Seed Saving for the Home Gardener

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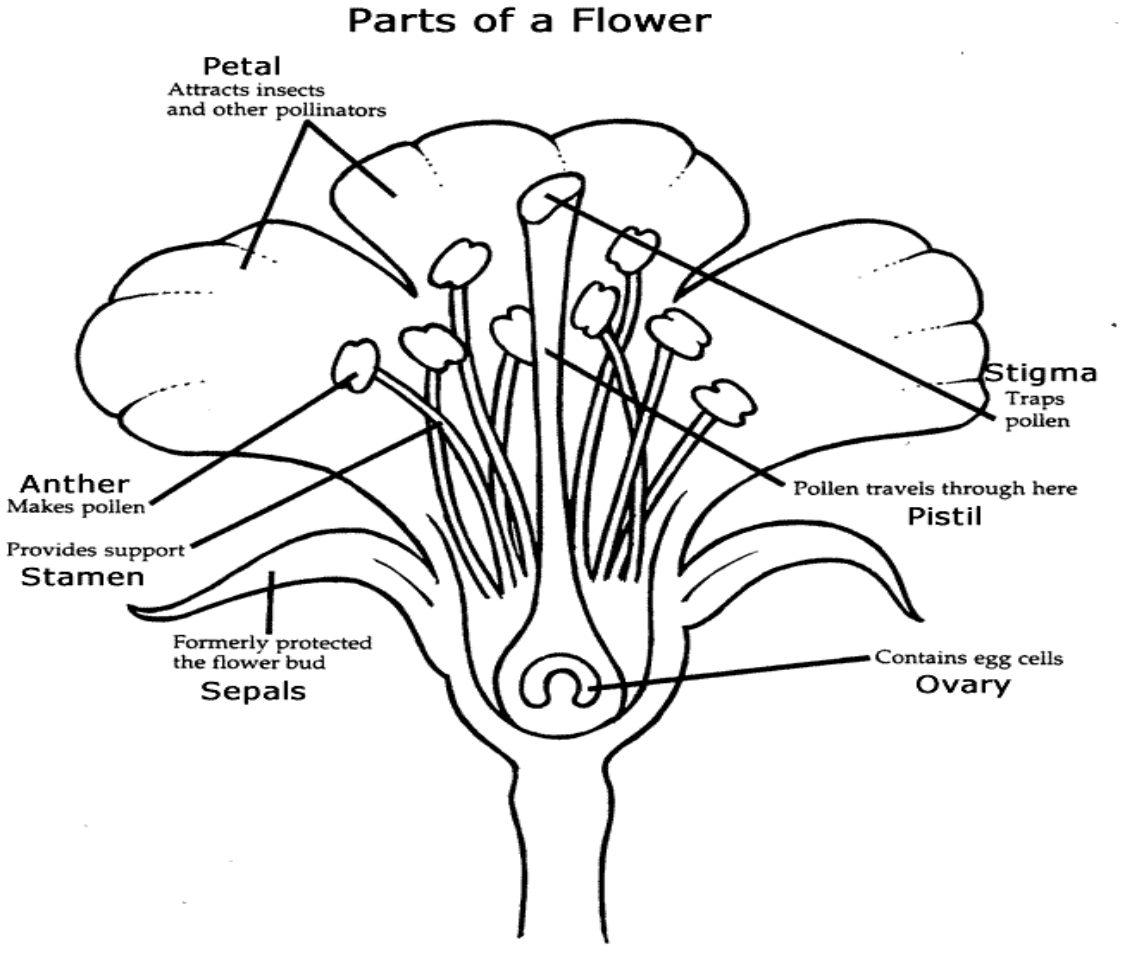
1. WHAT MAKES A SEED? fundamental concepts.

Garden plant reproduction

In some basic ways, your garden plants reproduce like humans. The reproductive organ of a plant is the **flower**. Flowers are where both **pollen** (akin to human sperm) and **ovules** (think eggs) are produced. During **pollination** the genetic material in pollen is combined with the genetic material in ovules. After this, plants form the next generation: the seed. A **seed** is basically an embryo whose growth is suspended until it finds a good place to grow, such as the soil in your garden.

