

Saving Vegetable Seeds from your Garden

In January, having survived the holidays and settling into the new year, Project Grow gardeners invariably begin to think of the upcoming gardening season, registering for their plots and especially of what to grow. The seed catalogues that flood our mailboxes at this time add urgency as we ponder what varieties to buy. Seed collectors, on the other hand, felt that quickening earlier, months earlier! They know that spring-sown vegetables and flowers complete their life cycles in late summer and produce seeds that are ready to be collected, if they would only go out there, bags and marking pen in hand, to gather them. This season is at that point and straight through fall conscientious seed savers will be out reaping a second harvest: seeds that ensure the cycle can be repeated next year. Why not join the group?

There are many reasons for saving seeds from your own vegetable garden. Among the personal ones are gaining a more intimate knowledge of your plants and their life cycle; having confidence that you will be able to grow your favorite veggies even if seed companies decide to drop them; developing cultivars best suited to your area through your practice of selecting the best seeds from the best plants; meeting and learning from other seed savers; knowing that you are maintaining cultivars that were developed long ago and sharing and passing them on to others; and even saving some money, as prices for seeds increase steadily.

There are also other, broader and more important reasons for saving seeds. As large companies have taken control of seed production, they promote their own hybrids or genetically-modified seeds over the seeds that generations of gardeners have sown and saved and which have been freely shared with others. Plants from these "heirlooms" will produce seeds for anyone willing to grow and collect them. Hybrids or GMO seeds, on the other hand, do not reproduce themselves and must be purchased annually by farmers and gardeners, thus ensuring their companies good returns for their efforts. But the story is not just an economic one. A greater negative potential of favoring hybrids over heirlooms is that heirlooms will be lost, go extinct; and with their loss is the loss of the genetic material contained in them. Reduction in the biodiversity in the garden gives us fewer options to deal with new adaptations among plant diseases and climate change. Was a solution sitting among the now lost cultivars whose genes are no longer available to us? We don't know and never will.

Saving and growing heirlooms presents an opportunity to counter this shrinking of the gene pool. Why not try it out? To help you start, basic concepts are presented below, followed by procedures for choosing, collecting, processing and storing seeds.

Hybrid vs Heirloom: When saving seeds, it is important to know whether the plants you are selecting are open-pollinated/heirloom varieties or hybrids. **Hybrids** are modern cultivars created by crossing two highly inbred lines containing the traits desired in the offspring, the F1 generation. Plants grown from these crosses will express those traits, which make them very attractive to gardeners and especially commercial growers. With hybrid plants, however, seeds from hybrid plants, or the F2 generation, will not necessarily reproduce the same traits and may even be sterile. To continue to grow hybrids, you will need to continue to buy seeds annually. However, if the idea of

seedsaving appeals to you and you want your seeds to replicate their parent plants, open-pollinated or heirloom varieties are what you should grow.

Why do **open-pollinated or heirloom** varieties work? Because these varieties have been allowed to freely cross-pollinate one another over many generations until their genetic make-up is similar and stable. Taking seeds from them will merely repeat what has already been going on for years by home gardeners. Growing them out next year continues that long tradition of home gardeners using their own seeds, saving and sharing them with neighbors, and passing them on for us to enjoy today.

How do you know whether you have planted hybrids or not? Check your seed packet. If it says "open-pollinated" or "heirloom," you're good to go. If it says "F1" or "hybrid," you are out of luck--for this year. Select heirlooms next year and you can be in the seed collecting business! All Project Grow plants and seeds are heirlooms.

Annual vs Biennial: Knowing whether a plant is an annual or biennial will also help you when collecting seeds. Many of the popular vegetables in Project Grow plots are **annuals**. These are plants that grow up, flower, set seeds and die within one growing season. Examples are corn, lettuce, arugula, peas, beans, cucumber, pepper, eggplant, tomato, and squash, among many others. Allowing a few plants to flower and go to seed will give you sufficient amounts to plant all you want next year and still have enough to share with friends.

Biennials take two years to produce seeds. The first year is spent growing the plant. It is the period that we are most familiar with because the plant is what we harvest and consume. Who doesn't enjoy growing huge heads of cabbage, collards, or cauliflower or pulling up beets, carrots, onions, or leeks? However, to get seeds from these and other biennials, harvesting the plants will have to be foregone, to allow them to continue into the second year to produce flowers and ultimately seeds. Because of the long time period involved and difficulty in over-wintering biennials, these are not plants that the novice seed collector normally considers. Exceptions are cold-hardy plants such as onions and leeks. A few plants left in the garden over winter will usually produce seeds for you the next season.

