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Tonight's Agenda

- Introduction: Why save seeds as gardeners?
- Botany basics
- What do you need to know first?
- The process: How do you harvest and save seeds?
- Plant families and examples
- Community and Sharing
- Questions



Photo: Fern State Master Gardeners

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Why Save Seeds



Photo: Oregon Seed Savers Exchange

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Humans have been saving seeds for millennia



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Why save seeds?



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Why save seeds?

- Joy in going from seed to seed!
- Grow hard to find varieties
- Save money/self sufficiency
- Share with friends and neighbors
- Community building
- Help preserve rare varieties
- Help varieties adapt to local climate and climate change



photos: Sue Kraemer and Seed Savers Exchange

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Your PNW Climate

The Seattle Times

Science ▾ My Account ▾

New hardiness zone map will help US gardeners keep pace with climate change

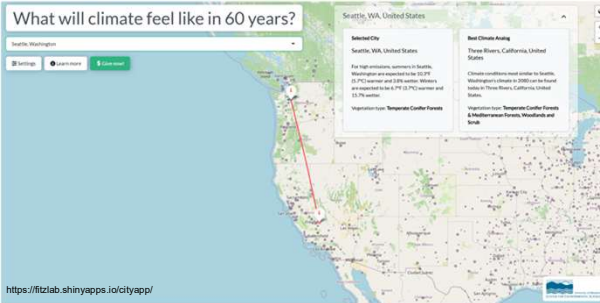
Nov. 18, 2023 at 9:58 am | Updated Nov. 18, 2023 at 6:37 pm

- Seattle is now in 9a
- Download new maps at <https://planthardiness.ars.usda.gov/pages/map-downloads>



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Climate Change Seed Saving Helps Us Adapt



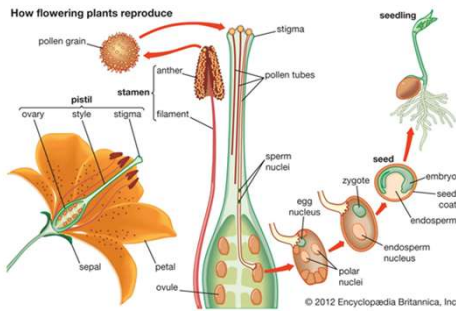
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Botany Basics



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Reproduction in Flowering Plants



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'Perfect' or Complete Flowers

- Have both anther and stigma (male and female)

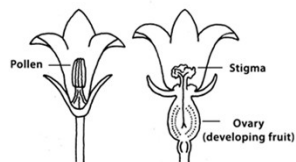


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'Imperfect' or Incomplete: Separate Male and Female Flowers



Male flower Female flower



Male flower Female flower

<http://extension.msstate.edu/publications/publications/growing-pumpkins-for-the-home-garden>

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Monoecious and Dioecious

- Monoecious plants have male and female flowers on the same plant.
 - Examples: squash, cucumbers, corn
- Dioecious plants have male and female flowers on separate plants.
 - Examples: Spinach, some varieties of cucumbers



photo: Sue Kraemer



photo: Wikipedia

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How Are Plants Pollinated?

Self



photo credits: Sue Kraemer

Insect



Wind



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Inbreeders or Outbreeders

- **Inbreeding (or selfing):** "when the sperm of an individual plant fertilizes an ovule of the same plant"
- **Outbreeding (cross-pollination or outcrossing):** "when the sperm of one plant fertilizes an ovule of a different plant of the same species"

—Organic Seed Alliance, A Seed Saving Guide for Gardeners and Farmers

Strong inbreeding

Strong outbreeding



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Open Pollinated (OP), Heirlooms, and Hybrids

From Seed Savers Exchange:

- **Open-pollinated variety:** A variety that, when allowed to cross-pollinate only with other members of the same population, produces offspring that display the characteristic traits of the variety.
 - **Heirloom variety:** An open-pollinated cultivar that has been grown and shared from generation to generation within a family or community.
- **Hybrid:** A plant or variety created by crossing two stable, genetically distinct parental populations; of or related to such a plant or variety; also called an F1 hybrid.
 - F1 stands for "first filial generation"
 - Companies are legally required to label hybrid seeds with F1



Cherokee Purple



Juliet (F1)

<https://seedsavers.org/what-are-heirloom-seeds/>

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Open Pollinated (OP) or Hybrids

