

The Seed Garden: Planning for Seed Saving and Lots of Vegetables

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1. Growing seed crops alongside vegetable production

- Seed crops have a longer, slower season and a less pressured pace most of the year.
- Diversify your sources of income. Often seed-growing has a higher dollar per hour than growing food
- Earn some money during the winter, when seed companies pay (and produce sales are down).
- Keep good Open Pollinated seed varieties alive and available. Support small inter-dependent seed companies.
- For some crops, you can grow seed and food at the same time, from the same crops.
- Improve a variety to best suit your climate, your customers, be more tolerant to a disease or a pest.

2. Which seed crops combine best with food production?

Start small

- In your first year, avoid unfamiliar crops or too many different seed crops. Grow one or two seed crops for yourself.
- Read up about seed-growing and the isolation distances required.
- Biennials (onions, carrots, most root crops) need a second growing season to mature seed – a bit more complicated!
- There is, as yet, no published table of time from sowing to seed maturity. Lettuce can take up to 2 months beyond eating stage.
- Keep records of your dates – the timing might be critical and some crops will work better than others.
- When you are ready to grow a commercial seed crop, contact seed companies before the growing season, to get a contract.

What type of crop to grow?

- Open-pollinated varieties. Seeds saved from hybrids produce very mixed progeny, some of it useless!
- Crops you can easily grow to maturity in your climate.
- Self-pollinated crops are a good place to start because they often have good open-pollinated varieties.
- Varieties where you want to increase the seed availability
- Crops you only grow one variety of, or can easily grow far enough from others.
- Crops your neighbors don't have growing the other side of your fence line!
- Seed of flowers that attract beneficial insects or pest-eating birds to your crops.
- Vegetatively produced clones, eg seed garlic, yellow potato onions, shallots, sweet potato slips.
- Crops with harvests either at the end of the main season, or weekly for the month of August (plan to pace yourself)
- Crops that grow without much attention in underused spaces, eg high summer in the hoophouse.

Double benefits - have your crop and eat it too: – tomatoes, peppers, watermelon, winter squash.

- Crops where you eat the ripe fruit take little extra time to mature seeds — you still eat or sell the food.
- Getting 2 crops from one plant can take more time compared to simply mashing whole tomatoes
- Harvesting a few leaves from greens grown for seed will not detract from seed production.
- Eat the produce from the edges of a block planting and save seed from plants in the center — this helps preserve the purity of the seed without "wasting" the edge plants.
- Eat the earliest fruit and save seed later (cucumbers), or save seed first and eat the later fruit. Don't save seed from plants past their prime, and don't risk your seed crop by reducing much the time it has to mature.

3. Population size

- Never save seed from just one plant (unless it's the second to last on the planet). Grow a big enough population of plants to keep enough genetic diversity for future adaptability and to prevent a genetic "bottleneck."
- With self-pollinators (inbreeders) such as beans, 20 plants may be enough - self-pollinated varieties are already genetically quite homogenous, and there is little gain from a bigger population.
- For out-breeders (cross-pollinators) grow at least 100 to avoid inbreeding depression, which leads, over time, to lower quality, less vigorous plants.
- Hybrids of cross-pollinators such as corn exhibit "hybrid vigor" (meaning hybrids undeniably have an edge as far as productivity goes), but hybrids of self-pollinators don't show this trait as much. While experienced seed growers can develop stable strains from a hybrid, this requires years of work and is not the place to start.

4. Isolation distances

- The isolation distance required for a particular species depends on whether the plants are self- or cross-pollinated.
- Self-pollinators use their own pollen to set seed, without any transfer of pollen from other plants. Because avoiding unwanted cross-pollination is not an issue, isolation distances are smaller.
- For example, tomatoes mostly self-pollinate, and only require an isolation distance of 75 to 180 feet (23–55 m).
- Cross-pollinating (outcrossing) plants may be wind- or insect-pollinated. Isolation distances (from other crops which could pollinate your crop) are large.
- For example, bees fly a long way, so cucurbits (crossers) have long isolation distances of 1,500 feet (460 m), or even as much as half a mile (800 m) if you have no physical barriers. Wind-pollinated crossers usually have the most genetic diversity and pollen that travels furthest, so they need the longest isolation distances.

