Growing Sprouts & Microgreens

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Benton County Master Gardeners

Corvallis Public Seed Library

A collaborative project of the Corvallis Sustainability Coalition and the Corvallis-Benton County Public Library, with educational support from the OSU Extension Service. Volunteer- run, with free seeds and events, open to all for personal use. Stocked with donated vegetable, herb & flower seeds.

Thanks to these generous contributors:

Adaptive Seeds
Shonnard's Nursery
First Alternative Co-op
Garland Nursery
Natural Grocers - Corvallis Store
Peaceful Valley Farm & Garden Supply
OSU Extension Food Hero Program
Friends of the Corvallis-Benton County Library
Individual Seed Donors and Volunteers

www.bentonmg.org/public-seed-library-resources

Connect at CorvallisPublicSeedLibrary@gmail.com

Pets like wheatgrass too. Photo by Jill Farrow.

Why grow sprouts & microgreens?

Food is medicine. They're also delicious, fun to grow, hyper-local and fast slow food.

“Let food be thy medicine,
and let thy medicine be
thy food.”

“All disease begins
in the gut”

- Hippocrates

“People are fed by the food industry,
which pays no attention to health…

And are treated by the health industry,
which pays no attention to food.”

-Wendell Berry

The top 10 leading causes of death accounted for 73.4% of all deaths in the US in 2019:

Heart disease
Cancer
Lower respiratory diseases
Stroke
Alzheimer disease
Diabetes
Kidney disease
Influenza & Pneumonia
Suicide

Metabolic syndrome is a cluster of conditions that often occur together and increase the risk of heart disease, stroke and diabetes. These conditions include high blood pressure, high blood sugar, excess body fat at the waist, high triglycerides, and low levels of HDL ('good') cholesterol.

(Kochanek, Xu, & Arias, Centers for Disease Control, 2020.) (Mayo Clinic, 2021)

- Research data shows 1/3 of all cancers are linked to diet. (Herring, 2016)
- Research demonstrates that diet can play an important role in preventing and treating cancer. Sulforaphane, high in cruciferous vegetables, is a compound that fights cancer, normalizes DNA function. (ibid)
- Polyphenols are antioxidants, can help prevent several cancers, reduce the formation of blood clots which decreases the risk of heart attacks and strokes, and promote dilation of blood vessels.
- Only 1 in 10 adults is eating the recommended 5-9 servings of fruits & vegetables a day. Children are eating even less. (Robbins, 2023)

“The nutritional value and content of phytochemicals often vary with plant growth and development within the same crop. Sprouted seeds and microgreens are often more nutrient-dense than ungerminated seeds or mature vegetables.”

(Ebert, 2022. ***Sprouts and Microgreens- Novel Food Sources for Healthy Diets.***)

Water and Sunlight as Elixirs

- “The sprouting process activates hydrolytic enzymes and releases seed nutrients from their phytate chelates, releases essential amino acids making them bioavailable; converts starch to sugar, accumulates phenolic compounds with antioxidant ability, and accumulates vitamins.
- The sprouting process reduces antinutritional factors by degrading phytate, oxalate, and tannins, leading to enhanced palatability, improved bioaccessibility of iron and calcium, and enhanced digestibility of proteins.
- Photosynthetic activity in microgreens enhances vitamin C and E compared to sprouts.”

(ibid)

Life *is* chemistry.

Key Components of Seeds

- Protective seed coat that helps to ensure seed survival in nature (and slows down sprouting)
- Embryo that grows to become root, stem, and two embryonic leaves called cotyledons in dicot plants, or one cotyledon in monocot (e.g. grass)
- Endosperm that provides food source to embryo until it's able to produce its own food through photosynthesis in true leaves which grow after cotyledons

What's the difference?

Sprouts:

- Sprouts are harvested when the cotyledons are still under-developed
- Before true leaves have emerged
- When eating a sprout, you're eating the entire baby plant from the root to the cotyledon shoot
- Sprouts can be grown in glass jars without soil
- They are more translucent than green due to lack of photosynthesis.

What's the difference?