TERRITORIAL SEED COMPANY

VEGETABLES • FLOWERS • HERBS • GARLIC • FRUIT • COVER CROPS • SUPPLIES • RESOURCES • ABOUT

SEARCH

☐ FRENCH BREAKFAST (11)
☐ TABLE (11)

Availability

☐ WEED (11)
☐ ORGANIC SEED (11)
☐ SEED DATE (11)

Key Features

☐ All American Selection Winner (11)
☐ Gold Medal Variety (11)
☐ Short Season Variety (11)
F1 (All American Selection)

Vegetables | Radish | Table

Caliente Radish
From \$3.95
* F1

Vegetables | Radish | Table

Cherry Belle Radish
From \$3.45
* F1

Vegetables | Radish | Table

Crimson Globe Radish
From \$4.45
* F1

Vegetables | Radish | Table

Dragon Radish
From \$4.45
* F1

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Hybrid Parent Plants

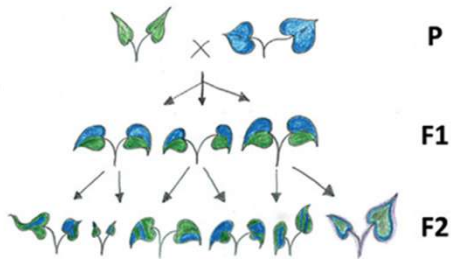
- Let flower and reseed over winter
- Hybrids will give you surprises!



Photo Credits: Sue Kraemer

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Why We Can't Save Hybrid Seeds



https://pubs.nmsu.edu/_n/H262/index.html

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What You Need to Know and Do First



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Make Sure You Know

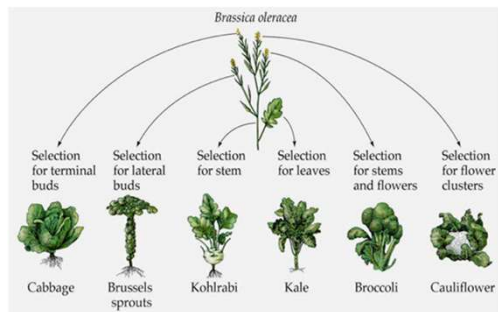
- If your plants are hybrids (F1)
- Species name
- How your plants pollinate
- Market maturity vs seed maturity



<https://www.seedsavers.org/saving-seeds-for-beginners>

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Varieties of the Same Species Can Cross Pollinate



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Pollination Methods

	Self-Pollination	Insect-Pollination	Wind-Pollination
Example crops	Beans, peas, tomatoes	Squash, cucumbers, brassicas (broccoli, kale, cabbage)	Corn, spinach
Breeding system	Naturally inbreeding — low outcrossing	Outcrossing/Outbreeding (cross-pollinating)	Outcrossing/Outbreeding (cross-pollinating)
Isolation distance needed	Little to none typically required	Moderate to large — e.g., ~1/2 mile between zucchini varieties	Very large — e.g., ~2 miles between corn varieties

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Seed Saving Guide Chart



SEED SAVING GUIDE

Crops	Species	Family	Life Cycle	Primary Pollination Method	Recommended Isolation Distance for Seed Saving	Wilder Seeds	Population Size (Number of plants)	Variety Maintenance	Genetic Preservation
edible bean	Vigna angustifolia	Fabaceae	annual	self	10-20 feet (3-6 m)	1	10-25	30+	
garbanzo	Cicer arietinum	Fabaceae	annual	wind	650-1,300 feet	1	5-25	30+	
American cucumber	Cucumis melo	Cucurbitaceae	annual	insect	800 feet-1/2 mile (244-805 m)	1	5-10	25+	
artichoke	Cynara cardunculus	Asteraceae	perennial	insect	800 feet-1/2 mile (244-805 m)	5	20-50	80+	
asparagus (cocked)	Asparagus sativa	Brassicaceae	annual	insect	800 feet-1/2 mile (244-805 m)	5	20-50	80+	
asparagus	Asparagus officinalis	Asparagus	perennial	wind	800 feet-1/2 mile (244-805 m)	217 (male, 1 female)	20-50	80+	
barley	Hordeum vulgare	Poaceae	annual	self	10-20 feet (3-6 m)	1	5-10	25+	
bean (common bean)	Phaseolus vulgaris	Fabaceae	annual	self or insect	10-20 feet (3-6 m)	1	5-10	25+	
beet	Beta vulgaris	Amaranthaceae	biennial	wind	800 feet-1 mile (244-805 m)	5	20-50	80+	
Belgian endive	Cichorium intybus	Asteraceae	biennial	insect	800 feet-1/2 mile (244-805 m)	5	20-50	80+	
broccoli	Brassica oleracea	Brassicaceae	biennial	insect	800 feet-1/2 mile (244-805 m)	5	20-50	80+	
broccoli raab	Brassica rapa	Brassicaceae	annual/biennial	insect	800 feet-1/2 mile (244-805 m)	5	20-50	80+	
broccolini	Brassica italica	Brassicaceae	annual	self or wind	100-200 feet (30-61 m)	1	10-25	30+	