5. Selecting "mother plants"

- Grow enough to allow for rogueing – remove off-types as well as existing fruits from the immediate neighbor plants.
- Also rogue out diseased plants and any early-bolting plants of crops you don't want to bolt.
- If you are selling seed, you have a responsibility to maintain that variety and all the genetic diversity it contains. You will need more plants than if you are just keeping seed to resupply yourself.
- If you are improving a variety, selecting for certain desirable traits, be particularly selective about mother plants.

6. Wet seeds and dry seeds (see the Southern Exposure Seed Exchange handout at the end for details)

- While small quantities of seed can be cleaned with basic kitchen equipment, if you move into larger quantities, you will want to buy some of the specialized equipment available, or make your own.
- **Wet seeds** are embedded in the fruit. Wet processing has 4 steps: scooping out the seed or mashing the fruit, fermenting the seed pulp for a few days, washing the seed and removing the pulp and then drying the washed seed. Ferment the seed long enough to release the clean seed, without waiting so long that the seed starts to sprout. Wet-processed seed is naturally cleaned during the fermentation and washing. Examples: Tomatoes, cucumbers, melons, peppers, eggplant
- **Dry seeds** are found in pods, husks or ears, and dry on the plant. Dry seed processing involves harvesting the pods or the entire plants, completing the drying indoors if needed, then cracking or breaking the pods to release the seeds. Legumes, okra, corn, radish, lettuce, spinach, beets, flowers (cosmos seed is very easy to collect). After drying, the seeds and chaff are sieved through 2 different gauge mesh screens: the larger one keeps back the big chaff and lets the seed pass through; the smaller one keeps back the seed while letting the small chaff pass through. After screening, the seed is winnowed, using a box fan and a sheet of cloth or a plastic tub to catch the seed.

7. Seed crops in the Twin Oaks vegetable garden

Tomatoes

- Roma is an OP paste tomato variety that was reliable and productive, but our yields were reduced by *Septoria* leaf spot.
- Tomatoes are self-pollinating, so planting 200, pulling out any off-types, and making a selection of 80–100 of those plants gives plenty of genetic diversity. For selection to improve the variety, it's important to have plenty to choose from.
- We don't put any tomato plants of any other varieties within 180 feet (55 m) of any of our Romas
- We plant about 530 Romas, and probably save seed from about a selected 130–180 mother plants.
- In early July I start monitoring the plants once a week, marking the best ones with flagging tape on the T-posts. We have 2 plants between each pair of T-posts, so I tie flagging tape on the nearest post, with a bow on the side facing the chosen plant. I

use red ribbon for high early yield combined with not much *Septoria* and yellow ribbon for healthy foliage with a decent yield. The star performers get both red and yellow ribbons. We're selecting for earliness, high yield and resistance to *Septoria*.

- Once the tomatoes start to ripen, I monitor on the day before a crew harvest, picking one or two fruits from each marked plant.
- If the plant no longer looks so great, I remove its ribbon.
- If a plant without a ribbon starts to excel in healthy foliage as the season wears on, we add a ribbon.
- We don't add many red ribbons after the start of the harvest, because we want to keep selecting for early fruit, and plants that yield well later are not what we want.

