A Guide to Seed Saving, Seed Stewardship & Seed Sovereignty

By The Seed Ambassadors Project

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If SEED SAVING is collecting seeds for replanting in the future…

Then SEED STEWARDSHIP is the process of saving seeds with the purpose of maintaining or improving that seed's health and resilience. It also includes the act of saving and selecting a variety over a period of many seasons, with the end goal of passing it on to others in the future.

The ideal of SEED SOVEREIGNTY firmly plants seed saving and seed stewardship in the realm of fundamental human rights. It is the freedom to save seed and determine the foundation on which our food system rests. With the current attacks of industry hitting at the heart of food sovereignty, the simple act of seed saving becomes a major act of resistance and social empowerment.

Front cover: Celeriac (the tasty starchy root of the Celery plant)

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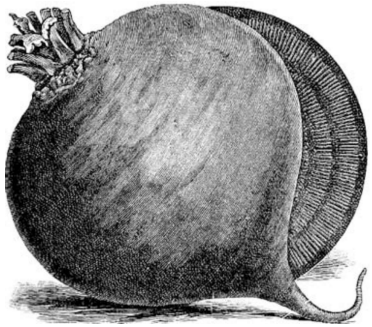


Welcome to *The Seed Ambassadors Project's* Guide to Saving Seeds

We are a group of folks who have recognized that saving seeds is the foundation of developing durable and resilient locally based food systems. We encourage others to join us in this important work. In our eyes every seed saved is a socially healing, community creating event.

Please See our website (www.seedambassadors.org) for an extensive rundown of the Project and our adventures so far.

We are not trained botanists, but have learned from our own experiments and experiences as well as from some of the best seed savers and plant breeders in the world, many of whom live right here in Oregon. This 'zine is a small attempt to share this wealth. As Matthew Dillon of the Organic Seed Alliance says, "Seed Knowledge is eroding even faster than Seed Biodiversity".

Based near Crawfordsville, Oregon, we are organic farmers and gardeners, simultaneously acting as the seed stewards of over 1,000 varieties of food crops. We are lucky enough to live in the Pacific Northwest, where mild wet winters & dry summers provide one of the best climates for growing seed crops. We are in the process of growing out as much seed as we can manage in order to share locally and widely, at seed swaps, and through the Seed Savers Exchange Yearbook. Also check out for our commercial seed list at www.adaptiveseeds.com

Why Save Seeds?

We are losing diversity, biological and social, at an unprecedented rate. This erosion of diversity directly limits our ecological and social resilience and adaptability within this changing world.

According to the United Nations Food and Agricultural Organization, crop genetic resources are disappearing at the rate of 1 to 2 percent a year. About 75 percent of agricultural crop diversity is estimated to have been lost since the beginning of the last century.

Saving seeds is a powerful way to counteract this problem and have

a profound effect on our future resilience and sustainability. We need genetic diversity in our gardens, farms and kitchens in order to recreate resilient healthy food systems and people.

Why can't we trust seed companies to save seeds for us? It is not simply an issue of bad germination and mixed up seeds. Most seed companies buy their seeds from giant seed corporations and just resell them. Every year they drop seed varieties, usually standby OP varieties or favorite heirlooms. More money per seed can be charged for hybrids. This switch is understandable because companies exist to make money. So, if you find a great rare variety in a catalog, buy it and save it before it is lost.

In 2008 with the acquisition of yet another seed company, De Ruiter, the Chemical & GMO Giant Monsanto now controls an estimated 85 % of the US fresh tomato seed market. The majority of commercially available seed varieties are controlled by the company. While most of the varieties sold by Monsanto are not GMOs and GMO seed is not generally available for home gardeners, buying Monsanto hybrid seed supports their ecologically irresponsible and unethical business practices.

By saving seed we can consciously and actively resist the powers that act against the public interest. By saving seed we can create new and vital connections with plants, our environment, our *foodshed* and our community.

Saving Seed Is Easy. Whether you are an experienced farmer or a new gardener with a handful of plants, you can save seeds. This 'zine will show you the basics no mater what your gardening experience.