Unlike humans, plants combine genetic material in many different ways. Some plants **pollinate** themselves, some get help from pollinators (bees, wasps, flies, us!), and some use phenomena like wind to move pollen from where it is made to where the ovules are. Also, flowers and plants aren't male or female. These basic biological facts affect what choices you have as a seed saver.



A "complete" or "perfect" flower - illustration from the "Journey North" organization

Flowers: where seeds are made

Complete or **perfect flowers** produce both pollen and ovules.

- some plants have complete flowers and self-pollinate. *Examples: peas, tomatoes, peppers, eggplant, peppers, beans, lettuce*
- some plants have complete flowers, but do not self-pollinate for a variety of reasons; they are **self-incompatible**. They need to receive pollen from another plant of the same species, usually by pollinators or wind. *Examples: carrots, dill, cabbage, broccoli*

Imperfect flowers produce only pollen or only ovules.

- some species produce both kinds of imperfect flowers on the same plant. *Examples: cucumbers, squash, pumpkin, watermelon, corn.*
- some species produce pollen and ovules on totally separate plants. *Examples: spinach, many fruit trees.*

A reason to know some basic taxonomy: species

If you want next year's plants to be the same as this year's plants, you need your saved seeds to have the same genetic material that this year's plants started with. To ensure this, it's important to know a bit about taxonomy and species. Plants can be identified from larger to smaller taxonomic groups. Plants grouped into the same species more closely resemble each other.

Tomatoes as an example. All tomatoes are the species *lycopersicum*, but can be different varieties:
FAMILY: SOLANACEAE (this large group is diverse; 42 Genus are part of it)
Genus: Solanum (*other Genus: Capsicum, Nicotiana, Solanum, Petunia*)
species: *lycopersicum* (*other species: clandestinum, tuberosum, nigrum)*
variety: sungold, tigerella, black prince

Most important for seedsaving, *different varieties of the same species can pollinate each other*. Plants of different species can't cross-pollinate. **Standard or "true to type"** seeds are formed when the pollen and ovules are of the same **species** AND **variety**. Plants grown from this seed will be as similar to the parent generation as possible. What you grow from the seed will look, taste, and grow like the plant you saved seed from.

Hybrid seeds form when pollen and ovules are of different **varieties** of the same **species**. Hybrid seeds produce plants that look, taste or grow unlike the parent plants. They might not grow at all.

Some notorious hybridizing varieties within species:
FAMILY: - BRASSICACEAE
Genus: Brassica
Species: *oleracea*
Varieties – broccoli, brussel sprouts, cabbage, kale
Species: *rapa*
Varieties – turnip, chinese cabbage

2. GETTING THE SEEDS YOU WANT

Getting true to type seeds

If you want **true to type plants** there are techniques for getting true to type seeds. It's easy to get true to type seeds from plants with perfect flowers that self-pollinate. Others require more work.

Easy: self pollinating and require no manipulation or isolation	**Moderate: may require some isolation and assistance with pollination**	**Difficult: require active and specific manipulation and isolation, most are biennial**
lettuce, beans, most peas, tomatoes (except potato-leaf varieties), tomatillos, chives, california poppies, petunia	squash (winter and summer), lima beans, cucumbers, corn, eggplant, melons, tomato (potato leaf varieties), sunflowers	most brassicas (cabbage, broccoli, kale etc.), carrots, onion

Some techniques for getting true to type seed are:

