



Saving Seed from Corn

Generations of seed savers have saved various traits in corn resulting in the thousands of different varieties that suit different growing climates and culinary preparations. Corn is one of the most diverse crops in the world but unfortunately most of the corn grown today represents only a small sliver of this diversity. Saving seed from corn can be challenging because of its reproductive strategy, but it is where the seed saver can play an important role in stewarding biological diversity.

Population size:

This Seed Saver packet of corn contains 250 seeds. It is advisable for the seed saver to grow large populations, **at least** 100 plants, to maintain healthy generations of corn. We recommend growing 200 plants or more; 250 seeds allows for some loss of plants to pests, weather, etc. A large population is needed because corn is very prone to inbreeding depression due to the outcrossing nature of the pollination process. While it is possible to save from fewer plants to obtain viable seed, if you do this over a few generations the negative effects of inbreeding will become apparent. Plants will lose vigor, won't produce both male and female flowers, and will be more susceptible to pests and disease. Growing large populations will produce the genetically healthiest seed.

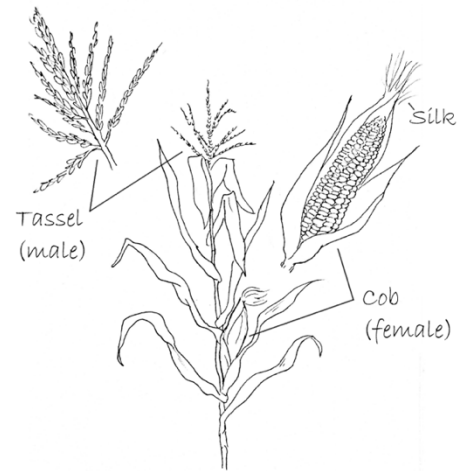
How Corn Reproduces:

Corn is a wind-pollinated species with imperfect flowers. It is because of this reproduction strategy that cross-pollination can occur more easily than in insect and self-pollinating crops. The pollen is light and has the potential to travel great distances.

The tassel, at the top of the plant, is the male flower. Pollen is shed from the anthers, along the tassel branches. The ear, or corn cob, is part of the female flower and is located on the stalk. Husk leaves will form at a leaf node, and eventually silks will emerge. Each strand of silk is a long stigma, receptive to any pollen falling along its entire length. Each silk is connected to a single immature kernel. As with other imperfect flower species, the male flower will appear first but the female flowers are not far behind and should just be peeking through the husk as the first anthers open. Many landrace varieties, like those stewarded by Native Seeds/SEARCH, will flower over the course of several weeks due to diverse genetics that allows them to be very adaptable.

Through the flowering process there are lots of pollen grains that will end up floating in the air to fertilize plants located at some distance from the source tassel or blow out of the field and not pollinate any silks. *It is best to lay out your planting in blocks, instead of rows, so that pollen has plenty of plants to mingle with within a short distance.* Growing many plants also ensures pollen is abundant to form kernels.

If you are interested in growing corn and saving seed it is important to understand that all types of corn will, if grown in close proximity, cross-pollinate. This will influence the generations of saved seeds and what you harvest to eat. For example, if you grow a flour corn variety next to your sweet corn variety the results will be a mix of both types. Pollen from the flour corn will fertilize your sweet corn resulting in starchy, tough kernels. Likewise, pollen from your sweet corn will fertilize your flour corn resulting in sweeter kernels that may not grind well for cornmeal. These may be happy experiments but more than likely not what you are expecting as a grower or a seed saver. However, there are several techniques, described below, that can prevent unwanted cross-pollination and allow more than one variety to be grown in close proximity.



Techniques to prevent cross pollination:

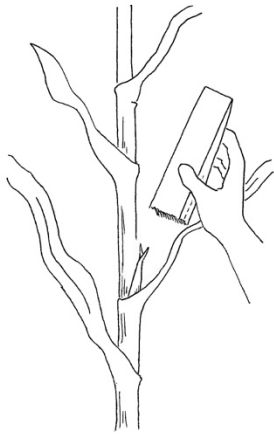
Isolation via time or space

Corn pollen can travel several hundred feet to miles. Spatial or temporal isolation of different varieties grown near each other is crucial for the seed saver. If isolating by space, separate different varieties by at least 800 feet. Separating by a mile or more is ideal. This distance can be reduced if tall barriers like trees or buildings are present between planting areas. For growers in areas with abundant and dense commercial corn fields, it is best to hand pollinate or to isolate by at least a mile or more.

Many regions of the Southwest have a long season and so it is possible to isolate varieties by time. Plant different varieties months apart so they will flower at different times. When planning this, be aware that some are shorter-season varieties and others are longer-season. An estimate of the number of days from planting to the start of pollination is printed on the front of the Seed Saver Size packets. Be aware that your results may vary significantly. Corn growth is determined by accumulated heat. So the warmer the temperatures the faster the growth and the cooler the temperatures the slower the growth. It is not just a factor of the high temperature, but an accumulation of heat even during the nighttime hours. Planting date, latitude, even shade that a garden receives can influence the rate of growth so consider these dates given as estimates based on observations at the NS/S Conservation Farm in Patagonia, AZ at 4050 feet elevation. Also be aware that land race corn varieties like these may continue to disperse pollen over a 2 to 4-week period.

