

Microgreens



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What Will We Cover?

- What are Microgreens
- Why eat Microgreens
- Why grow Microgreens
- What Microgreens can I grow
- All About Growing Microgreens



What are Microgreens

- Microgreens are seedlings grown to fully expanded cotyledons or one true leaf.
- Microgreens are a close cousin of sprouts.
- Microgreens are grown with light in a soil mix unlike sprouts, which are typically grown in the dark without soil.
- Sprouts are consumed entirely-leaves, stem, & roots; only the stems & leaves of microgreens are eaten.



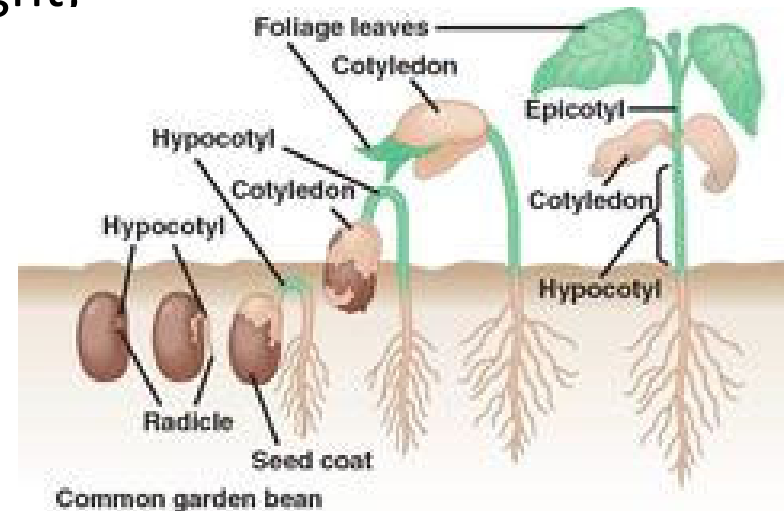
Immature Harvesting Growth Stages

Sprouts: germinated seeds with emerging root

Microgreens: 2-3 inches in height;
7-21 days (harvest stem,
cotyledons, and emerging
true leaves)

Baby greens: 4-6 inches
in height; 21-40 days

Mature greens: >6 inches in height; 40-60 days



Why Eat Microgreens

Nutritious

Vivid colors

Versatile



Intense flavor

Tender texture



Study from University of Maryland College of Agriculture & Natural Resources

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Article

pubs.acs.org/JAFC

Assessment of Vitamin and Carotenoid Concentrations of Emerging Food Products: Edible Microgreens

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ABSTRACT: Microgreens (seedlings of edible vegetables and herbs) have gained popularity as a new culinary trend over the past few years. Although small in size, microgreens can provide surprisingly intense flavors, vivid colors, and crisp textures and can be served as an edible garnish or a new salad ingredient. However, no scientific data are currently available on the nutritional content of microgreens. The present study was conducted to determine the concentrations of ascorbic acid, carotenoids, phyloquinone, and tocopherols in 25 commercially available microgreens. Results showed that different microgreens provided extremely varying amounts of vitamins and carotenoids. Total ascorbic acid contents ranged from 20.4 to 147.0 mg per 100 g fresh weight (FW), while β -carotene, lutein/zeaxanthin, and violaxanthin concentrations ranged from 0.6 to 12.1, 1.3 to 10.1, and 0.9 to 7.7 mg/100 g FW, respectively. Phyloquinone level varied from 0.6 to 4.1 μ g/g FW; meanwhile, α -tocopherol and γ -tocopherol ranged from 4.9 to 87.4 and 3.0 to 39.4 mg/100 g FW, respectively. Among the 25 microgreens assayed, red cabbage, cilantro, garnet amaranth, and green daikon radish had the highest concentrations of ascorbic acids, carotenoids, phyloquinone, and tocopherols, respectively. In comparison with nutritional concentrations in mature leaves (USDA National Nutrient Database), the microgreen cotyledon leaves possessed higher nutritional densities. The phytonutrient data may provide a scientific basis for evaluating nutritional values of microgreens and contribute to food composition database. These data also may be used as a reference for health agencies' recommendations and consumers' choices of fresh vegetables.