Processing tomato seeds

- Basic equipment for wet seed processing consists of buckets, knives, silverware. Fermentation kills some seed-borne diseases.
- I keep the fruit in the bucket for 4-5 days till dead ripe, then scoop seeds on Food Processing days. I cover the fruit with water, then remove and cut each tomato in half lengthways into a clean bucket. Using a soup spoon, I then scoop out the seeds into another bucket and put the empty "shells" into another clean bucket. We make sauce and salsa, including the seed tomatoes .
- I ferment the seed in a covered bucket for 2-3 days at 70°F approximately, till bubbles stop. I stir 3x/day approximately
- I wash the seed, pouring off the water from one bucket to another. The best seeds sink, and the floaters are not likely to be good, so don't worry about losing a few seeds when pouring the water off. I pour from bucket to bucket, rather than onto the ground, so if I make a mistake, I haven't lost the seeds.
- When the seed is clean, I strain it and spread it out on paper towels on a tray, with a fan blowing on it, for a few days. I break up the clumps of seeds and turn them over a few times.
- 20 gallons (4 buckets) of tomatoes makes 130gm seed. Usually I deal with 1 or 2 buckets/week.
- For example: Harvest Mon, scoop Friday and start the fermentation, wash Monday, harvest the next batch.
- This job is usually finished by the end of August. If necessary I continue into the beginning of September

Watermelons

- We have been selecting Crimson Sweet watermelons for earliness, disease-resistance, and flavor and (large) size.
- We used to plant about 430 Crimson Sweet, but due to improved productivity, we were able to plant only about 300.
- We make sure no-one is growing any other kind of watermelon within half a mile, as watermelons cross-pollinate with each other (not with other types of melon). Even though they are cross-pollinators, cucurbits act more like self-pollinators genetically, so it's actually OK to save seed from a fairly small population.
- Early in July, I walk round the watermelon patch and number 30-40 early large watermelons from healthy plants (I use grease pencils/china markers). The crew knows not to pick watermelons with numbers on.
- I keep a notebook, to help me keep track (melons are easily lost.) In August I start checking for ripeness. Ideally, watermelon for seed would be overmature by 10 days, but waiting too long is a disaster! We do the "Scrunch Test" for ripeness, after checking for brown tendrils. Put two hands spread out across the melon, press down quite hard, listen and feel for a scrunch – the flesh in the melon is separating under the pressure. Rumor has it that it only works once, so pay attention!
- I harvest about 6-8 melons each week, as they ripen. If the vine has died, I do not keep the seed, as clearly it wasn't a healthy plant, and I'm selecting for disease-resistance. I make notes about size, then I cut the melon in half crosswise, observe the color, and take a big serving spoon and scoop out part of the heart to taste. If the flavor is good, I scoop the heart out into a very clean bucket, for us to eat later. I scoop the seeds out into a seed bucket. Lastly, I scoop more good flesh into the food bucket.

Watermelon fermentation

- This is done the same way as tomatoes, but for 4 days at 70°F. Stir 3x/day. Wash on the 4th day.
- Dry on racks with fans. For example: Harvest and scoop Tuesday, wash Saturday and set them to dry.
- 1 Crimson Sweet melon = 22gm seed; 22 melons = 1 pound seed.

8. Summer hoophouse use for seed crops

- Hoophouses can be great places to grow seed crops. We pull a sheet of shade cloth over our hoophouse in early May
- Inside a hoophouse the hotter air can hold more water without causing damp plants. Additionally, the walls of the hoophouse provide a partial physical barrier to prevent cross-pollination.
- Check that you have no other crops growing near enough to cross-pollinate.
- We have grown southern peas, soup beans and Envy edamame for seed.
- According to Nancy Bubel, in the *Seed Starter's Handbook*, bean seed usually matures 6 weeks after the beans were tender and good to eat fresh, and are ready when your teeth can scarcely make a dent in a sample bean. Maturing happens faster in a

hoop house. We have had seed beans 3 weeks after the food crop was ready. In order to avoid seed shedding in the hoop house, we finished the drying elsewhere. The seed quality and the germination rate are top notch.

