

## Collecting and Storing Seeds from Your Garden

*Taun Beddes*, Utah State University Extension Horticulture Agent

*Dan Drost*, Utah State University Extension Vegetable Specialist

*Brian McClain*, University of Idaho Extension Agriculture Agent

### Summary and Introduction

Many home gardeners are interested in harvesting and storing their own vegetable seeds. For gardeners who have had this in mind, there are several aspects to consider that include:

- Vegetable seeds are available in two forms, open pollinated and hybrid varieties.
- Seeds produced from open pollinated varieties often grow into plants with the same or very similar traits as the parent. They are developed from several self-crossing generations, where, over time, relatively pure, genetically stable lines are developed because self-pollination is an intensive form of inbreeding. However, exceptions exist. These include corn and cucurbits. Both readily hybridize (cross-pollinate) with other closely related species or varieties meaning collecting seed from these unintended out-crosses will not have the same or similar characteristics as the parent plant. Pollination needs to be more closely managed and manipulated, and these efforts are often not practical for the home gardener. Additionally, it may not be worth the effort to collect certain vegetable seeds due to how difficult it is to obtain without specialized equipment.
- Hybrid seeds are a result of a controlled cross of two or more parent lines (sources) which results in superior combinations of desired plant characteristics. Plants grown from hybrid seed usually have enhanced growth characteristics such as earlier or increased yields, or improved disease resistance. Seeds produced by crossing two hybrid plants are genetically different from the parent plants and the resulting plants produced from the seeds are usually of inferior quality and do not perform like the parents.

- Seed viability, the capacity of a seed to germinate, declines greatly over time. Storage methods greatly impact this. Once seeds are properly processed, they should be stored in a cool, dry location. Warmer temperatures and high humidity accelerate seed deterioration which results in a loss of viability.

### Hybrid and Open Pollinated Seed

Two general types of seed are available for retail purchase. They include hybrid and open-pollinated types. Hybrid seed, mostly developed after World War II, is the product of controlled pollination between two or more closely related but genetically distinct parental inbred lines. To maintain the hybrid, a plant breeder must manually cross the inbred lines each year which is expensive and time consuming. Of the two types, hybrid seed is the most common in commerce.

Seeds produced from these crosses will grow and offer such features as increased vigor, increased yields and better disease resistance. However, seed produced by crossing two hybrid plants in the garden will either be sterile or not grow back true-to-type. Hybrid seed almost always has the designation “F-1” or “F-1 hybrid” or “hybrid” on the seed packet label or description.

In contrast, open-pollinated (OP) cultivars or varieties are either self- or cross-pollinated. To maintain genetic purity (true-to-type) in many species, plants need to be isolated from other varieties so pollen transfer from them does not occur. Therefore, maintaining OP crops or cultivars is “easier” as the gardener only needs to isolate the parent plants rather than maintain unique parent plants (inbreds) like in hybrid seed production systems. Seed from these OP crosses usually grow back true-to-type when replanted. If interested in collecting seeds, collect OP varieties. One disadvantage to OP varieties is

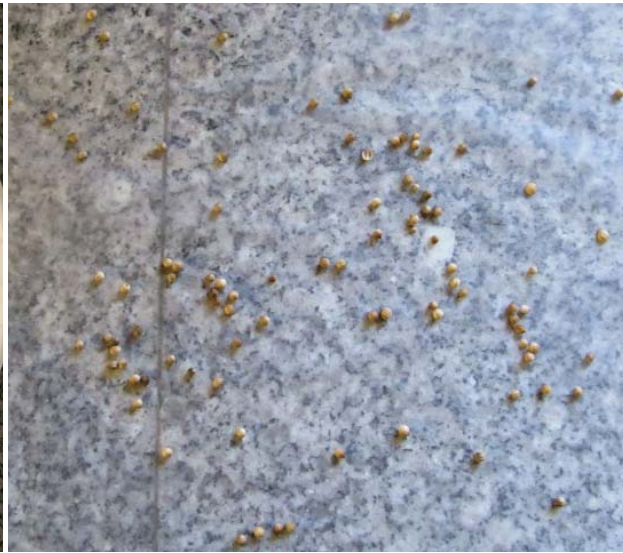
that they often have less disease resistance and may produce lower yields compared to hybrid types. Seed packets labels may or may not list a variety as OP depending on the company marketing the seed. Additionally “heirloom” varieties – varieties developed mainly before World War II are OP.

## Harvesting Seed

For most vegetables:

- Harvest seeds from the fruit when the fruit is fully mature, but not rotten.