- **Plant and wait** for the seeds to mature (AKA: do nothing) for self-fertilizing plants with complete flowers that rarely cross or attract pollinators (tomatos, beans, peas, lettuce)
- **Isolate varieties by distance** (even if they are *capable* of self fertilizing, like kale) – hard to do in urban settings unless you grow a very unusual species. Isolation distance depends on how pollination usually happens and varies greatly depending on the plant. Examples: spinach = 5 miles, watermelon 0.5 miles
- **Isolate varieties by timing** for plants that readily cross pollinate – involves growing varieties so they flower at different times. Still requires that no one near you is growing a variety that will cross with yours. (example: lettuce)
- **Mechanical isolation** uses physical barriers*** to prevent unwanted pollination and needs to be modified depending on how the species is typically pollinated.
  - for plants capable of self pollinating, but that cross readily, this is as simple as covering flowers or entire plants before blossoms open.
  - More involved techniques, like alternate day caging, can be used for plants that need pollinators to visit, but that cross easily.
- **Hand pollination** involves transferring uncontaminated pollen to an uncontaminated stigma manually. It's useful for plants that need help from pollinators, but can be used for wind-pollinated plants too, such as corn. The purity of the blossoms being used must be maintained by physically isolating them before pollination and up until fruit set.

*** **Never** cover any part of a plant with clear and/or non-breathable materials such as plastic! You will cook the plant.

Picking the best ones (roguing)

Be picky- don't save seed from diseased or poorly performing plants. Identify plants that have desirable characteristics, for example: late bolting in lettuce.

BUT don't be too picky – try to save seed from more than one individual. Saving from many satisfactory plants prevents your variety from suffering a "genetic bottleneck". This is not an issue for primarily self-pollinating plants.

Identify the plants/branches you saved/want to save from with tape or a loosely tied string.

3. HARVESTING SEEDS

To your best, allow all fruits or pods to reach full maturity. Fruits will have reached their full color and size. Pods will turn brown and dry.

Wet processing – for fleshy fruits such as squash, cucumber etc..
Scrape seeds out of large fruits or crush and mash small fruits. Wash to remove pulp and juice. When seed is clean, put on a surface that won't stick (NO paper towels!) such as window screen, a glass or ceramic plate, cookie sheet or piece of wood. Although not necessary, you can also wet process pepper and eggplant seeds, because you can get rid of the bad seeds, which will float.

Fermentation processing is a kind of wet processing necessary for some seeds, such as tomatoes. Seeds need to sit in some water and get moldy for a few days before being washed. This gets rid of a gel-like capsule surrounding the seed that inhibits germination.

Dry processing – for seeds in pods or husks such as beans, kale, sunflowers, lettuce, corn.
If possible, wait for pods to dry on the plant and harvest the pods. You might need to protect some seeds from animals (corn, sunflowers). If frost threatens, you can pull up the whole plant, hang it somewhere that won't freeze and wait for the plant to dry.

After the pods dry, it's best to remove their covering or **thresh** them. This can be as simple as pulling open a bean pod. If you are harvesting a lot of seeds, small seeds or seeds with very hard pods you can use other methods such as putting them in a sack (like a pillowcase), and smacking them against a hard surface or stepping on them. You can also crush them between two boards. You'll need to figure out how much pressure will break open the pod without injuring the seed.

You really don't need to separate the chaff from the seed, but, if you want to **winnow** the seeds, consider the weight and size of seeds and chaff. If seeds are heavier than chaff, toss or drop it all in the air and blow away the chaff with a good wind, fan at low speed or hair dryer on low with the heat off. You can also stir small amounts in a bowl and chaff will sit at the top. Round seeds can be rolled down a board with a fan blowing across or up the board to remove chaff. These are all methods of **gravity separation**. If seeds and chaff are about the same weight, use **mechanical separation** such as rubbing the mix against a screen larger than the seeds to sift out large chaff. You can then use a screen smaller than the seed to filter out small chaff.

4. KEEPING SEEDS ALIVE

Storage is a critical aspect of seed saving. Yet, it is as simple as **dry, cool, pest-free, and labeled**. If kept well in an unfrozen state, seeds can remain viable for several years, depending on the species. They can be kept longer if frozen, but this requires much higher accuracy and additional equipment.