Microgreens:

- Microgreens are tender, immature greens, more developed than sprouts, but smaller than baby greens.
- They have a central stem with two fully developed cotyledon leaves and mostly one pair of small true leaves that are bright green and look like the crop.
- The stem, cotyledons, and first true leaves are eaten, but not the roots and seeds which were planted in soil.

“What’s in a name? That which we call a rose, by any other name, would smell as sweet.”

– William Shakespeare,
Romeo and Juliet

Sprouts in Jar

Pros
Fastest to harvest
Fewer supplies to buy
Don't require direct light
Easy to observe all growth

Cons:
Must rinse 2-4 times daily
Seed husks remain in jar
Shorter storage life
Risk of contamination if don't rinse & drain properly

Microgreens

Pros
Can store live in tray
Some cut & come again
More vitamins & minerals
Seed husks fall off easily
Used soil is compost

Cons:
Need sun through window or light
Must buy soil (& fertilizer)
Can't reuse soil
Risk of contamination from soil or pots standing in water

Supplies for Growing in Glass Jar

- High quality sprouting seeds
- Fresh water for rinsing
- Distilled vinegar or apple cider vinegar to sanitize surface level of seeds before sprouting, and facilitate sprouting time
- Glass jars with strainer tops, or cheesecloth & rubber band
- Draining rack or bowl where jar can be supported at angle to drain and have air flow
- Strainer (fine mesh, flat bottom easiest)

Why use filtered or distilled water?

Municipal water and local well water may contain biological or chemical impurities that you may not want exposure to through your sprouts and microgreens. These range from residual chlorate and TTHMs from Corvallis' disinfection of water to their addition of fluoride, also metals.

Learn more about what's in your city's water at Earth Working Group's (EWG) Tap Water Database

Sanitization

- Wash hands and equipment thoroughly.
- Consider type and quality of seeds, and whether to sanitize the seeds before soaking. Soaking gelatinous seeds is not advised.
- Sanitization of seeds by soaking in agent to kill pathogens also begins to breakdown seeds' protective coating and hastens germination.
- Guidance on how to sanitize seeds varies: see References.
- Individual risk tolerance for potential exposure to pathogens varies by age, health condition, personal values and goals.
- May use 2 T of apple cider vinegar or white distilled vinegar to 1 T of greens sized seeds in a jar, or same 2:1 vinegar to seed proportion for legume sized seeds. Stir or swirl well and let soak for 15 minutes. Then drain.

(Kansas State/University of Missouri Extension, 2018)

Sanitization Agent Rinsing

- Rinse well by filling jar 3/4 full with fresh water, swirling, then draining, repeating 3-4x or until you don't smell sanitizing agent.
- Fill jar with enough water to cover the seed by an inch or more, then skim off all floating seed, seed coat fragments, and other debris to reduce risk of contamination.
- Use a strainer lid, or unbleached cheesecloth secured well with rubber band or twine. Gently shake out residual water.

(ibid)

Soak Seeds After Sanitizing

- Some seeds need to be soaked fully submerged in fresh room temperature water for many hours to fully hydrate and facilitate consistent germination.
- Guideline is 1 part seeds to 3 parts water. Seeds will absorb water and expand!
- After initial soaking, rinse with fresh water and swirl, then drain. Do 2-3 times: soaking liquid can ferment and so spoil crop.
- Gently shake out all water.
- Sniff to learn your crops' smell.

Rinse, Drain, and Observe

- After initial soaking, rinse with fresh water and swirl, then drain. Gently shake out all water.
- Rinse, swirl, and drain 2-4 times daily.
- Store jars in warm area, out of drafts. Crops have temperature preferences; 65-75F optimal for sprouting most crops. Confirm for each.
- Don’t place in direct sunlight.
- Do place near sink to make rinsing care easy.

Adzuki beans and other legume sprouts are generally ready to harvest in about 3-4 days, and can be eaten before the cotyledon leaves appear, or grown further.

Broccoli sprouts are generally ready in 3-5 days. Varies with temperature. You may choose to provide indirect light to green some, as you prefer.

For avoiding reflection while taking this photo, these jars are shown placed more vertically in the rack than they are normally stored. Sprouts shown Day 3. Photo by Jill Farrow.