Method of Pollination: Knowing how plants are pollinated is important for seed collectors because fertilization methods impact the purity of the seeds produced. Serious seed collectors know the pollination methods employed by the vegetables they grow and carry out gardening practices that maximize seed purity. There are three ways for pollen to reach ovules within a flower to achieve fertilization: through **self-fertilization, the help of others, such as insects, or the wind**. Self-fertilization occurs in plants with "perfect" flowers which contain both male and female structures and allow self-fertilization to occur (some plants with perfect flowers resist it and depend on other flowers and pollen-carriers for pollination). For the self-pollinators, such as beans, peas, lettuce, and tomatoes, fertilization usually takes place before the flower even opens. Concern that unwanted cross pollination may take place between different varieties of the same vegetable, therefore, is minimal, though it is still possible with a very determined bee! Gardeners can avoid that by planting only one variety of lettuce, peas or beans or by planting one early and the second variety later, so that their flowering periods do not overlap. Avoiding cross-pollination among tomatoes is more problematic since most

gardeners want a range of them for fresh eating, cooking, and canning. Just do your best to separate different tomato varieties as much as possible and plant attractive (to bees) flowering plants in between. The odds are in your favor for getting reliably pure seeds.

Plants bearing non-perfect flowers either have male and female flowers on the same (monoecious) or different (dioecious) plants. Monoecious examples are zucchini and the many vining plants, such as cucumbers, squashes, and melons. On these, the female flower can be identified easily because it has a miniature fruit at its base; the male does not. Among dioecious plants, such as asparagus and spinach, only the female plant will bear seeds. Given the distance between the two kinds of flowers, a carrier for the pollen is required for fertilization to occur. Insects, the wind, and occasionally humans carry out that role.

Assuring seed purity with insect or wind pollinated plants is difficult, as both vectors can carry pollen over wide areas. Best and easiest is to plant only one variety of each vegetable from which you wish to collect seeds. Second easiest is to plant two or more varieties with different times of flowering. Planting early, mid- and late-season corn will allow you to have three reliably pure seeds, for example, as receptivity periods are brief among corn, making crosses unlikely. However, if a neighbor is also planting corn that is flowering at the same time, there will probably be some crosses. Just hope it isn't with field corn!

For vegetables that bloom over a long period, such as the vining group, isolate each of the different varieties by covering them separately with row covers to prevent insects from reaching the flowers. Then, on different days, uncover one variety to allow pollination to take place, and recovering it at night. Continue the process until you have as many pure-seeded fruit produced for your collection (tag them, so you know), at which point all of the covers can be removed. The later fruit will be true, but their seeds will be of unknown parentage.

If you want to take seed collecting a step further, vining plants are great ones to learn how to hand-pollinate vegetables: their flowers are large, male and female flowers are easy to identify, and there are usually enough of each so that mistakes are not devastating. Hand-pollination can ensure a bountiful harvest should bees be few in number. Steps to follow are:

1. Identify the two kinds of flowers on the vine. Males have just a stem at their base, appear first, often bloom in clusters, and are more plentiful; females flowers have a miniature fruit at their base, which is the ovary, and always are alone.
2. Carefully snip off a fresh male flower (early morning is the best time to find them) and trim off its petals. Be careful not to touch the central stalk, the pollen-bearing stamen.
3. Next, locate a fresh, wide-open female flower and gently roll the pollen-covered stamen several times over the stigma, or opening to the ovary, at the center of the flower. From here, the pollen will travel to the ovules within the ovary/fruit to achieve fertilization. You can maximize your success by using several male flowers from different plants to do so.
4. Tag the pollinated female flowers in some way, so you know which ones you will collect true seeds from later. You don't want to unwittingly add it to your salad!

What to Collect: The best seeds to collect are those that are fully-developed, large for its kind, and well formed with unbroken coats. They should also come from plants that are representative of their variety, free from disease, and vigorous. Other desired traits can be added when selecting your seed plants, such as taste, productivity, time of maturity, etc. Your selection should include several plants or several fruit from several plants. Doing so ensures the genetic viability of your future crops.

It is important to label your plants and seeds at all stages of gardening and seed collection, so you know exactly what vegetable and variety you are dealing with. Do not presume that you will remember. You will not! Seeds from bok choy, mustards, and their relatives all look alike. If you haven't labeled your plants this season, try to reconstruct what you have grown from your seed packets, your online order forms, talking with neighbors who grew the same things, etc. Should you discover your plant names, make a label and stick it next to them so you will know. As you collect seeds, place only one variety into a labeled bag or envelope. Continue this care with labeling throughout the whole process, and you will know and be confident of what your seeds are.