- Because of the humidity and rainfall, it is hard on the east coast to grow “dry” seed crops. Compared to outdoor crops in our climate, legumes grown in the hoop house have very clean, unspotted beans and pods.
- Clean pods can also be important for *food* crops of edamame, where the customers see the pods.
- Growing legumes also has an advantage for the soil, and helps the crop rotation.

9. Seed storage and germination testing

- Seeds must be stored dry and cool and airtight once dry. For long-term storage, put the airtight jar in the freezer.
- Make sure your storage places are mouse-proof.
- Initial storage can begin when seeds are down to 8 percent moisture. At this level, seeds break or shatter when you try to fold them or hit them with a hammer. They don't bend or mash.
- Put the dry seeds in a jar (optionally with an equal weight of a desiccant such as silica gel) for 7 days. For USDA Certified Organic, check the OMRI list before using desiccant - only use allowed materials.
- Then remove the desiccant and put the seed in a labeled bag inside a labeled glass or metal container with an airtight lid.
- When removing seeds from the freezer, allow the container to warm to room temperature for a day before opening. This prevents moisture from condensing on the seeds.
- **Test your seed germination:** Fold a thick paper towel lengthwise, unfold it and spread 50 or 100 seeds along the inside of the fold. Close the fold, dampen the towel with water and roll it up loosely. Put it inside a loosely closed plastic bag and set the bag somewhere at a suitable temperature; often the top of the fridge is suitable.
- Beware the top of gas water heaters: this inhibits tomato seeds and other nightshades.
- See Nancy Bubel, *Seed Starter's Handbook*, for ideal temperatures for different crops. 75°F (24°C) is good for most vegetables, 80°F (27°C) is better for tomatoes and peppers, 85°F (29°C) for melons.
- Check twice a day (the air change will help the seeds even if you know it's too early to see sprouts).
- Count the number of sprouted seeds after 7 days and remove the sprouted ones.
- Repeat after another 7 days and add this count to the first one to calculate your percent germination.

Seed Saving and Plant Breeding Resources (Checked Jan 2020)

PRESKO Biodegradable Flagging Tape – <https://gemplers.com/products/presko-biodegradable-flagging-tape>

- ❑ *The Seed Garden*, Micaela Colley and Jared Zystra, Seed Savers Exchange, 2015
- ❑ *Seed to Seed*, Suzanne Ashworth, 1991, ISBN 0-9613977-7-2
- ❑ *The Seed Savers Handbook*, Jude and Michel Fanton, 1993, ISBN 0-646-10226-5
- ❑ *Back Garden Seed Saving: Keeping Our Vegetable Heritage Alive*. Sue Strickland, 2001. ISBN 978-1899233090
- ❑ *Vegetable Seed Production*, Raymond A.T. George, 1999
- ❑ *Seed Production: Principles and Practices*, Miller McDonald & L. Copeland, 1997
- ❑ *Breed Your Own Vegetable Varieties*, Carol Deppe, 1993, ISBN 0-316-18104-8
- ❑ *Organic Seed Grower*, John Navazio, 2012, ISBN 9781933392776 <http://chelseagreen.com/the-organic-seed-grower>
- ❑ *Diseases and Pests of Vegetable Crops in Canada*, Ronald Howard, 1994, ISBN 0-9691627-3-1
- ❑ *Principles of Plant Breeding*. 2nd Ed. R.W. Allard, 1999.
- ❑ *Seed Starter's Handbook*, Nancy Bubel,
- ❑ *Knott's Handbook for Vegetable Growers*, 5th Edition, Donald Maynard, 2006, ISBN: 978-0-471-73828-2 Widely available online <http://extension.missouri.edu/sare/documents/KnottsHandbook2012.pdf>

Seed production manuals from **The Organic Seed Alliance** <https://seedalliance.org/publications/>

