultivated for microgreens. Asian and vegetarian recipes have long relied on mungbean and soybean sprouts as crucial year-round ingredients (Ghani *et al.*, 2016). Mungbean microgreens have gained popularity recently in the Americas, Europe, and Africa. Although this category includes a number of different crops, "bean microgreens" is the name that most people associate with them. The majority of legumes used as food and pasture are renowned for their high nutritional content, profusion of minerals, and secondary metabolites. Compared to uncooked seeds, microgreens frequently have greater amounts of beneficial substances (Kurian *et al.*, 2020). When cereal grains are used for microgreens, their nutritional content is

improved, especially when at least 8 to 10 days of sprouting are used. During the sprouting process, hydrolytic enzymes are activated and minerals are liberated from their phytate chelates, making them accessible (Lemmens *et al.*, 2019). Additionally, vitamins are synthesized and accumulate. While many common goods like bread, pasta, noodles, and cereal flakes include sprouted grains, food processing frequently degrades their nutritional value.

Table 1. The crop groups commonly used for microgreen production.

Crop Group	Family	Common Name	Botanical Name
Vegetables & herbs	Apiaceae	Celery	*Apium graveolens*
		Carrot	*Daucus carota*
		Coriander	*Coriandrum sativum*
		Parsley	*Petroselinum crispum*
		Fennel	*Foeniculum vulgare*
	Amaryllidaceae	Onion	*Allium cepa*
		Leek	*Allium porrum*
		Chives	*Allium schoenoprasum*
	Fabaceae	fenugreek	*Trigonella foenum-graecum*
		Garden pea	*Pisum sativum*
		Snow peas	*Pisum sativum var. saccharatum*
	Brassicaceae	Purple mustard	*Brassica juncea*
		Chinese kale	*Brassica oleracea*, var. *alboglabra*
		Cabbage (red)	*Brassica oleracea* var. *capitata*
		Purple kohlrabi	*Brassica oleracea* var. *gongylodes*
		Broccoli	*Brassica oleracea* var. *italica*
		Pak choi	*Brassica rapa* var. *chinensis*
		Turnip	*Brassica rapa* var. *rapa*
		Watercress	*Nasturtium officinale*
	Amaranthaceae	Beet	*Beta vulgaris*
		Spinach	*Spinacia oleracea*
Legumes	Fabaceae	Chickpea	*Cicer arietinum*
		Lentil	*Lens culinaris*
		Alfalfa	*Medicago sativa*
		Clover	*Trifolium repens*
		Mungbean	*Vigna radiata*
		Adzuki bean	*Vigna angularis*
Cereals	Poaceae	Barley	*Hordeum vulgare*
		Maize	*Zea mays*
		Oat	*Avena sativa*
		Rice	*Oryza sativa*
		Rye	*Secale cereale*
		Wheat	*Triticum aestivum*
Pseudocereals	Amaranthaceae	quinoa	*Chenopodium quinoa*
		amaranth	*Amaranthus sp.*

Conclusion

This article examined the nutritional value of microgreens as well as their potential health advantages as revealed by in vitro and in vivo investigations. The nutrients and antioxidants found in microgreens include VC, minerals (including Cu and Zn), carotenoids, and phenolic compounds. Numerous studies have revealed that microgreens have more nutritional value than their mature counterparts. The nutritional value of microgreens can be improved by a number of pre- and post-harvest procedures, including light exposure, salt stress, nutrient fortification, and the use of natural media substrates. Microgreens have a great antioxidant capacity and are efficient in regulating plasma lipoprotein and cholesterol metabolism due to their high vitamin and phytochemical content, suggesting a possible role in the prevention and/or treatment of chronic diseases.

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