- Separate seeds from the surrounding fruit tissue or pulp and allow them to air dry on wax paper or a wax coated paper plate for several days. Keep out of direct sunlight but place them in a well ventilated area with low humidity.
- The humidity is low enough in the Intermountain West that seed driers or other specialized equipment is usually not needed. However, for serious hobbyists, inexpensive seed processing equipment can make the process quicker.



*Place freshly removed seed on a surface such as wax paper or a wax coated paper plate to make removal easier when seeds are dry. Seeds placed on surfaces such as paper towels are difficult to remove and may be damaged. (Taun Beddes)*

## Seeds Easily Collected from the Garden

**Tomatoes:** Tomatoes are among the easiest seeds to collect and save. Since heirloom and OP tomatoes are almost exclusively self-pollinated, plants grown from collected seed almost always grow back true-to-type. Select fully ripe tomato fruits that are of shape and size similar to parent plant. Squeeze the seeds onto a wax paper or a piece of screen and leave them at room temperature until thoroughly dry. Soaking the freshly harvested seeds in a container of tap water at room temperature for 2 to 3 days and then drying helps remove the jelly-like membrane around the seed and may increase germination rates.

**Peppers:** Peppers are also easy to collect and store. Select fully mature pepper fruits, preferably ones that are turning red (or are changing from green to another color). Place the seeds on a towel or screen until thoroughly dry. Some out-crossing may occur in pepper

which makes bell peppers hot if grown too close to hot pepper types.

**Eggplant, Tomatillo (Husk Tomato or Ground Cherry) and Garden Huckleberry:** Separate seeds from mature fruit and dry thoroughly at room temperature.

**Legumes:** When collecting beans, peas, soybeans and other legumes, leave pods on the mother plant until the pods are dry enough to allow the seeds to rattle around in the pod. Watch carefully because pods of some legumes split when they are dry and scatter the seeds. Pick dry pods and place in a well ventilated area at room temperature. On occasion, insects and birds will feed on drying seeds. If this occurs, harvest the seeds as late as reasonably possible and continue drying in a safer location. When pods are completely dry, remove the seeds. To prevent weevil infestation, freeze seeds for 24 to 30 hours. Additionally, home grown peanuts are relatively easy to collect. Collect and dry pods of larger size, but do not shell until ready to plant or roast.



**Leave pods on the plant until relatively dry. When pods are harvested from the plant, carefully remove and continue drying in a well-ventilated area in a manner that seeds can still be collected if pods shatter. Once pods are completely dry, remove and store in airtight, pest resistant containers.** (2009. © Christine Dugdale, used with permission.)

### Seeds More Difficult or Impractical to Collect

For many vegetables it can be difficult to consistently produce seed that are true-to-type. For some the lifecycle of the plant is not conducive to both being grown as a vegetable and for seed production at the same time (biennial crops). For many species, plants readily hybridize with closely related crops or weeds. For others it may be difficult to remove the seed from the fruiting structures.

Here are some of the common vegetables where seed production creates some real challenges.

**Sweet corn:** Sweet corn is usually hybridized by seed companies and pollination occurs naturally by the wind. These factors make it impractical for home gardeners to manipulate crossing so sweet corn will come back as the same variety. To save seeds, cover the ear with a paper bag before the silks emerge from the ear. Once the silks are all out, then take the tassel from the same plant, remove the bag exposing the silks, shake pollen from the tassel onto the silk, and then replace the bag over the ear to ensure that no additional pollen has access to the silks. This works well for heirloom sweet corn varieties but should not be attempted with the newer hybrid sweet corn types.