https://bit.ly/seed-savers.org/site/pdf/Seed%20Saving%20Guide_2017.pdf

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Isolation Methods

- Distance
- Containment
- Pollinator distractions/barriers
- Timing of flowering (or prevent flowering to avoid unwanted crosses)
- Hand pollination



<https://seedsavers.org/learn/isolation-methods/>

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Planning Required!

- May need more plants to achieve viable seeds
- May need to limit varieties for isolation
- Plant far apart for isolation distances
- Pay attention to what your neighbors are planting



photo: Garden Culture Magazine

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Selection and Roguing

- Save the 'best' plants in the population.
- Mark plants with traits that you like (vigor, color, taste, and so on) so you can harvest those specific seeds later.
- As plants grow, remove undesirable plants so they don't cross when flower (example: early bolting)
 - Roguing: "remove inferior or atypical plants from the population"

Organic Seed Alliance Seed Saving Guide for Gardeners and Farmers

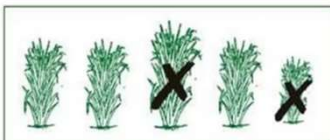


photo: Colorado State University

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Market Maturity vs. Seed Maturity

- Seeds in some varieties are ready to harvest at the same time as harvest for food.
 - Example: tomatoes
- Some require extra time for ripening
 - Examples: Zucchini and cucumbers
- Biennials require extra planning
 - Example: Kale



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How to Process, and Store Seeds



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Wet or Dry Processing



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Wet Processing Steps

- Step 1: Harvesting
- Step 2: Dislodging seed
- Step 3: Separating viable seed from plant material, usually involving fermenting or soaking
- Step 4: Drying



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Dry Processing Steps

- Step 1: Harvest
- Step 2: Drying
- Step 3: Dislodging seed
- Step 4: Separating viable seed from plant material (hand shelling, screening and winnowing)



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How to Store Your Seeds

- Don't forget to label!
- Cool conditions
- Dark conditions
- Dry conditions
- Protect from pests and mishap
- Viability—varies by crop



<https://seedsavers.org/storing-seeds/>

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Seed-Saving for Specific Families



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Fabaceae (Legumes)

- Bean (bush, pole, dry) (*Phaseolus vulgaris*)
- Runner bean (*Phaseolus coccineus*)
- Fava bean, broad bean (*Vicia faba*)
- Pea (garden, snap, snow) (*Pisum sativum*)
- Soybean, edamame (*Glycine max*)
- Lentil (*Lens culinaris*)
- Cowpea, black-eyed pea (*Vigna unguiculata*)



photo: Sue Kraemer

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Peas (*Pisum sativum*) and Beans (*Phaseolus vulgaris*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Processing	Seed Life
Annual	Perfect	Self	*10-20'	1	After food maturity	Dry	3 years

- Allow pods to turn brown on the plant, dry 1-2 weeks.
- Shelling by hand is sufficient for most home gardeners



photo: Gisa Parsons



photo: Gisa Parsons



photo: Seed Savers Exchange



photo: Seed Savers Exchange



photo: Nebraska Extension

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Solanaceae (Nightshades)

- Tomato (*Solanum lycopersicum*)
- Pepper, chile pepper (*Capsicum annuum*)
- Eggplant (*Solanum melongena*)
- Potato (*Solanum tuberosum*)
- Tomatillo (*Physalis philadelphica*)
- Ground cherry, husk cherry (*Physalis pruinosa*)



photo credits: Sue Kraemer



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Tomatoes (*Solanum lycopersicum*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Annual	Perfect	Self/Insect	*10-50'	1	same as food maturity	Wet	3 years

- Mostly self-pollinating — good crop for beginners
- Varieties vary on self pollination and insect pollination



photo credits: Sue Kraemer

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Tomatoes (*Solanum lycopersicum*)