Broccoli sprouts after 3 days.
Photo by Jill Farrow.

- Rinse and drain well 2-4x daily. Be thorough, also gentle with baby shoots.
- Store inverted at angle for drainage and airflow.
- Give seeds space to grow on sides of jar. Reduce clumping.
- Sprouts thrive in aerobic environment, not too cold or hot, not too wet or dry.
- Growth is visible daily!
- Growing period is crop & temp dependent, 3-10 days.

Wash Sprouts to Remove Hulls Before Storing

Photo by Jill Farrow

- Husks will hasten spoilage.
- A flat bottomed strainer is helpful for separating husks from sprouts while spraying.
- Partially submerge salad spinner bowl in water to rinse away husks.
- Dry in salad spinner or using clean towels.
- Store in refrigerator <40F wrapped in paper towel placed in container, or in glass jar with lid.
- Do not freeze.

A simple bowl of homemade roasted carrots & yam with ginger root soup served topped with fresh broccoli sprouts is delicious, and high in vitamins A, B's, & C, iron, minerals & sulforaphane shown to fight cancer, improve immunity & heart health. Photo by Jill Farrow.

Supplies for Growing in Soil

- High quality sprouting seeds
- Fresh water
- Distilled vinegar or apple cider vinegar to sanitize surface of seeds before sprouting, and facilitate sprouting time
- Small growing containers (reusable mushroom tray, plastic pint, small loaf pan with several holes poked in bottom, filled with 1” to 1 1/2” of soil)
- Kelp meal fertilizer, if desired, to boost nutrients
- Germination mix (peat moss, vermiculite, and perlite, or coir, is sterile, not reusable). Pumice or unbleached paper towels as non soil alternatives. Plastic, towel, plate or box to cover.
- Spray misting bottle.
- Sharp and sanitized scissors (spray with 70% alcohol).

Prepare Containers

- Wash growing containers well.
- Measure out soil needed, then pre-wet it before filing containers: Mix moistened soil to ensure no dry pockets, then fill containers. Want uniformly wet, not soggy soil.
- To boost nutrients, if desired spread kelp meal on bottom of container in ratio of 1/2 teaspoon kelp meal to 1 1/4 cup soil (amount needed for small loaf pan 3”x6 ”)
- Fill containers with 1 to 1 1/2 inches of soil.
- Don’t fill soil to very top of container: leave 1/4” or so of space for best watering & easy clean cutting to harvest.
- Smooth & level soil to provide good seed to soil contact.

Seeding

- Some crops benefit from soaking to enhance germination, while gelatinous seeds become a gooey mess.
- Take a large pinch of seeds and sprinkle them evenly on top of soil surface, so seeds just barely or not quite touch each other in single layer for highest germination rate and crop yield. For a pint container, that's about 1 teaspoon of seed. See References for Density Calculator and photo examples.
- Gently press seeds to soil surface to seat them well.
- Don't densely compact the soil: loose airy soil is easiest for roots to grow through.
- Roots will curl to form mat on bottom of container where the kelp fertilizer was placed, if used.

Do Not Soak Gelatinous seeds

- Gelatinous seeds include chia, flax, arugula, basil, radish and watercress.
- If you get these wet, they will start to form a gel and become gooey. The gel helps protect the seed from drying out or absorbing too much water.
- Don’t grow in glass jar. Sprout in soil, or try sprouting mesh, unbleached paper towels, or terra cotta clay.
- Leave them be for several days after seeding to let the seeds germinate and start growing before you check on them, as they may stick to a covering layer.

Pro Tip

Cut a piece of cardboard to just fit on the top growing surface of container. Place it on top of plastic barrier, with small weights (like washed river rocks) on top of cardboard for the first two days of darkness.

This will help the seeds' roots penetrate the soil and produce thicker sprouts (so have more texture and fiber).

After 2 days, remove weights and continue dark germination period for another 1-2 days.

(MicroGreen Silo) (Oregon State University, College of Agricultural Sciences Department of Horticulture)

Growing microgreens samples.
Photo by Jennifer Klammer.