The list of 'easy seed' types in the Table O' Contents all are truly easy. The 'less easy seed' is still easy if you follow a few simple techniques. After all, seed saving is one of the most fundamental human (and squirrel) activities, practiced long before the idea of formal schooling was invented. Even many ancient non-agrarian cultures still saved seeds to some extent to manage wild plant populations.

Some fruits, such as tomatoes and melons, have mature seeds inside them. These only require minimal processing before you can store or sow them. Other plants, like snap peas and green beans, are usually eaten before the seeds have matured inside

them. You can simply forget to harvest a few pods, let them dry on the plant and a few weeks later collect the seeds. Other seeds are a bit more complicated than that (only by a bit). Our hope is that this guide will provide you with the knowledge and inspiration to save seed from a myriad of common and not so common edible food crops. After many of the common crops are learned, uncommon crops become intuitive.

From our experience, enthusiasm may cause one to become overwhelmed with the opportunity to save seed from EVERYTHING. This is perfectly normal. We suggest taking a step back and starting with one or two types of plants from the 'easy seed' section. Really getting to know a crop is a valuable thing to do and yields endless entertainment. Or just jump in and try it all. Don't get discouraged if things don't workout all the time, old wisdom can be hard to rekindle. Also, plants dying is often a good thing when it comes to stewarding a seed. It is a *Selection Event*, selecting the hardy ones for next generation.

You will soon discover that the rewards of saving seeds are far greater than the efforts extended, from money saved by not purchasing seed to the joy of experiencing a plant living through its entire life cycle, stewarded along by your helping hand.

"Food Sovereignty is Seed Sovereignty"

How to steward a seed...

For plants that are usually eaten in the vegetative stage, all you have to do is eat the seconds and let the best plants make seed. For plants that we eat the fruit of, such as tomatoes & melons, eat and save seed from the best tasting fruits. Expose your plants to selection pressures (natural and human caused) and see how the plants adapt to your growing conditions.

If you save seed from the best flavored and healthiest plants you wil be stacking the deck in your favor for next season and, for future generations of plants *and* people.

Why Steward Seed?

You fully choose what you grow and the characteristics of what you

grow, thereby escaping dependency on seed companies. You may not believe it at first, but your garden is much more dependable than a seed company. Often, one grower and distributer produces all of the seed for one variety for the entire US seed market. If there is a crop failure on that mega seed farm then your favorite bean that you have been growing for years may be gone for good. Varieties often degenerate in the hands of big producers. They don't have time to select them for good flavor or other characteristics you love in a particular variety. The classic example is the Delicata squash seed that was grown a few years back. It was contaminated with extremely bitter genetics. There was only one grower in the country that year and the line was completely ruined. The industry had to go back to seed savers to repair the line. This kind of thing happens all the time. Examples could fill this 'zine.

FUNDAMENTAL CONCEPTS

There are a few fundamentals to know when saving seeds. Once you are familiar with these concepts you can easily and successfully save just about any seeds you want.

Peruse the "Jargon" section for more fun concept explanations.

- Open Pollinated (OP) *and* Heirloom *and* Hybrid (F1)

Open-pollinated (OP) plants are plants that are allowed to reproduce according to the whims of the bees and the wind, or whatever pollination mechanism they depend upon. Open-pollinated can refer to self-pollinating plants (tomatoes and beans), or cross-pollinating plants (cabbages and beets). OP is usually used to describe plants that are not hybrids. OP seeds can be just as vigorous, disease resistant, and commercially useful as hybrids if properly stewarded.

Heirloom refers to a variety of plant (or animal) that has been passed down from generation to generation. Usually a minimum of three (human) generations are required for a plant to be known as an heirloom, but the term may also refer to old (over 100 years) commercial varieties. All Heirlooms are OP, but not all OP varieties are heirlooms.

Hybrid (or F1) refers to plant (or animal) varieties that are achieved by the crossing of two distinct inbred lines. This results in increased uniformity & *sometimes* vigor and disease resistance. Seed saved from hybrids will not grow *true-to-type*. Hybrids are used extensively in industrial farming because they are uniform and yield all at the same time, which is good for grocery stores. Hybrids are also good for seed companies because they create proprietary control over the seed: if a farmer wants to grow a hybrid variety she or he must purchase new seed from that company every year. **Hybrid seed is usually more expensive and is often bred for shipping and shelf life *not* flavor or nutrition**.