- ❑ <https://seedalliance.org/publications/principles-practices-organic-bean-seed-production-pacific-northwest/>
- ❑ <https://seedalliance.org/publications/principles-practices-organic-radish-seed-production-pacific-northwest/>
- ❑ <https://seedalliance.org/publications/principles-practices-organic-spinach-seed-production-pacific-northwest/>
- ❑ [Beet Seed Production: Quick Reference](#)
- ❑ [Broccoli Seed Production: Quick Reference](#)
- ❑ [Winter Squash Seed Production: Quick Reference](#)
- ❑ [Cucumber Seed Production: Quick Reference](#)
- ❑ [Tomato Seed Production: Quick Reference](#)
- ❑ [Sweet Corn Seed Production: Quick Reference](#)
- ❑ [Kale Seed Production: Quick Reference](#)
- ❑ The **Seed Savers Exchange** <https://www.seedsavers.org/>

- The **Grassroots Seed Network** <https://grassroots-seed-network.sharetribe.com/>
- Organic Seed Resource Guide** <https://eorganic.org/node/378>
- Activity Guidebook in the Living Tradition of Seed Saving*, Eli Kaufman <http://growseed.org/GenerationtoGeneration.pdf>
- Seed production manuals** from **Saving Our Seeds** www.savingourseeds.org/growguides.html :
- Isolation Distances
- Seed Processing and Storage
- Bean Seed Production
- Brassica Seed Production
- Publications on seed saving** from **Saving Our Seed SOS** (different from Saving Our Seeds) www.savingourseed.org/pages/ResourceGuide.html
- Cucurbit Seed Production
- Pepper Seed Production
- Tomato Seed Production

Southern Exposure Seed Exchange Handout on Seed Saving

www.southernexposure.com P.O. Box 460, Mineral, VA, 23117. 540-894-9480

Wet Seed Saving for Home Use *General principles of saving seeds that mature in a wet fruit:* Avoid or minimize cross-pollination by isolating from other varieties of the same species. Fermentation helps reduce risk of disease, separate seeds from pulp, and may increase germination. Excessive fermentation may cause sprouting or rot. Use a lid to keep bugs out. Mature seeds (other than watermelon), when separated from pulp, will generally sink, making seeds easy to rinse. After rinsing, dry seeds thoroughly. Protect from rodents in storage.

Crop	Isolation Distance	Self / Cross	Min. Population		Seed lifespan, room temp	When and How to Harvest
			Viable Seed	Long-Term Maintenance		
Eggplant	50 ft.	Self	1 plant	10 plants	3 years	Harvest after fruits turn dull yellow. Cut into 1-2" cubes and cover with water for 24 hours at room temperature (stirring once midway). Squish seeds out of the fruit. Let sit 12 hours more if seed is still difficult to remove. Rinse and spread in a thin layer to dry for 3 weeks.
Tomatoes, heirloom	20 ft.	Self	1 plant	10 plants	4 years	Harvest fruits when fully ripe. Mash or blend into a container with a loose fitting lid. Let sit at room temperature until bubbles stop forming (usually 36 hours), stirring every 12 hours. Pull off large chunks. Rinse seeds. Spread in a thin layer to dry for 3 weeks.
Tomatoes, modern	5 ft.					
Cucumber	300 ft.	Cross	1 plant	20 plants	3 years	Harvest fruits that have turned yellow or brown. Cure at room temperature for 2 weeks or until there are signs of mold. Open fruits and scoop seeds out into a container. Let sit at room temperature for 2 days, stirring every 12 hours. Rinse seeds. Spread in a thin layer to dry for 3 weeks.
Squash, Zucchini, Pumpkins, Cantaloupe	300 ft.	Cross	1 plant	10 plants	3 years	Allow the fruits to grow big and hard. Let sit at room temperature for one month to cure. Cut the fruit. Scoop out the seeds. Rinse them, removing all the fleshy matter. Spread them into a thin layer to dry for 3 weeks. To more easily clean the seeds, we cover them with water for 24 hrs (stir once after the first 12 hours) before rinsing and drying.
Watermelon	300 ft.	Cross	1 plant	10 plants	3 years	When fruits are fully ripe, scoop the guts out and leave at room temperature for 2-3 days, stirring every 12 hours. Rinse seeds through a strainer, as they won't sink. Spread in a thin layer to dry for 3 weeks.