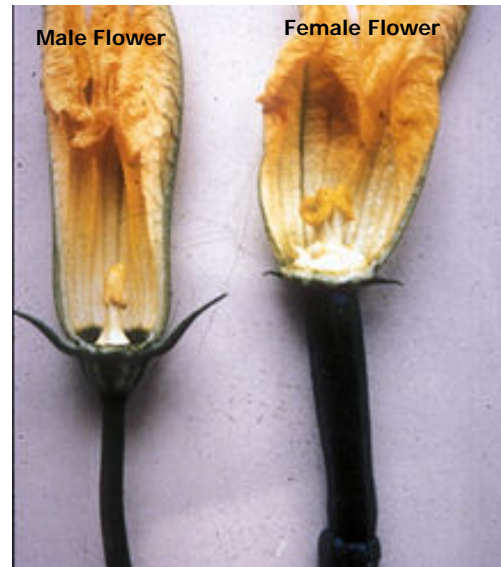
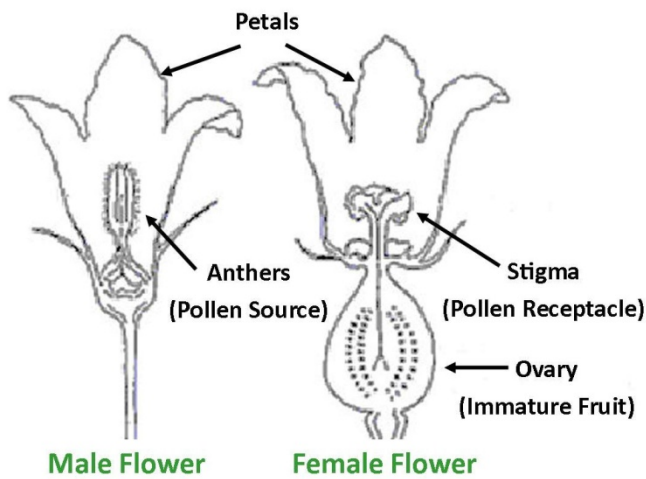
**Cucurbit Vine crops:** Vine crops readily cross pollinate within their respective genus and species; especially cucumbers, melons, squash and pumpkins. Without controlled isolation, these crops become crossed with other varieties of the same species and sometimes with other species. However, muskmelon (*Cucumis melo*) will not cross with cucumber (*Cucumis sativus*) and watermelon will not cross with any other cucurbit

species. However, several of the Cucurbita species (squashes and pumpkins) readily cross with each other.

To produce seed, identify blossoms that are ready to open the following day. They will have a light yellow color and the petals are still folded together with a distinct pointed tip. Select a male and female flower on the same plant. Female flowers have a miniature fruit just behind the blossom. Male flowers are on a longer stem and do not have the miniature fruit at the base of the flower. Prevent the female blossom from opening by placing a paper clip, clothes pin or rubber band on the tip of the flower, gently cinching all petals together. An alternative method is to place an appropriately sized paper bag over the flower and tying the end of the bag so insect pollinators cannot enter. Take care to not damage the stem using either method. Clipping or bagging the flower prevents exposing the female flower to unwanted pollen.

The next morning, remove the male blossom from the plant. Carefully remove the flower petals to expose the anthers (pollen source), and gently but firmly touch or dab the anthers to the center of the female flower (stigma) several times. Close or cover the female flower again since bees or other insects may transfer additional pollen.

Grow this fruit to maturity and collect the desired seeds. It is wise to mark the fruit, so that it is not confused with others developing in close proximity. One way to do so is to loosely tie a length of yarn to the fruit stem. The fruit must be very ripe before harvesting. Cucumbers must be entirely yellow, melons over-mature and squash and pumpkins must be thoroughly mature. Scoop out the seeds or flesh and dry as described earlier.



*Typical cucurbit flowers.* (Illustration, 1997 © The State of Queensland, Australia, used with permission; Photo, Dan Drost)

**Biennial Crops:** Carrot, beet, onion and plants in the cabbage family (Brassica's) are questionable for seed collection by the home gardener. All of these require 2 years (biennial) to complete their life cycle and produce seeds. During the first year simply allow the plant to grow. The plant requires exposure to an extended cold period to initiate flower stalk development, before it will flower in the second year when seed stalks are formed. Many of the crucifers (broccoli, cabbage, cauliflower, etc.) intercross among each other and may also cross with native, wild cruciferous species. Carrots also out-cross with the prevalent wild carrot species.

For gardeners wanting to collect seeds from beet or carrots, harvest and store the roots by over-wintering them in a cold garage at 32-45°F in moist sand. As soon as soil can be worked in the spring, replant the roots on 2 foot centers in the garden and allow them to flower. If growing several varieties, cage the plants with insect proof netting so bees and flies do not transfer pollen from different varieties. This is necessary to ensure the resulting seeds are true-to-type. When using cages, bees or flies may need to be introduced to the cage so pollination can occur.

With onions, keep the bulbs cool and dry for the winter, then plant them in early spring. A flower stalk will form. Insects (bees, flies, etc.) are needed to help pollinate the flowers. If ornamental alliums are growing close by, out-crossing can occur so caging may be necessary with onions, too. When the seeds become dark colored and quite dry, bag them on the plant so any seed loss is collected before they fall to the ground, then complete the drying at room temperature.

### Storing Seed

Once collected seed is clean and dry, place it in a paper envelope and seal in a plastic bag. Label each

packet with the species and variety name and year it was collected. Keep purchased seeds in their original packages. This is an easy way to remember what type of seed they are and when they were purchased. Fold or close the package tightly so seeds are not lost.