- Harvest seed when ripe for eating
- Squeeze pulp and seeds into a container and ferment 2–3 days to remove the germination-inhibiting gel coating
 - viable seeds sink; discard seeds that float
- Rinse thoroughly and dry on a non-stick surface (coffee filters work well)



photo credits: UC Agriculture and Natural Resources and Sue Kraemer

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Peppers (*Capsicum* spp.)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Annual	Perfect	Self/Insect	300-1,600'	1	often same as food	dry	2 years

- Isolation by containment is easy if distance isn't possible
- Harvest when fruit reaches final color and begins to soften
- Dry seeded: scrape seeds from the core and air-dry on a non-stick surface



photos: Seed Savers Exchange

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Asteraceae

- Lettuce (*Lactuca sativa*)
- Endive, escarole (*Cichorium endivia*)
- Chicory, radicchio (*Cichorium intybus*)
- Globe artichoke (*Cynara cardunculus* var. *scolymus*)
- Sunflower (*Helianthus annuus*)
- Salsify (*Tragopogon porrifolius*)



photo: Sue Kraemer

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Lettuce (*Lactuca sativa*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Annual	Perfect	Self	10-20'	1	After Food Harvest	Dry	5-6 years

- Save seed from plants that bolt later in the season
- Harvest in stages: shake ripe, feathered seed heads into a bag every 1-2 weeks
- Shaking plants reduced need for cleaning



photo: Seed Savers Exchange

photo: Pacific Horticulture

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Cucurbitaceae

- Cucumber (*Cucumis sativus*)
- Summer squash (zucchini, crookneck) (*Cucurbita pepo*)
- Winter squash (acorn, delicata, spaghetti, pumpkin) (*Cucurbita pepo*)
- Winter squash (butternut, pumpkin) (*Cucurbita moschata*)
- Winter squash (buttercup, hubbard, pumpkin) (*Cucurbita maxima*)
- Melon, cantaloupe (*Cucumis melo*)
- Watermelon (*Citrullus lanatus*)



photo: Gta Parsons

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Squash (*Cucurbita* spp.)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Annual	Monoecious	Insect and self	800'–½ mi	1	Summer: after food Winter: same as food	Wet	6 years

- Difficult to isolate and recommend hand pollination



Cucurbita pepo



Cucurbita maxima



Cucurbita moschata

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Squash Hand Pollination



<https://seedsavers.org/squash-hand-pollination/>

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Squash (*Cucurbita* spp.)

- Summer squash will be much bigger than when harvest for food and have a hard rind similar to winter squash
- Winter squash seed quality peaks after ~1 month of cool (50–55°F) storage before extracting
- Scoop out seeds and pulp; rinse, or soak 4–12 hours before rinsing

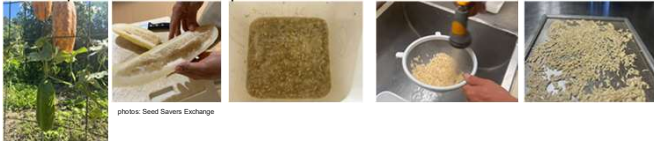


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Cucumbers (*Cucumis sativus*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Annual	monoecious	Insect	800'–½ mi	1	After food maturity	wet	5 years

- Suggest hand-pollination
- Requires fermentation step like tomatoes



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Apiaceae (Carrot Family)

- Carrot (*Daucus carota*)
- Celery (*Apium graveolens*)
- Celeriac (*Apium graveolens* var. *rapaceum*)
- Parsley (*Petroselinum crispum*)
- Parsnip (*Pastinaca sativa*)
- Dill (*Anethum graveolens*)
- Fennel (*Foeniculum vulgare*)
- Cilantro, Coriander (*Coriandrum sativum*)



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Coriander (*Coriandrum sativum*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Processing	Seed Life
Annual	Perfect	Insect	*800'–½ mi	5	Same as food	Dry	3 years

- Outcrossing not a concern since subtle differences between varieties



photos: Sue Kraemer



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Amaryllidaceae (Alliums)

- Onion, bulb onion (*Allium cepa*)
- Shallot (*Allium cepa*)
- Green onion, bunching onion, scallion (*Allium fistulosum*)
- Leek (*Allium ampeloprasum*)
- Garlic (*Allium sativum*)
- Chives (*Allium schoenoprasum*)
- Garlic chives (*Allium tuberosum*)



photo: Seed Savers Exchange

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Common Onion (*Allium Cepa*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Biennial	Perfect	Insect	800'–½ mi	5	After Food Harvest	Dry	1-2 years