- Crossers *and* Selfers

Some plants are out-breeding/cross-pollinating, which is to say the flowers they produce usually do not fertilize themselves. They depend upon having a large population and, in the case of insect pollinated plants, the participation of sufficient pollinators to get the job done. *Crossers* may be either insect pollinated or wind pollinated or both. They may have perfect flowers (containing both male and female parts, as in the case of carrots or broccoli) or imperfect flowers (male and female parts found in different places, as is the case with corn; or spinach, which has male and female plants). Only one variety per species of a crosser should flower at a time if seed purity is one of your objectives.

Selfers, or self-pollinating plants, always have perfect flowers. The flowers usually pollinate themselves before they open, but sometimes depend on pollinators to trigger pollination. Some *selfers* can be cross-pollinated depending on conditions such as temperature or the friskiness of pollinators present. Bumblebees have been known to tear bean flowers open and cross-pollinate flowers before self-pollination has occurred. When saving seed, many varieties of a self-pollinating species usually can be grown at the same time.

- Dry *and* Wet *and* Fermentation Seed Processing

To save seed there are only three simple processes to know. Once you have an understanding of each of the processes,

you can save almost any seed.

1. *Dry seed processing* refers to seed that dries down on the plant and needs to be kept dry until it is sown. The steps involved are harvesting (usually cutting the seed stalk off of the plant), threshing (separating the seed from the stalk and chaff) and winnowing (removing the seed from the chaff using a breeze). Dry seed processing is used for grains, lettuce, brassicas, onions, beets, carrots, celery, cilantro, and chicories, among others.

2. *Wet seed processing* is the process by which the seed of many garden fruits are saved. This includes melons, peppers, eggplant, tomatillo, and squash seed. Wet seed processing involves removing the seed from the fruit, rinsing clean of debris, and then drying. A jar of water can be used to separate seed from debris -- seeds sink and debris usually floats. Drying the seed quickly and completely after wet processing is very important.

3. *Fermentation seed processing* is similar to wet seed processing, but the seeds and their juices (as in tomato and sometimes melons and cucumbers) are mixed with a little water and allowed to ferment for a day or few. The fermentation process breaks down germination inhibitors such as the gel-sack that surrounds tomato seeds. When a layer of mold has formed on top of the water and the seeds sink, the fermentation is complete. You simply need to add more water, swish it around, then decant the mold and pulp. You may need to repeat this process several times, as the good seeds sink to the bottom and the scum floats off the top. After all of the pulp, bad seeds, and mold is removed, drain the water from the seeds and set them out on a plate, screen, or paper towel to dry. Once the seeds are thoroughly dry, place them in a moisture-proof container, label and store them for the future.

- Annuals *and* Biennials *and* Perennials

Annuals are plants that complete their life cycle (produce seed and die) in one growing season. Many of the garden fruits and vegetables we eat are annuals, such as lettuce,

beans, peas, squashes, cucumbers, melons, basil, cilantro, summer broccoli, potatoes, and annual radishes. In cooler climates, tomatoes and peppers are annuals.

Biennials are plants that require two seasons to complete their life cycle (produce seed and die). This includes: cabbages, onions, leeks, beets, parsnips, celery, parsley, rutabagas, and carrots. Biennials are usually insect or wind-pollinated and require dry processing.

Perennials are plants that live for a minimum of three years, but some can live for decades. They usually can produce seed and not die. Common edible perennials include many herbs such as oregano and rosemary; tree fruits like apples and pears; berries, rhubarb, artichoke and asparagus; as well as tomatoes and peppers in warm climates. The term perennial includes herbaceous ornamental plants we usually call 'perennials', as well as trees, bulbs, shrubs, cacti, bamboos, some grasses, and vines.

- The Pedigree *and* The Adaptivar

When saving seed, it is important to be clear about what you are trying to achieve. Do you want to maintain varietal integrity and keep a variety pure? This is necessary if you want to preserve a rare variety. In this case, you need to make sure to have proper isolation distances between out-breeders and have sufficient population size.