Hand Pollination

If you wish to grow more than one variety together and don't have a way to isolate them, or if you have neighbors growing corn, you can hand pollinate to ensure true-to-type seed. Corn shoot bags or tassel bags are placed over developing female flowers (the ears) before silks emerge so that the pollination process can be controlled. Feel the bag to check for silk emergence, and watch for pollen shedding from anthers.



placing shoot bag over emerging ear shoot

Bees visiting the anthers is another sign that pollen is dropping. Using a paper bag or bowl, collect pollen from many different plants to maximize male diversity. Simply bend each tassel over the bowl and gently shake it, being careful not to break the tassel, as it will shed pollen over several days. Then remove the shoot bag from an ear and confirm there are silks emerging from the husks. Trimming the silks evenly to give them a brush cut will make more of the silks accessible to the pollen. Shake pollen onto the silks that have emerged. Replace the bag immediately to prevent unwanted crossing from pollen that might be in the air. The pollen is most biologically available in the morning before temperatures rise, so hand pollinate early. Because silks develop over time it is useful to do this process every other day, opening and re-bagging each time. Once the silks are fertilized they will cease to grow and begin to turn brown. The most useful bags to cover fertilized silks are wax-lined tassel bags that can also be used to collect pollen and are large enough to accommodate the growing corn ear. The wax lining prevents the bag from deteriorating in the rain. These supplies are available from Native Seeds/SEARCH and elsewhere. You can eat any ears that were not bagged but save seed from only those ears where the pollination process was controlled and bagging techniques used.



shaking pollen into a bowl

Block planting

Another alternative to isolating is to save seed only from the plants located nearer the center of block plantings. It is more likely that the plants on the borders of the blocks would be pollinated by pollen blowing over from a neighboring variety. While not as controlled as hand pollination, the interior plants will more likely be pollinated by an adjacent plant of the same variety. This is most effective if the block has several dozen to hundreds of individual plants, and also if there is some distance between the blocks of different varieties.

Harvesting for Seed:

To harvest corn for seed, regardless of the type, pick the corn when the husks are completely brown and dry. Peel back the husk layers and press the kernels with your fingernail. Mature kernels should not dent. For sweet corn this means that the ears you are saving for seed should be allowed to mature well beyond ideal time for eating. If the field conditions don't allow the ears to stay on the plants they can be picked and dried indoors. This is recommended if moisture content of the ears is still high and a hard frost is expected. However, allowing ears to stay with the plants for as long as possible will result in more mature, higher quality seed.

Ears can be shelled by hand or with mechanical or hand-crank shellers. For most varieties the seeds should separate easily from the cob, if not they need to be dried further. It is appropriate to store seeds on the cob if you have the space. The seeds will actually be viable for longer and is a traditional way of storing corn for many indigenous peoples of the Southwest. Shelling may be more practical for many, as the stored kernels take less space. After shelling, additional winnowing and removal of cracked kernels is necessary.

When saving seed for replanting you want to get a good mix of seed from across the field. For dent, flour, and popcorns you can mix all the harvested kernels together and take a random sample from the mix. For sweet corn, leave several dozen ears to dry on the plants ... be sure these are from different areas in the field to get a good diversity of genes represented in the saved ears.

Storing Seeds:

Before storing seeds, remove all plant material from seeds. Excess material can increase the risk of mold and insect damage. Check that seeds are thoroughly dried. Excess moisture can quickly lead to mold and total seed loss. Store only healthy, viable, disease-free seeds.

Use sealable plastic bags, paper envelopes, jars with good lids or any airtight container to store seed from one year to the next. Something airtight is useful because it minimizes the fluctuation between moist and dry air which can damage seed embryos. Store seeds in a cool, dry place, such as a hall closet, refrigerator or freezer. Seed viability is longer the colder they are stored; consistency of conditions is also key to ensure longevity. When handling seeds in the fridge or freezer, be aware of condensation and make sure the container and seeds are completely dry before storing. Even if you don't freeze for long term storage, it is good practice to temporarily place in the freezer for a week after initial drying to kill off any insect eggs or other unseen pests. Maize weevils burrow into kernels and lay eggs. You may not see the damage until it is too late, so continue to monitor stored seed to ensure they are safe. Keep good records. Label each package with the year, the variety, where the original seed came from, and any notes/observations.

Text adapted from *Saving Seeds in the South West: Techniques for Seed Stewardship in Arid Lands* by Joy Hought and Melissa Kruse-Peebles, available through the Native Seeds/SEARCH store or online at www.nativeseeds.org. More seed saving information and techniques are also available at www.nativeseeds.org.