Examples of how many years seeds stay usefully viable in dry, unfrozen state: tomatoes 4-10, cucumbers 10, kale 4, beans 4, lettuce 3.

How dry? All seeds need to dry thoroughly before being stored. If they bend rather than snap, they're too wet. Wet conditions foster disease. If it shatters with a hammer, it's dry enough! Anywhere warm (under 96 F) and dry with good air flow and out of the sun works (on top of the fridge, in the garage, etc). When picking a place, remember that many animals love to eat seeds! Things you can do to speed drying and prevent mildew: put in a room with a ceiling fan, put seeds in front of a low speed fan, put them on a screen rather than a solid surface. Turning a few times a day will prevent mildew and speed drying time. DON'T put seeds in an oven or direct sunlight. Food dehydrators can be used if they are cooler than 96 F.

***Never expose drying seeds to temperatures above 96 degrees or direct sunlight!

In humid conditions or in preparation for freezing, you can use a dessicant such as silica gel. This is available from several sources and can be reused quite a few times.

How cool? Any dry, dark, place between 40 and 60 degrees can be used for storage. The fridge can work, but ensure that seeds are thouroughly dry and airtight because condensation and mildew damages them. If you want to dabble, info on specific seeds and freezing can be found by using some of the sources listed below.

Pest free? Seeds can go in any sort of packet, such as a plastic baggie or envelope, as long as they ultimately end up in a container that keeps pests out. Examples: a hermetic jar, a canning jar, a regular jar with gasket made from an old inner tube, a metal box, tupperware.

Labeling. Label them with the variety, type of plant and year packed. Other info may be useful: where you originally got the variety, what you selected for, how many plants you saved seed from, what worked and didn't work for growing and saving the seed, and any other info useful for growing that crop again (days to germination or fruit, common pests and controls, etc…)

RESOURCES

BOOKS/PUBLICATIONS

A Guide to Seed Saving, Seed Stewardship & Seed Sovereignty - a great little booklet with info on saving seed from common garden plants. Free download .
https://www.seedambassadors.org/seed-saving-guide/

Seed to Seed: seed saving techniques for the vegetable gardener - by Suzanne Ashworth. A comprehensive and respected book on seed saving techniques. Gives specific info for common garden species. Available in several editions.

Garden Seed Inventory - A comprehensive inventory of non-hybrid vegetables available through American and Canadian seed companies. A wealth of information for identifying and finding varieties that may do well in different locations.

WEBSITES/ORGANIZATIONS

The Five Valleys Seed Library is our homegrown seed library. Their resources are housed in the Missoula Public LIbrary and can be accessed when that library is open to the public.

The Organic Seed Alliance is an organization supporting the development and accessibility of organic seed. They have lots of information on varieties appropriate for seed saving and offer a basic seed saving guide for free download.
https://seedalliance.org/publications/seed-saving-guide-gardeners-farmers/#

Seed Savers Exchange is a non-profit that specializes in preserving and selling heirloom non-hybrid varieties suitable for saving seed. Lots of learning resources, ways to connect to community and some seed-saving tools available for purchase. Visit their "resources" sections. https://www.seedsavers.org/how-to-save-seeds

Open Source Seed Initiative Inspired by the open source software movement, OSSI is a group of plant breeders, farmers, seed companies and sustainability advocates working to

keep the genetic bounty of seeds available to the public. They offer access to open pollinated seed sources and resources for seed-saving. https://osseeds.org/

Native Seeds/SEARCH is a non-profit that preserves and sells seed from traditional native american plant varieties mostly from the southwest, although they also carry seed from other nearby areas that are well adapted to arid climates (like ours!). Seed-saving equipment and some literature available for purchase. https://www.nativeseeds.org/

MSU's extension service has helpful information online for home gardeners, including many downloadable guides about plants, pests, local growing conditions and locally adapted varieties (including heirlooms). The local office in Missoula may be useful: 2825 Santa Fe Court, 406-258-4200. https://www.msuextension.org/yardgarden/