If maintaining a pedigree line is not your goal, it may be wise to steward an adaptivar. An adaptivar is a collection of several varieties of a cross-pollinating species that are allowed to cross-pollinate with each other, thereby producing plants with a large degree of genetic variation. The genetic variation is so diverse that you are getting new crosses with each generation. Though the plants produced from adaptivars are not uniform or stable, and will not likely breed true-to-type, they are useful because they are vigorous and will have enough variation that some of them may be able to thrive in less than ideal circumstances. Pedigrees, on the other hand, tend to be less resilient over time in adverse growing conditions.

Ancient adaptivars, sometimes referred to as land races, are where most of our agricultural genetic diversity originated. This is often the chosen stewardship mode of indigenous cultures and subsistence farmers. **True seed stewardship embraces the selection events nature presents as the means to reconnect to the evolutionary relationships between the ecology and its organisms.** Another benefit to adaptivars is that they offer a variety of flavor. And you can always select down from the pool to develop a distinct pedigree.

- A little bit about storage

Storage is possibly the most critical aspect of seed saving. Yet it is as simple as dry, cool, pest-free, and labeled.

- Dry, very dry. Small seeds can be left out for a few dry days and sealed into their bag or jar once they feel crispy dry. Old window screens, cookie sheets or plates all work well for this. Larger seeds need more help. Use a dehydrator or fan. Careful, because heat above 100° F can damage seed viability. Direct sunlight by itself has been shown to not harm seed viability, but it is better to avoid it because temperature swings in full sun can cook naked seeds. Air flow is the most important consideration when drying seeds. The ideal seed drying conditions would be cool DRY air flowing through and around the seeds.

- Cool, cold or frozen. Genebanks keep their seeds in sub zero freezers and this can keep a seed viable for 50 or more years. Although deep freezers are not necessary, keep your seeds as cool as possible. The coolest room in the house, basement or the garage is sometimes the best option. Extra room in the freezer? Dry your seeds down completely and stick 'em in. Warning: damp seeds will die if frozen.

- Kill seed eating bugs. The easiest way to keep insects from eating your seeds is to get them dry and then freeze them for 3 days. This is most important with large seeds like corn, beans and peas. Careful not to open the cold seed container until it warms up to room temperature. Some people have had success with CO2, when dealing with large quantities. All you need is a home brewing friend to borrow a CO2 tank from. With the seed in a bucket, add a fair amount of CO2 by pressing the valve for 5 seconds in the bucket. Put a lid on it to prevent air from mixing back into it. CO2 is heavier than air and sinks, forcing out the air. After a few days it will have killed any bugs.

- Choose a good container and label well. Reused glass jars work great. We use Ziploc bags put in small hard plastic totes. This keeps mice away and is space efficient. Labeling is very important when you save more than a few varieties. Masking take and sharpies are indispensible. Putting crispy dry pieces of paper as labels inside the bags acts as a light desiccant. If you pull them out and they are not crispy dry anymore then your seeds are a still bit damp.

Useful tools for seed saving (you would be surprised how many of these you can do without)

First you must have...

2 buckets or totes - for collecting into and for winnowing.
Jars or small plastic tubs/yogurt containers - for fermenting and wet processing seed.
Plate or baking sheet or window screen - for seed drying.
Air tight containers and/or envelopes - for storing seeds. Keep them cool, dry, and rodent proof.

It is very good to have...

Tarps - drying seed heads, catching seed or winnowing onto.
Hardware cloth screen - for screening seeds from debris
Masking Tape - for labeling things.
Sturdy storage container - protection from mice.
Sieve or fine mesh strainer - to drain water from wet seeds.
Box fan - for when there is no consistent wind for winnowing.
Food Dehydrator - for drying seeds to ideal (low) moisture content for storage. Must set thermostat lower than 95 degrees.
Pruners - important for clipping, picking, cutting and harvesting stuff.

Don't bother with...

- *Neat little seed saving kits* – They're tiny, high in price & low quality.
- *Fancy seed cleaning screens* - Not necessary, too small and expensive. Use hardware cloth or a pasta strainer instead.
- *Silica gel* - Only mildly effective. If you must, reuse them for drying small quantities from sushi nori packages. Re-dry them first by the fire or oven.

