



Vegetable Seed Saving

University of California Cooperative Extension
Stanislaus County

November 2008

This publication discusses how to save seeds from vegetables grown in your garden. It also lists information on the storage life of seeds and provides directions for testing the viability of seeds. Page 7 of this publication is an “at a glance” calendar for when to plant various crops for seed and transplants.

SEED VIABILITY

A seed is a living, resting embryo. A seed’s viability is its ability to sprout, which is measured in years. If cared for properly, seeds can be viable for several years. Page 2 of this publication lists storage and germination time for most vegetable seeds.

The newer the seed, the better the viability. Most seed packets are stamped with a date. When purchasing seeds that are on sale, be sure to check their age.

- Choose 20-100 seeds
- Place the seeds between 2 paper towels that have been lightly misted
- Put the paper towels in a plastic bag and label with the date
- Keep the bag in a place that is 70-80°F. Keep towels well misted
- Check the seeds for up to 10 days
- Record the number of seeds germinated and calculate the viability percentage
- 70% is considered a good rate

Ensure seeds do not come into contact with moisture or heat. Keep them in their original packets, and place them in glass jars or tightly sealed plastic bags.

Seed packets and saved seeds that have been exposed to heat or moisture have less viability. If you are unsure of a seed source, use the simple test on the bottom left side of this page.

WHAT TYPES OF SEED TO SAVE

Saving seed is a fun activity that requires a little background knowledge.

Some seed packets are marked with the term “hybrid.” These seeds have been selected by plant breeders for favorable characteristics such as better yield, disease resistance or improved color. The result of these unions is called a “hybrid.”

Hybrid seeds produce the desired plant created by plant breeders. However, seeds from a hybrid plant are either sterile or produce plants unlike their parents. Seed packets marked “open pollinated” or “heirloom” are good candidates for seed saving.

Sometimes a vegetable from the grocery store or farmers market is so tasty, gardeners

want to save its seed. Just remember, if the crop was a hybrid, the seed won’t produce true to what you ate.



When saving seeds, select the healthiest plants in your garden as a seed source. Use seeds from several of these plants to create genetic diversity in your personal “seed bank.” For example, save the seed of 6 different cucumbers from 6 different healthy plants (all the same variety).

CROSS-POLLINATION EXPLAINED

In the garden, some pollination occurs by wind or insect. In the case of seed saving, cross-pollination is something a gardener may need to prevent. Because of this, certain crops should be grown some distance away from each other, or not grown at all.

Many crops can cross amongst themselves. For example, an ‘English breakfast’ radish will cross with a ‘cherry belle’ radish. Also, certain crops can cross with each other. For example,

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spinach will cross with beets. This publication instructs how far apart to keep various crops, in order for the seeds to retain purity.

GENERAL SAVING INSTRUCTIONS

To save time when harvesting edible seed crops such as beans, peas and corn, pull the entire plant and dry it. When you are ready, remove the seeds from their pods and husks.

For crops that have a fleshy fruit like peppers and tomatoes, pick when they are mature and slightly soft.

Some crops have seeds that are easily scattered, so monitor these crops and save their seed before this happens. These crops include lettuce, onion and okra.

While waiting for your crops to flower, you may notice that the seed stalks get very tall. If they tend to lean over before maturing, tie them to a stake to prevent them from falling over.

A NOTE ABOUT SMALL SEEDS

It is sometimes helpful to use a piece of screen to help separate seeds from the rest of the plant debris, known as "chaff." Rub the seed pods over the screen, allowing the small seeds to pass through.

PACKAGING

Place newly harvested seeds in envelopes or paper bags.

Label the packets with the date saved and type of seed. Keep these paper bags in storage containers that are water-resistant, such as glass or plastic bags. Use a permanent marker to label the packages. Include planting instructions. Keep seeds out of direct sunlight, at storage temperatures of 75°F or lower. If you store your seeds in a refrigerator or freezer, do not use plastic, as it tends to gather moisture inside.