- Save seed from one variety per year
- Biennial—vernalization required, overwinter in the ground in our climate



photos: Seed Savers Exchange



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Amaranthaceae

- Spinach (*Spinacia oleracea*)
- Beet, beetroot (*Beta vulgaris*)
- Swiss chard (*Beta vulgaris*)
- Quinoa (*Chenopodium quinoa*)
- Orach, mountain spinach (*Atriplex hortensis*)
- Grain amaranth (*Amaranthus spp.*)



photo: Sue Kraemer

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Spinach (*Spinacia oleracea*)

Life Cycle	Flowers	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed processing	Seed Life
Annual	Dioecious	Wind	800'–1 mi	10	After food maturity	Dry	3 years

- Our climate well suited for saving spinach seeds
- Strong outbreeder and needs larger population—sharing seeds is helpful here



photo: Wikipedia

photo: Gordon Wilson

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Brassicaceae (Brassicas)

- Arugula (*Eruca vesicaria* and *Diplotaxis tenuifolia*)
- Broccoli (*Brassica oleracea*)
- Brussels sprouts (*Brassica oleracea*)
- Cabbage (*Brassica oleracea*)
- Cauliflower (*Brassica oleracea*)
- Collards (*Brassica oleracea*)
- Kale (*Brassica oleracea*)
- Kohlrabi (*Brassica oleracea*)
- Mustard greens (*Brassica juncea*)
- Pac Choi (*Brassica rapa*)
- Radish (*Raphanus sativus*)
- Rutabaga (*Brassica napus*)
- Sea kale (*Crambe maritima*)
- Turnip (*Brassica rapa*)



Photo Credit: Sue Kraemer

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Cole Crops - (*Brassica oleracea*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Annual or Biennial	Perfect	Insect	800'--½ mi	5	After food maturity	Dry	4 years

- Biennial varieties need a cold period (vernalization) before they will flower and set seed
- Self-incompatible and cross pollinates with the many varieties of this species
- Crops flowering at different times (for example, Kale vs Broccoli) can allow for isolation
- Window for optimal harvest is short since siliques can shatter



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Radishes (*Raphanus sativus*)

Life Cycle	Flower	Pollination Method	Isolation Distance	Population Size for Viable Seed	Seed Maturity	Seed Processing	Seed Life
Annual	Perfect	Insect	800'--½ mi	5	After food	Dry	5 years

- Insect-pollinated and self-incompatible.
- Can lift roots at market maturity to cull any off-type or diseased plants.
- A few varieties may require cold (below 50 degrees) before flowering



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Community and Seed Preservation



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Appendix: A 'Not quite' Saving Seed Note



photos: Sue Kraemer

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Great Work Going On!



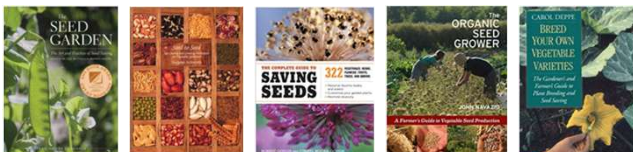
<https://seedalliance.org/>



<https://www.seed.org/>

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Books on Seed Saving



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Sharing Seeds

- Friends and neighbors!
- Local seed swaps



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Sharing Seeds



[Our Work](#) [Get Involved](#) [About Us](#) [Support Us](#) [Marketplace](#)



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Questions?



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Resources

- ask-a-mastergardener@live.com
- <https://extension.wsu.edu/king/mg-home>
- Seed Savers Exchange:
www.seedsavers.org
- https://seedalliance.org/wp-content/uploads/2010/04/seed_saving_guide.pdf
- <https://wpcdn.web.wsu.edu/extension/uploads/sites/43/2024/04/01-FULL-BINDER.pdf>
- Home Vegetable Gardening in Washington, #EM057E
- <https://tilthalliance.org/our-work/gardeners/washington-state-seed-library-network/>
- <https://lancaster.unl.edu/saving-and-storing-garden-seeds/>
- Territorial Seeds: www.territorialseed.com



Photo Credit: Sue Kraemer

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Thank you!

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Master Gardener Foundation of King County

<http://www.mgfk.org>

- Fundraising for these programs

More information about growing groceries:

<https://kingcounty.mastergardenerfoundation.org/education/gg/>

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