Easy seed:

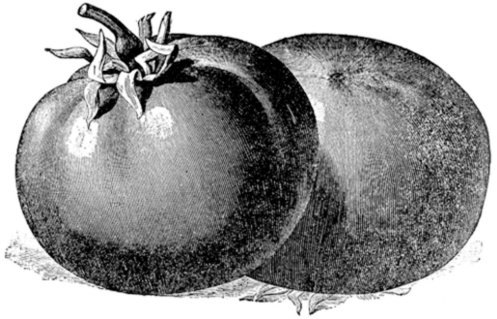
TOMATOES *Lycopersicon esculentum*

Saving TOMATO seed is pretty darn easy. We consider it the "gateway drug" of the garden and seed world. An in-season, ripe, organic TOMATO is often a consumer's first introduction to real organic food. Success growing a TOMATO is often a new gardeners introduction into heavier gardening. Saving seed of a favorite TOMATO variety is often a new seed saver's introduction into heavier seed saving. To top it off, ripe TOMATOES from the garden & farmer's market come complete with mature seed inside. Be aware, though, that most commercially available TOMATOES are hybrids, and the seed you save from these fruits will not produce fruit identical to the one you saved seed from. Also, most TOMATOES from the grocery store are bred to hold their shape and color through the rigors of mechanical harvesting, transport, and distribution, and usually taste like styrofoam, or worse. So be sure to taste the TOMATO before you save the seeds! Or avoid the supermarket. *Heirloom* and *open-pollinated* TOMATOES are by definition not hybrids and usually taste delicious, so save seed voraciously.

To save TOMATO seed, cut the fruit in half. Use your finger or a knife to scoop out the seeds and juice from their cavities, or squeeze the TOMATO over a glass jar. Use a small jar, such as a jelly jar, if you are only saving seed from one or two TOMATOES. Once the seeds and all their juicy juice is in the jar, add no more than 25% water and slosh it around. Place the jar someplace warm for two or three days. Every day check on the concoction and stir it a little.

After a few days (depending on the weather), a mold should form on the top. When this mold forms it time to get excited. This method mimics the rotting of the TOMATO in nature or the actions of the digestive system of an animal and breaks down the clear gel coat around the seeds, which prevents the seed from sprouting inside the TOMATO or in your stomach. Once the mold covers the entire top of the liquid and the seeds have begun to sink, the gel coat has been broken down and they are ready for cleaning. Be careful not to leave the seeds in the jar for too long at this point because once the gel coat is broken down the

seeds may sprout in the jar and you will have to start over.



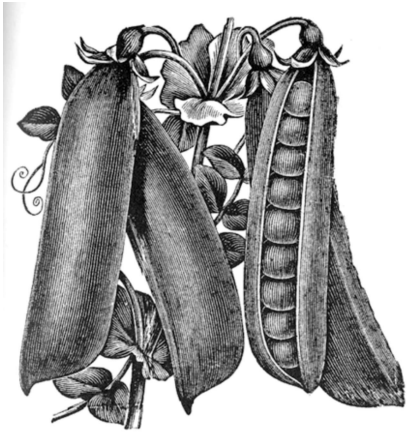
You know seeds are ready for their final cleaning when most of them have sunk to the bottom of the jar. Add water to fill the jar and slosh it around. Let it settle for a moment. Carefully pour the water out of the jar. The mold, pulp, and immature seeds will all flow out with the water, but the mature seeds should sink and stay in the jar. Repeat this decanting process two to five times until you have only clean seeds and clean water. Pour out as much water as you can without losing the seeds or pour it through a fine mesh strainer. Pat dry through the strainer and then scoop the seeds out onto a small plate (we use the lid from a yogurt container). Allow to dry without intense heat. When they are very dry store the seeds in a moisture-proof container in a cool, dry place. It is very important to label the container with variety and date. TOMATO seeds can last for ten years or more if stored cool and dry.

Another easy way to save TOMATO seed is to spit out a few seeds onto a square of toilet paper as you are eating the TOMATO. Just let the seeds dry down on their own, and they will stick to the toilet paper. This method is convenient because you can write the date and type of TOMATO right onto the TP. BUT, because you have skipped the fermentation process, you will get lower germination, so make sure to save and sow extra if you use this process. You also will get sticky seeds stuck to paper, which is kind of problematic, but you can plant the piece of TP when it is sowing time.