When storing seeds for multiple years, whether purchased or self-collected, the two factors that impact seed quality over time are storage temperature and humidity levels. Cooler temperatures (35-45 F) and low humidity encourages longer shelf life. Place individual packets of self collected or purchased seed in plastic buckets with a good rubber seal or mason jars with good lids will ensure that dry seeds stay dry. A cool location in the basement or storage in the refrigerator will ensure better temperature control. Since the refrigerator is quite humid, proper storage containers with good seals are a must to keep seed dry, viable and vigorous.

Seeds can be frozen, but they need to be in airtight containers so the moisture in the freezer does not change the moisture content of the seeds. If seeds are stored frozen, they will last for up to 10 years. Otherwise, refer to Table 1 for how long seeds can be reasonably stored if kept cool and dry.

### Germination Test

Many gardeners wonder whether stored seeds are still viable, so it is best to perform a germination test before planting them in the garden. Refer to Table 1 for acceptable germination rates of various vegetables. Here is an easy way to calculate the germination percentage of stored seeds.

- Moisten two or three layers of paper towels.
- Place 25-50 seeds in rows on the top towel and roll or fold the towels over the seeds. Place the towel roll in a plastic bag, but do not seal the bag.

- Keep in a warm place such as kitchen counter or on top of the hot water heater. Seeds generally germinate best at temperatures between 70-80° F.
- Some seeds, such as radishes, will germinate in two to three days. Peppers may take 10 to 14 days. Count the number of seeds that have germinated every 2 to 3 days and record this value. Remove the germinated seeds (ones with a root) and continue observing the seeds.
- Once no more seeds germinate, add up the number germinated and divide it by the total number of seeds placed in the paper towel. Multiply this number by 100 to get the percent germination. The higher quality seeds should have a germination percentage greater than 80%. If lower than normal germination rates are recorded, sow double or triple the recommended number of seeds in the garden to get acceptable

plant stands and do not save the seed for in future years.



*Seeds positioned in folded paper towels and placed in a plastic bag for germination testing. (Taun Beddes)*

**Table 1. General Seed Storage Information**

Vegetable	Minimum Germination (%)	Average Number of Seeds		Relative Longevity (Years)
		Grams	Ounce	
		Asparagus	60	
Beans	70	4	100	3
Beets	65	70	2,000	4
Broccoli	75	290	8,100	4
Brussels Sprouts	70	300	8,500	4
Cabbage	75	280	770	3
Carrot	55	790	2,200	3
Cauliflower	75	310	8,600	4
Celery	55	2700	76,000	5
Chard, Sweet	65	50	1,500	4
Corn, Sweet	75	5	140	2
Cucumber	80	40	1,100	5
Eggplant	60	260	6,200	5
Kale	75	360	10,000	4
Kohlrabi	75	330	9,200	5
Leek	60	350	9,900	2
Lettuce	80	930	26,000	5
Muskmelon	75	40	1,100	5
Okra	50	18	500	2
Onion	70	30	8,500	2
Parsley	60	640	18,000	1
Parsnip	60	240	6,800	1
Pea	80	7	200	3
Pepper	55	160	4,500	4
Pumpkin	75	7	200	4
Radish	75	110	3,500	5
Spinach	60	100	2,900	5
Squash	75	10	300	5
Tomato	75	360	10,000	4
Turnip	80	500	14,000	5
Watermelon	70	10	300	5

## References

Justice, O., and L. Bass. 1978. Principles and Practices of Seed Storage. USDA Science and Education Administration. U.S. Govt. Printing Office. Washington, .

Sukprakvarn, S., S. Junkakool, and R Huang. 2005. Saving Your Own Vegetable Seed: A Guide for Farmers. AVRDC publication number 05-647. AVRDC—The World Vegetable Center, Shanhua, Taiwan. 25 pp. Available online at:

[http://www.avrdc.org/pdf/PROD6-saving\\_your\\_own\\_vegetable\\_seeds.pdf](http://www.avrdc.org/pdf/PROD6-saving_your_own_vegetable_seeds.pdf)

Utah Department of Agriculture and Food Minimum Vegetable Seed Germination Standards. Administrative Code R68-8-9. Available online at: <http://www.rules.utah.gov/publicat/code/r068/r068-008.htm#T9>

*Photo in header courtesy Sanjay Ach, Wikipedia.*

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions.

Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities.

This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Noelle E. Cockett, Vice President for Extension and Agriculture, Utah State University.