You can ensure your seeds are free from moisture in their packages by using a simple and inexpensive method. It was created by Dr. James Harrington, a Seed Specialist at UC Davis. His instructions are to lay out 4 pieces of tissue, and then put 2 heaping tablespoons of powdered milk in the center. Next, fold the tissue into a pouch and seal it with a rubber band or tape. Place the home made product in a wide mouth jar, and add your seeds.

Remember that this packet is created to absorb moisture, so when opening the jar to remove seeds, always promptly replace the lid.

BARRIER PLANTS

Under some categories, planting a barrier plant between crops and/or varieties is suggested. Depending on the season, the barrier plant would need to be several feet tall. Some barrier plants for spring/summer could be larkspur or

| Vegetable | Storage (years) | Germination Time (days) |
|------------------|-----------------|-------------------------|
| Bean | 3 | 7-10 |
| Beet | 4 | 7-14 |
| Broccoli | 3 | 5-10 |
| Brussels Sprouts | 4 | 5-10 |
| Cabbage | 4 | 5-10 |
| Carrot | 3 | 12-14 |
| Cauliflower | 4 | 5-10 |
| Celery | 3 | 10-14 |
| Corn | 2 | 7-10 |
| Cucumber | 5 | 7-10 |
| Eggplant | 4 | 10 |
| Kale | 4 | 5-10 |
| Kohlrabi | 3 | 5-10 |
| Leek | 2 | 10-14 |
| Lettuce | 6 | 7-10 |
| Musk Melon | 5 | 7-10 |
| Okra | 2 | 7-14 |
| Onion | 1 | 10-14 |
| Parsnip | 1 | 14-21 |
| Pea | 3 | 7-14 |
| Pepper | 2 | 10 |
| Pumpkin | 4 | 7-10 |
| Radish | 5 | 5-7 |
| Spinach | 3 | 7-14 |
| Squash | 4 | 7-14 |
| Swiss Chard | 4 | 7-14 |
| Tomato | 4 | 7-14 |
| Turnip | 4 | 7-14 |
| Watermelon | 4 | 5-7 |

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delphinium. Barrier plants for fall/winter would be snapdragons or stock. Any tall flower that grows during the season of your crop will work.

EASY TO SAVE SEEDS

Beans, peas, lettuce, pepper and tomato are the easiest seeds to save because they are self-pollinated. Each flower has male and female parts that pollinate each other. However, in some cases, unwanted cross-pollination within crops may occur. Suggested separation distances are listed on pages 3-6.

BEANS

Plant April-July. Ideally, bean varieties should be separated by at least 100 feet, although cross-pollination is rare. Allow pods to dry on the plant, usually about 6 weeks after initial harvest. Do not save seeds from diseased plants.

To test a bean seed for storage readiness, bite down on it. If your teeth can dent it, it's not ready. Dry beans in a cool location until pods are brown and seeds rattle.

PEAS

Plant August-October and/or February-March. Separate varieties by 5-10 feet. As a rule, sugar peas and snap peas do not cross.

About 4 weeks after normal harvest time, the pods will be dry. Remove pods from the

plant, or remove the whole plant from the ground. Then separate the pods from the plants, and the peas from the pod. The pods should open easily.

LETTUCE

Plant lettuce February-April and/or August-November. Lettuce is self-pollinating, and usually comes true from seed. To be sure, plant a barrier plant between rows of different varieties.

Allow seed heads to dry for 2-3 weeks after flowering occurs. Not all heads will ripen at the same time. Wait until at least 1/2 the plant has gone to seed, then cut the top of the flower head off and dry it upside down in a paper bag. Keep the bag in a warm, dry place away from heat or moisture.

PEPPER

Plant April-July. Plant other crops in between rows to avoid cross-pollination by bees.

Choose overly mature peppers for seed saving. Collect seeds by the "wet" or "dry" method. The dry method works well for collecting a small amount of seed. Cut the bottom off the pepper, and slide your finger along the seeds to strip them off. The seeds should be dried at room temperature on a newspaper for 2-3 days.

For a large volume of seeds, cut the top off the peppers (just under the stem) and fill

the pepper with water. Stir the water until the seeds come off. Debris and immature seeds will float to the top and can be removed. The viable seeds will be at the bottom. Finish drying seeds as described in the "dry" method above.