Keep Seeds Warm & Moist

- Spray surface of soil, and keep it moist for 3-4 days.
- Don’t put soil over seeds to facilitate clean growth and harvest. May use unbleached paper towel or leave uncovered.
- Cover with plastic, then thick towel, plate, or box to keep the soil consistently moist and keep the seeds in darkness.
- Keep warm, optimally 65-75F, out of cold drafts, and not right by heat source. Above refrigerator works great, or on a shelf in a cupboard or closet. Floors can be cold.

Growing microgreen samples: Pots seeded, sprayed, then covered. Silver covered plastic bag 100% recycled material from Co-op, placed in box with lid. Photos by Jennifer Klammer.

Light & Watering

- After seeds germinate, place in direct sunlight by window, or use full spectrum light during dark days if you want your microgreens to green more.
- Keep soil moist, but not soggy. Check soil moisture daily— temperature and humidity are key variables.
- To reduce risk of mold, water soil from bottom by submerging only the lower portion of container in fresh water for 5 min, then allow to drain in sink. Soil capillary action will draw up water. Alternatively, water surface of soil. Generally less risk of mold if leaves are not sprayed or water splashed off soil.

Seed trays sprouted in darkness after 3 days, about to be moved to sunlight. Photos by Jennifer Klammer.

Seed trays at 6 days, with 3 days in SE window, during cold snap. Inside daytime temps 68F, overnight 64F. Photos by Jennifer Klammer.

To reduce risk of pathogens, mold, & spoiling:

- Use organic or untreated seeds that have been tested for pathogens and germination rate.
- Wash your hands before handling.
- Sanitize surface of seeds before soaking to sprout in jar.
- Don’t allow scissors to touch soil then contaminate crop.
- Use salad spinner and/or clean towel to remove water before storing harvest in refrigerator.
- Wrap in paper towel and place in baggie with air pressed out or container with lid.
- Store at < 40F, but do not freeze.

Food safety:
What's the white stuff?

- Hairs develop on roots if they are reaching out for more water. Spray to dampen with water and they will virtually disappear. Root hairs are normal, and not a health risk. (Hill, 2016)
- Don't eat sprouts if white roots, translucent or green leaves turn brown or have spots, smell putrid, or turn slimy.
- If white fuzz is fluffy like cotton, is longish threads tangled together spreading over multiple microgreen stems, is above the soil, and growing up the stem of fully grown microgreens, it is likely mold.

Sample Chart Crop
(Temperature Dependent)

Crop	Notes	Soak (Hrs)	Sprouts (Days)	MG (Days)
Adzuki Bean	Nutty flavor. High in protein, vitamins, minerals, fiber. Optimal 70F. Harvestable after roots appear	8-12	3-6	
Alfalfa	Mild taste. 1 T yields about 3C. High antioxidants, phytoestrogens, vitamins & minerals	4-8	3-6	
Arugula (Rocket)	Gelatinous. Peppery. High vitamins, minerals, antioxidants	No	-	8-12
Basil	Gelatinous. Flavor varieties. Optimal 65-75F; cold and water sensitive, will blacken. Heat mat helps	No	-	16-25
Bean Mix	Botanical Interest mix is adzuki, mung & lentils. High in protein. 70F. Harvestable after roots appear	8-12	3-6	
Cilantro	Brush gently with hand to free seed husks. Handle gently when drying for storage.			14-21

Crop	Notes	Soak (Hrs)	Sprouts (Days)	MG (Days)
Cress	Gelatinous. Break easily, be gentle when harvest and dry. Harvest young, cut high to avoid soil	-	-	10-15
Fenugreek	Nutty sweet flavor. High in vitamins, minerals & phytochemical. 70F.	8 -12	3-6	
Garbanzo Bean	Nutty flavor. High in protein, vitamins, minerals, fiber. 70F. Harvestable after roots appear or grow til 3-4” tall.	8-12	3-6	14-21
Kale	High in vitamins, minerals, minerals, fiber. 70F. Harvest when 2-4” tall.			14-21
Purple Kohlrabi	Great color and crunch. High in vitamins, minerals polyphenols. Optimal 70F	8-12	6-8	
Mustard	Many types: greens, reds, purple, mild to spicy. High in vitamins, minerals, polyphenols. Cold tolerant.		9-10	
Pea Shoots	Tender and sweet. Highly nutritious. Harvest when 3-4” tall. Optimal 60-70F	4-8	3-6	14-21