KEYWORDS: Microgreens, phytonutrients, ascorbic acid, carotenoids, phyloquinone, tocopherols, HPLC



<http://agnr.umd.edu/news/mighty-microgreens>

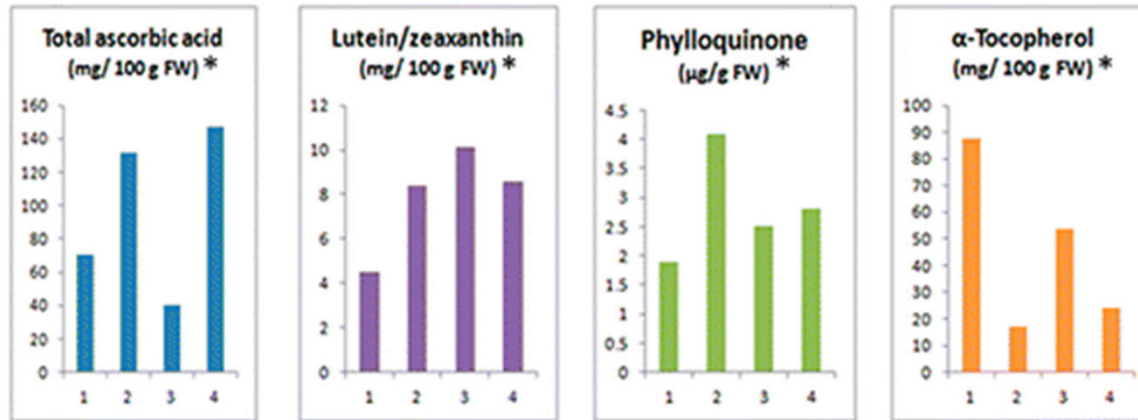


Nutrients Assessment

- Objective: to analyze the concentration of vitamins and carotenoids in 25 commercially available microgreens.
- Nutrients analyzed:
 - 1) Ascorbic Acid (V_c)
 - 2) Phylloquinone (V_{K1})
 - 3) Tocopherols (V_E)
 - 4) Carotenoids (Provitamin A: β -Carotene, Lutein/zeaxanthin, Violaxanthin.)



A Major Takeaway



In comparison with nutritional concentrations in mature leaves (USDA National Nutrient Database), the microgreen cotyledon leaves possessed higher nutritional densities.

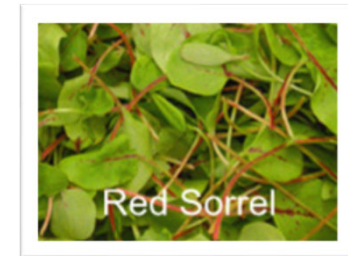


Top 5 Microgreens Rich in Carotanooids

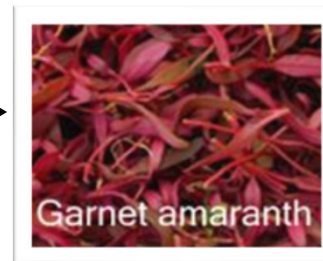
- No. 1 Cilantro



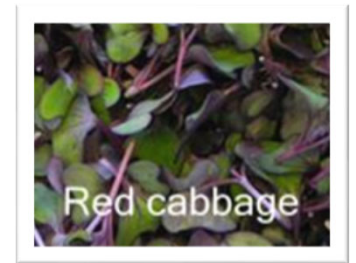
- No. 2 Red sorrel



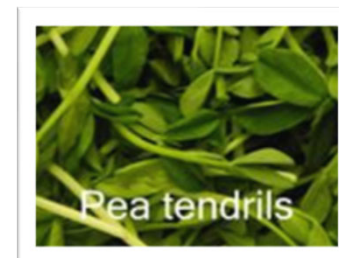
- No. 3 Garnet amaranth



- No. 4 Red cabbage



- No. 5 Pea tendrils



Dietary Tips

- Microgreens can boost color, enhance flavor, and add texture to any dish, while delivering a nutritional boost as well.
- Some tips for adding microgreens into meals include:
 - using them as a topping for salads and soups
 - tossing a small handful into a smoothie or juice before blending
 - using them as a garnish alongside any main dish
 - placing microgreens on top of a flatbread or pizza after cooking
 - adding microgreens into an omelet or frittata
 - replacing lettuce with microgreens on a burger, sandwich, or tacos



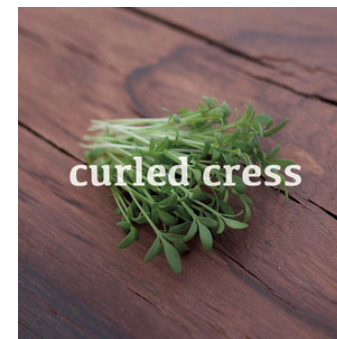
Why Grow Microgreens

- Fun & easy to grow
- Harvest in 10-14 days
- Grow year-round
- \$1/oz. in Whole Foods



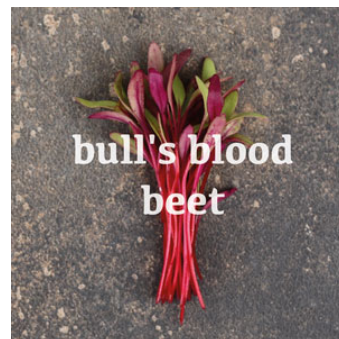
What Microgreens Can I Grow

Fast and easy: arugula, kale, radish, broccoli, mustard, broccoli raab, bok choy, komatsuna and other Asian greens, cress, lettuces (fragile)



What Microgreens Can I Grow

More challenging: amaranth, beet, Swiss chard, cilantro, basil, pea and sunflower shoots



Simple Steps to Growing

- Fill a shallow container with 1-1.5 in. of moist growing media
- Sow seeds thickly and evenly
- Water from bottom
- Harvest with scissors when 2-3 in. tall
- ENJOY!