TOMATO

Plant April-July. Place plants of different varieties about 10 feet apart. Avoid using hormone sprays to help with blossom set, as they may interfere with seed production.

Allow the fruits to completely ripen before harvesting. Cut the tomato across the middle and gently squeeze out the pulp. Place the pulp into a container and cover it loosely for about 3-4 days. Stir daily.

During the fermentation process, a layer of fungus will form over the top and eat away the gelatinous material that surrounds the seeds (the scent of this fungus is not pleasant).

After 3-4 days, fill the container with warm water. Once the contents have settled, begin pouring the water out, removing the immature seeds and pulp. The viable seeds will be at the bottom. Strain out the seeds and let them dry on newspaper for several days at room temperature. Clumps of seeds will form, but can be

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easily broken up for packaging.

VARIETY SEPARATION NEEDED

The next category of crops require separation between varieties to prevent unwanted cross-pollination. Many varieties of the same crop or in the same family blossom at the same time, which is the reason for separation. Crops in the following categories need less than one year of growing time in your garden.

CORN

Plant April-July. All types of corn, including sweet corn, popcorn and ornamental corn are wind pollinated. This means unwanted pollination can easily occur. Separate varieties by at least 1000 feet if you want no crossing to happen whatsoever. If some crossing can be tolerated, 250 feet is a good distance.

Instead of planting corn in traditional long rows, plant in short blocks of 3-4 rows, 2-3 feet apart.

This can help prevent some unwanted crossing.

After harvesting corn for eating, leave the cobs you wish to save on the plant.

About 4-6 weeks later, pick the cobs, peel back the husks and lay the cobs on racks in a warm, ventilated place. To store the seeds, grip the ear with one hand, and twist with the other, allowing kernels to fall into a container.

Popcorn kernels can be difficult to remove from the cob. Try rubbing the ears against one another to make kernels fall off.

CUCUMBER

Armenian cucumber is actually a musk melon, so use that category when saving its seed.

Plant April-July. Cucumbers will not cross with melons or squash, however crosses between varieties of cucumbers can occur. If you are worried about crosses from neighboring plants, use the hand pollination technique described under the "Squash/Pumpkin" heading.

Separate all varieties by 200 feet. Remember that sliced and pickled types can easily cross. Leave cucumbers on the vine 5 weeks after the eating stage has passed. Cucumber skin will turn a golden color.

Slice fruit lengthwise and scrape out seeds with a spoon. Follow instructions for tomato seed saving.

Like tomato, cucumber seeds have a gelatinous coating that needs to be removed during seed saving, which is why the fermentation process mentioned under the "tomato" section is necessary.

MUSK MELON

Plant April-June. Musk melons are melons with green, yellow or orange flesh. They include cantaloupe, casaba, crenshaw, honeydew, and Armenian cucumbers. They will not cross with squash or watermelon,

however, they do freely cross amongst themselves.

Keep melons at least 200 feet apart to ensure seed purity, or just grow one type. Otherwise, hand pollinate according to instructions listed under the "Squash/Pumpkin" heading.

Harvest seeds when melons are ripe. Simply rinse the seeds and lay out on a cookie sheet or newspaper to dry.

RADISH

Radishes can be planted almost year-round. However, for seed-saving purposes, radishes can be tricky for first-time seed savers. The plants have trouble producing seed in hot, dry weather and bees often overlook their tiny flowers. Plant in early spring or late fall for best results.

Separate varieties by at least 200 feet. Be aware that radishes can easily cross with wild radish weeds that are common in many gardens. Radish can also cross with mustard, turnip, rutabaga, and Chinese cabbage.

Radish seed stalks grow to 3' or taller. Green pods begin to form, then turn brown as the seeds mature. Seed pods do not open easily, and must be crushed by hand or with a wooden mallet.

SPINACH

Plant February-May/and or August-November. Spinach is unique in that it has various plant forms, including small

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and stunted plants. Pull these out as soon as you notice them, as their seed is not desirable. Also, avoid using plants that are the first to bolt (flower) for seed.