Crop	Notes	Soak (Hrs)	Sprouts (Days)	MG (Days)
China Rose Radish	Beautiful red stems, spicy flavor. Cruciferous family, high in nutrients.	8-12	3-6	
Salad Mix	Botanical Interests mix of alfalfa, clover, broccoli & kale, with burgundy amaranth. 70F.	8-12	3-6	
Swiss Chard	Apple Blossom mix of green, red, & white. Slow growing, cut high & cut again. Harvest when 2-4” tall. Optimal 60-75F.	8-12		14-21
Sunflower	Nutty flavor, crunchy. High in protein, iron, calcium, healthy unsaturated fat,	8-12	6-10	7-14
Umami Asian Blend	Savory taste. Mix of Tatsoi, green & red mustards, cabbage. Optimal 65-75F.			7-14
Wheatgrass (Tritium aestivum)	Optimal germination soil temp 60-70F. High in vitamins, minerals, chlorophyll. Dogs & cats love it, kids & the Easter Bunny too.	8-12	2-4	8-10
Cat Grass (Avena sativa)	Cats love this, and it can help with furball elimination	-	-	8-14

- OSU Extension Service Food Hero Program Microgreens Grow Along program: Sign up online for 2 week self-directed guided experience. Also available in Spanish. foodhero.org/microgreens-workshop
- Microgreens Growing Tips. foodhero.org/microgreens-garden-tips
- How to Grow Microgreens. foodhero.org/sites/foodhero-prod/files/gardening-tip-sheets/GIO_MicroGreens_EN_101122.pdf


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Buy or grow?

Supply and Demand

With all the research on all the health benefits of sprouts and microgreens, why aren't they more available? And why are they expensive, given they don't take long to produce?

Sprouts and microgreens are challenging to sell on a large scale because they are so perishable. With such a short shelf life, they're often not stocked because there's little profit margin. And to consumers, the price seems high for the quantity per pint or bag.

Buying bulk untreated or organic sprouts and microgreens seeds to grow at home is an economical and easy way to add fresh whole food with high nutrient levels to your diet.

(Evans. 2020. *The Sprout Book.*

Local Sources for Sprouting Seeds & Sprouting Supplies

This fall, the Public Seed Library received generous donations of Botanical Interests Sprouting and Microgreens seeds from Garland's Nursery and the local Natural Grocers store. They have seed racks stocked in their stores during Spring through Fall.

The First Alternative Co-op South store stocks several crops of sprouting seeds in their Bulk section year round. First Alternative Co-op North has a few jars in their Bulk section (currently below the bulk tea stock) year round.

Online Sprouting Seeds & Sprouting Supplies Sources

- **MicroGreen Silo**. Sells seeds. Growing tips blog. www.microgreensilo.com/microgreen-types/

- **Nature Jim's Sprouts**. Sells seeds. Free how-to guides & recipes. www.naturejims.com/

- **Peaceful Valley Farm & Garden**. Sells sprouting seeds from mums' with thorough 'Planting & Care' instructions including yield and nutrition. www.groworganic.com/collections/sprouting-seeds?_pos=3&_psq=sprouts&_ss=e&_v=1.0

Online Sprouting Seeds & Sprouting Supplies Sources

- **True Leaf Market**. Sells microgreen and sprouts seeds, sprout kits. Free educational resources. www.trueleafmarket.com/

- **West Coast Seeds**. Sells sprouting seeds, convex stainless steel sprouting lids, microgreens seeds. Free how-to guides. www.westcoastseeds.com/pages/search-results-1?filters%5Bcustom_fields.collection%5D%5B0%5D=Microgreens%20Seeds&q=microgreen%20seeds

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The Corvallis Public Seed Library wants your feedback on its offerings and input for future events!

Email CorvallisPublicSeedLibrary@gmail.com