Seems easy enough, right?



Growing Media

- **Soilbased** – Any microgreen can be grown in soil, but that doesn't mean it's the best choice. Low growing crops like basil, for example, end up pretty messy at harvest. The closer you can harvest your microgreens to the media while keeping it clean, the better.
- **Soil-less media** – Coco coir, blends of vermiculite and/or perlite with an organic amendment, or hydroponic lava rock are examples of soil-less media.
- **Hydroponic** – It involves the use of a growing 'pad' which absorbs and retains water so as to keep the germinating seeds and emerging greens continually moist.



More on Media

- Fertilizing isn't needed with microgreens so make sure soil based media has little or no added nutrients
- If using soil, it should be a germination mix which includes a lot of vermiculite. May need sterilization.
- A rule of thumb is the large seeds should be grown in soil or soil-less media. This is because they need to be covered with a small layer of soil in order for the seed coat to shed itself from the emerging first set of leaves.
- Some hydroponic grow mats can be cleaned off, flipped over and used a second time – soil and soil-less media may not be reusable
- Compost leftover soil, soil-less and biodegradable mats



Commercial Flats for Growing Large Quantities



Repurposed shallow food container (lid becomes saucer)



You Can Really Grow in Anything!



Growing Mats for Hydroponic Growing



Wood fiber mats



More Mats



Biostrate



Coco (coir)



Hemp



Synthetic



Light

- First few days after planting should be a “**blackout**” period. Light isn’t needed, but the humidity and warmth is. Typical recommendation is to cover with a blackout dome. Blackout times are different based on the type of seed being planted
- After this period they need:
 - Direct Sunlight – 5 hours per day
 - OR
 - Indirect Sunlight – 8 hours per day

<https://www.bootstrapfarmer.com/blogs/microgreens/the-ultimate-microgreen-cheat-sheet>



Light (cont.)

- Window light may be insufficient
- Lettuce, arugula, mustards, Asian greens will grow ok in low light
- T-8 fluorescent lights can supplement or replace sunlight (keep tubes < 2 in. from plants)



Water

- All water is not created equal.
- The ideal pH of water for microgreens is 6.0
 - 2 teaspoons of lemon juice to gallon of water
- Keep media moist without being uber wet
 - Mist or base water to keep media off plants
- Tray-in-tray or Container-in-container watering is a preferred method
- These are general recommendations as some microgreens prefer to be a little drier



Planting

- Recommended plant spacing: 3/16 in. to 1/4-in.
- Difficult to sow seeds evenly (no thinning necessary)
- 20-row seeding flat contains around 1,000 plants



20-row seeding flat produced larger plants and root systems than plain flat



Crops in the Same Tray Should Have Similar Germination Rates



Tray a Variety of Crops, Containers and Locations



Invasion of the “White Fuzzies”

- Mold
- Root Hairs



Harvesting

- Cut at “soil line” when greens are 2-3-in. tall
- No re-growth
- Refrigerate for up to 10 days



Closer Look



What To Do With The Leftovers

- Compost
- Vermicompost
- Flip
- Bake (180° for 30 min)
- Disgard



More on Leftovers

- Thoroughly clean
- Sterilize with bleach solution



In Closing

Experiment with different seeds and containers

Have fun!

Enjoy your bounty!



Sources and Resources

Web Links:

<https://extension.umd.edu/>

<http://www.growingmicrogreens.com/>- commercial site for microgreen supplies

<http://agnr.umd.edu/news/mighty-microgreens-UMD> AGNR research project

<http://www.ext.colostate.edu/pubs/foodnut/09373.html>- Health Benefits and Safe handling of Salad Greens

<http://extension.msstate.edu/news/southern-gardening/2014/home-gardeners-can-grow-microgreens>

<https://www.bootstrapfarmer.com/blogs/microgreens/the-ultimate-microgreen-cheat-sheet>

Books:

Microgreen Garden- Mark Braunstein

Microgreens- Fiona Hill

Microgreens- Eric Franks & Jasmine Richardson