Do not grow spinach for seed at the same time you raise beets and/or chard. More information is provided under "Beets and Swiss chard" section.

SQUASH/PUMPKIN

Plant April-July. Squash does not cross-pollinate with melons or cucumbers.

Zucchini, spaghetti, scallop, crookneck, acorn, cocozelle, and pumpkin are *Cucurbita pepo* and can't be grown together, as they will cross-pollinate. Separate them by at least 500 feet.

Banana, buttercup, delicious, hokkiado and Hubbard make up the species *Cucurbita maxima* and should not be grown together, as they will cross-pollinate.

Butternut squash is *Cucurbita moschata* and will cross with plants of *C. pepo*.

If you are worried that neighbors are growing the same squash varieties or that you do not have enough space in your garden for the varieties you want, you can hand pollinate. This process requires being able to identify both male and female squash blossoms, which is quite simple. Just remember that

squash plants tend to sprawl, so give the plants plenty of space, and label different varieties so you can hand-pollinate the correct varieties.

The female blossom has a small, early growth stage of the fruit at its base, while the male flower does not. Select 6 newly opened female flowers and carefully tie, staple, or rubber band a paper bag over the flower (to discourage honeybees). Mark the bags with an "F" as well as the variety you are pollinating, if you are doing more than one. Then, select an equal number of male flowers and do the same, marking the bags with an "M." Leave the flowers protected overnight this way.

The next morning, remove the bag from a male blossom, pick the flower and remove its petals. Next, remove the bag from the female blossom, and gently rub the pollen from the male blossom onto the female pollen receptacle. Then, re-cover the female blossom with the paper bag. Leave the bag in place for about 4 days, and tie some string around the stem so you can identify your hand-pollinated fruit later. Follow this procedure with each of the male and female blossoms you have selected, using the male blossoms only one time.

Pumpkins and winter squash can be harvested when the rind is hard. Wait 3-4 more weeks before cutting them open and scooping out seeds. Rinse

seeds thoroughly to remove the pulp, use a wire strainer if necessary. Towel dry and spread on newspaper or cookie sheets until the seeds are thoroughly dry.

Summer squash should be left on the vine until the end of fall. The squash will be very large, and the rind should be hard. To harvest, cut the squash in half. Then, remove the seeds with a spoon into a bowl filled with water. Mix with your hands to help remove the pulp. Pour the seeds out onto a newspaper or use cookie sheets. Allow up to a week to dry, stirring frequently. Store only when seeds are thoroughly dry.

EXPERT SEED SAVER

The following crops need to grow in your garden for more than one year before their seeds will be ready for saving. This means they will need plenty of space to reach their full size. Allow for at least two feet between plants.

BEETS & SWISS CHARD

Plant in February-May and/or August-October. Beets, spinach and chard are all in the Chenopodiaceae (or Goosefoot) family. All three of these crops will cross with one another and among themselves. Spinach is in a previous category because it takes only one season to produce seed.

Seeds from these three crops remain viable for at least 4 years, so you can intersperse your plantings.

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During the first year, keep the ground well-mulched and pull out any stunted or undesirable plants. Thin the plants to 18" apart.

When some of the seeds of your chosen crop have reached maturity, bend the stalks into a bag and strip the mature (brown) seeds off with your fingers. Not all seeds will be ripe at the same time, so make several trips to the garden to collect them. Use a screen to remove the chaff before storing.

CABBAGE FAMILY

Plant in February-April and/or August-November. *Brassica oleraceae* includes broccoli, cabbage, Chinese cabbage, cauliflower, Brussels sprouts, collards, kale, kohlrabi, and mustards. All of the plants in this group can cross-pollinate with each other. If you grow more than one in your garden, separate them by at least 200 feet to avoid cross-pollination.

While waiting to harvest seeds, Brussels sprouts, kale and collards can be lightly trimmed for eating.

While flowering, plants may reach almost 4 feet tall, and should be spaced 2 feet apart. Stake the flower spikes if necessary.