Dry Seed Saving for Home Use

General principles of saving seeds that mature in a dry pod, or in the open air: Avoid or minimize cross-pollination by isolating from other varieties of the same species that might flower at the same time. Harvest before rain to keep mature seeds or pods from getting wet. Mature seeds will often fall from seedheads. When harvesting whole seedheads or pods, allow them to dry further, away from direct sunlight, before detaching seeds. This helps ensure seed maturation. To remove chaff, winnow by carefully pouring in front of a fan. Use one wide container to catch seed, & another to catch chaff. Check that not too many seeds land in chaff container. If necessary, use screens to further remove chaff. Protect from insects in storage.

Crop	Isolation Distance	Self / Cross	Min. Population		Seed lifespan, room temp	When and How to Harvest
			Viable Seed	Long-Term Maintenance		
Beans, string (similar methods for other beans)	10 ft.	Self	1 plant	6 plants	4 years	Harvest pods when they have turned leathery & begun to turn brown. Allow them to dry in a single layer out of direct sunlight until 1 week after seeds rattle in the pods. Thresh pods either individually, or by putting in a pillowcase and stomping on it. Winnow on high fan speed.
Lettuce	5 ft.	Self	1 plant	6 plants	2 years	EITHER 1.) When plants are in half feather, dig up root balls and let tops sit on a tarp for 2 weeks. OR 2.) After plants have begun to "feather", knock seeds off into a bucket by vibrating plants. Winnow on low fan speed.
Peas, Garden	10 ft.	Self	1 plant	10 plants	3 years	Harvest after pods have turned leathery and begun to turn brown. Allow pods to dry in a single layer until 1 week after seeds rattle in pods.
Peas, Southern	10 ft.	Self	1 plant	20 plants	4 years	Harvest pods when crinkly dry or leathery. Allow them to dry in a thin layer for 2 weeks. Thresh & winnow as with beans.
Peppers (can also be processed wet)	40 ft.	Self	1 plant	10 plants	2 years	After the fruits are completely ripe (in their last color phase), cut them open, scrape the seeds on to a paper plate in a single layer, and allow them to dry for 2 weeks.
Okra	300 ft	Cross	1 plant	6 plants	4 years	Allow pods to mature on plants until brown or splitting open. Clip pods and allow to dry until 1 week after fully brown. Remove seeds.
Brassicas (radish, collards, mustard kale, broccoli, cabbage)	300 ft.	Cross	5 plants	75 plants	3 years	Allow overwintered plants to bolt. Harvest seed pods when they and the seeds inside them are brown. Allow them to dry in a layer no more than 1/4 inch thick for 2 weeks. Thresh by vigorously rubbing handfuls of pods, or by putting pods in a pillowcase and stomping on it. Winnow.
Spinach	300 ft.	Cross	10 plants	75 plants	2 years	Allow plants to bolt. They will segregate into male and female plants. Harvest the seed from the female plants when they are brown. Allow them to dry in a single layer for 2 weeks.
Leeks, Parsley	300 ft.	Cross	5 plants	50 plants	1 year	Overwinter and allow to flower. Harvest seeds when they are brown and allow them to dry in a single layer for 2 weeks.
Corn	300 ft.	Cross	10 plants	250 plants	4 years	Harvest ears after they are brown and allow them to dry further in the shucks in a single layer for two weeks. Shell.
Annual Flowers & Herbs	Let flowers dry on the plant. When seeds look like the ones that were initially planted, or when stalks are brown at least an inch down from the seedheads, cut seedheads and allow to dry for 2 weeks in a single layer. Or, use lettuce method #2, above.					