When to Collect: Collect all seeds when they are fully mature. Only then do they contain the resources to survive the storage months and create seedlings with strength sufficient to push up through the soil. For seeds that are collected dry, such as peas, beans, arugula, onions, bok choy, and corn, among many others, wait until the pods or seed heads are brown and dry. Just be mindful that some varieties will "shatter" and spread their seed over a wide area when fully mature. Monitor your seed plants to select a time that precedes that event.

When collecting seeds that are contained within a fruit, such as with cucumbers, eggplants, tomatoes, peppers, melons, and squashes, the fruit itself must be fully mature to ensure fully developed seeds within. How mature is "mature?" For melons and tomatoes, that means at the ripest eating stage. For peppers, it means when they have achieved their mature color, be it red, yellow, etc., and are slightly wrinkled but still very edible. Cucumbers and eggplants, on the other hand, should be past the eating stage, yellow and soft. With hard-skinned squashes, wait 3-4 weeks after collecting the ripe fruit to be sure.

Processing Your Seeds: Seed pods collected dry can be hand-shelled, with the large debris removed by hand and the fine detritus by gently blowing on them. Seed heads vary, some needing to be rubbed to free the seeds, others merely needing to be shaken. Free seeds over a tray or plate. Place cleaned seeds in jars or plastic envelopes and label them fully, with type of vegetable, variety name, and date or year collected. You will not remember the data in a year's time, so take a few seconds now to document them.

With wet-collected seeds, a little more needs to be done. Seeds from melons, peppers, cucumbers, eggplants, and squashes should be scraped or picked from the fruit, washed clean in a strainer, then spread on a labeled paper plate or sheet of stiff paper to dry undisturbed in a safe place. Do not use napkins or paper towels, as they do not release the dried seeds easily. Shake or move around the seeds as they dry to allow all surfaces to air dry and to prevent them forming clumps. They are ready for storage when the seeds shatter when hit by a hammer or crack instead of bending if squeezed. It may take

1-2 weeks to reach the shatter/crack stage. Don't rush the timing: it does not matter if you take 3-4 weeks to package them. You just don't want them molding in your jars. Place dried seeds into labeled jars or plastic envelopes.

Tomato seeds may be collected like the other fruit above, but they benefit from a period of fermentation that mimics what happens in nature: tomatoes ripen, fall to the ground and ferment, destroying the gel sacs surrounding the seeds which prevent germination and killing seed-borne diseases. Seeds that undergo this process germinate more quickly and produce stronger seedlings and plants.

To do so, slice the tomato in half at its equator and gently squeeze out the seeds into a bowl, along with whatever seed gel, pulp and juice that come along (the remaining fruit is still edible and perfect for cooking or canning). Place the contents into a jar, adding a little water, if needed, so the seeds are covered with liquid. Cover loosely and let sit for a few days on the kitchen counter. Within a day or so, a white film of fungus will form on the surface. The fungi eat the anti-germinating seed gel while producing antibiotics that destroy seed-borne pathogens. All the while good (heavy) seeds will sink to the bottom while less viable (lighter) seeds float to the top. When the film covers the whole surface, in a few days, the fermentation is done and seeds can be cleaned.

Remove the film, add some warm water to the jar, stir, then set aside for the contents to settle. Slowly pour off the liquid and any floating seeds and pulp, while retaining the seeds at the bottom. Repeat the process until mostly clean seeds remain. Empty the contents into a strainer, rinse one final time, shake off the excess water from the strainer, and spread the seeds to dry, as above.

Storing your Seeds: Seeds require cool, dry and dark conditions to retain their best growing potential. The ideal site is your freezer or refrigerator. However, care must be taken here to store your seeds in closed, moisture-proof containers to ensure they remain dry. When removing seeds from the chilled container, be sure to let it achieve room temperature first before opening it, to prevent condensation from occurring inside. For most collectors, however, other sites must be considered. A closet with an outdoor wall will be several degrees cooler and will serve well. As will a north-facing room.

Well stored seeds will last a long time, with larger seeds tending to deteriorate faster than smaller ones. They will perform best the first year after collection, with a decreasing rate thereafter. If you are not sure whether your older seeds are going to be worth planting, perform a **germination test** to find out. Moisten a paper towel, squeeze it out, and spread 10 or 20 seeds on it. Fold up the towel so all the seeds are covered, insert it in a plastic bag, and place it on a warm surface (under lamps, near but not on a heater, etc.) for a few days. Check it after 2 or 3 days, count the number of germinating seeds, then re-package carefully as before. Continue to check daily to see how many more have grown. Calculate the percentage of germinating vs non-germinating seeds when it is obvious that no more will grow out. You now have a good estimate of how well your seeds will do if planted. At this point, you can decide whether to discard the lot, over-sow your plantings, to make up for the reduced viability of your seeds, or plant them normally.