To harvest for seed, pick dry pods. These are usually located on the lower part of the plant. Keep pods in a bag until all are

collected, then smash the bag with a mallet to open them. Sift through and remove the chaff.

TURNIP & CHINESE CABBAGE

Plant January-March and/or July-September. These crops are also in the genus *Brassica*, but their species' names are different, and they are root crops. Included plants are pak (or bok) choi, root turnips, rutabaga, Italian turnips, and spinach mustards. (Radish is also in this category, but under the "Variety Separation Needed" heading).

Separate varieties by at least 200 feet. Mulch crops well in the fall. As pods begin to turn brown, remove them or wait until most pods turn brown and remove entire plant. Smash pods that won't open in a cloth bag with a wooden mallet.

CARROT

Plant February-April and/or September-November. Soil must be loose and mulched with organic matter. Carrots take 14-21 days to germinate, so be careful not to let soil dry out. Also, keep carrots well-weeded as they are unable to compete with weeds.

Grow only one variety for seed at a time. During the second season of one variety of carrot, you can plant another variety that you want



to save. Or keep varieties separated by at least 1000 feet. Note that the weed Queen Anne's lace can cross-pollinate with carrots.

The umbel-shaped flowers of carrots will mature at different times. Collect umbels as the seeds turn brown. Store in a warm location for 2-3 weeks. Remove seeds by beating umbels inside a bag or rubbing them between your hands.

ONION, CHIVES, LEEKS & SHALLOTS

Plant from seed January-March. Onion sets as well as chive and shallot bulbs are available in November from most local nurseries.

In the second year, thin the crop 3-4 inches apart in rows 3 feet apart. In midsummer, the bulbs will begin to flower. Do not harvest seed from plants that flower early, wait for later flowering bulbs. Then collect the seeds as they turn black. If a lot of chaff is collected with the seeds, use water to separate, but dry seeds immediately.

At a Glance Planting Guide

| Month | Direct Seed | Plants Available at Nurseries | Bare root or Bunches |
|------------------|---|--|--|
| January | Kale, Kohlrabi, Cabbage, Chinese Cabbage, Head Lettuce, Radish, Turnips | | Artichoke, Asparagus and Seed Potatoes |
| February | Beets, Cabbage, Chinese Cabbage, Carrots, Chard, Head Lettuce, Kale, Kohlrabi, Onions (seed), Peas, Radish, Spinach, Turnips | | |
| March | Beets, Cabbage, Celery, Chinese Cabbage, Carrots, Kale, Kohlrabi, Chard, Lettuce, Radish, Onion, Peas, Spinach, Turnips | | |
| April-May | Beans, Beets, Broccoli, Carrots, Cucumber, Chard, Corn, Eggplant, Lima Beans, Melons, Okra, Pepper, Pumpkin, Snap Beans, Spinach, Squash, Tomatoes, Tomatillo, Watermelon | Cucumber, Eggplant, Peppers, Melon, Squash, Tomato | |
| June-July | Beans, Beets, Brussels sprouts, Carrots, Cabbage, Cauliflower, Celery, Chard, Chinese Cabbage, Corn, Lettuce, Snap Beans, Turnips, Kohlrabi, Rutabaga | Cucumber, Eggplant, Peppers, Melon, Squash, Tomato, Watermelon, Celery (if you can find it) | |
| August-September | Beets, Carrots, Chard, Leaf Lettuce, Turnips, Kohlrabi, Peas, Radish, Spinach | (arriving in late summer, early fall) Broccoli, Brussels sprouts, Cabbage, Chinese Cabbage, Cauliflower, Celery, Chard, Lettuce, Peas, Spinach | |
| October | Beets, Carrots, Fava Beans, Kohlrabi, Lettuce, Onions, Peas, Radish, Rutabaga, Turnips | Broccoli, Brussels sprouts, Cabbage, Chinese Cabbage, Cauliflower, Celery, Chard, Lettuce, Peas, Spinach | |
| November | Peas, Fava Beans, Radishes, Carrots | Broccoli, Brussels sprouts, Cabbage, Cauliflower, Celery, Chard, Lettuce, Peas, Spinach | Onions available in bunches (80-100 count) in November |

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