Easy seed:

Beans and Peas

Common Beans and **Peas** are among the easiest plants to save seed from. If you have **Peas** and **Beans** in your garden, all you have to do is forget to pick some toward the end of the season and let them dry down on the plant. For better quality and a higher seed yield, set aside a few of the best whole plants for seed saving. When you pull up the plant at the end of the season, dried seeds will be ready for you to save. All you have to do is shell them from the pod. Make sure the pods are crispy dry or the seed may not be as mature as would be ideal. Harvest before the rains start in the fall.



Snap Peas and **Beans** that are picked for market for fresh eating do not have mature seed, so you cannot simply dry these down and plant them. BUT you can plant any dry **beans** you grow or buy from the grocery store, such as pinto **beans** or black **beans**. Dried **Peas** from the grocer's can also be planted, but make sure they are not split peas.

Peas and **Beans** are *almost* always self-pollinating in the Pacific Northwest. The flowers usually pollinate themselves before they open. This means many varieties can be grown close together and still maintain relative seed purity. Sometimes though, bumblebees can tear flowers open and introduce other pollen before the flower has self-pollinated. This can be viewed either as the exciting birth of

a new variety or contamination. We usually see less than 1 in 100 seeds planted that appear to have been crossed, which is very acceptable to us and even entertaining. The potential for crossing is a good reason to grow out many plants of each variety in order to identify and rogue out (or save) off-types. Make sure to label these kind of crosses as crosses, not as the original seed variety.

Fava Beans (*Vicia faba*) and **Runner Beans** (*Phaseolus coccineus*) are both different species from the common **bean**, (*Phaseolus vulgaris).* They are both insect pollinated and will cross easily with other varieties of the same species. Isolate different varieties by planting them at least 300 ft apart. Save them as you would the **common beans** and **peas. Favas** and **Runner Beans** can be picked when the pods turn brown or black. **Runner Beans** are rot resistant in the pod, so fear no rain. Make sure to dry them well once shelled

There are no hybrid **beans** or **peas** available for sale, so you are sure to get the same variety as you planted. Unless of course, there was a frisky bumblebee around.

For the best storage of **Peas** and **Beans** the seeds must be very dry. They must shatter when hit by a hammer and not squish. When dry freeze them for 3 days to kill bean weevils that may be living inside the seed. Seal in a moisture proof container stored in a cool dry place.

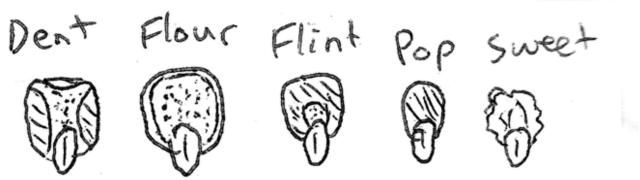
The incredible diversity of the legume family makes it one of the most rewarding families to save seed from. We can also use more protein and nitrogen fixing in our gardens.

Easy seed:

Corn *Zea mays*

Corn seed is another easy-to-save annual, but, though similar, growing **corn** for seed is a little different than growing it for fresh eating. The big question is… what type of **corn** do you want to grow? The varietal diversity of available **corn** seed is amazing. Your basic type choices are: dent, flour, flint, pop, sweet and parch. Flour types are dry **corns** with a powdery texture when ground and are good used for tortillas, cornbread, & cakes. Flint types are dry **corns** with a glassy coarse texture and are good for polenta, grits, hominy, and tamales. Dent types are half way between flint and flour. Popcorn pops and sweet **corn** is sweet, when you pick it in the *milk stage.* Parch types are dent **corns** that pop a little when dry roasted and turn into a kind of corn-nut. Even a dry **corn** variety can be eaten in the milk stage. Although it may be not-so-sweet **corn**, it tastes great cooked up & smeared with butter and is more hearty, too. Most sweet **corn** available today are *F1 Hybrids*, so if you grow **corn** and want to save seed, make sure it is an *open-pollinated* variety.

Corn is very much an out-breeding, wind-pollinated plant and optimum pollination and seed quality is achieved when it is planted in wide blocks of a 100+ plants. As the classic textbook out-breeder, **corn** is very susceptible to *inbreeding depression*: the seed saved will be weak and low quality if the population is not large enough. The tassels on the top of the plant are the male parts, and the cob contains the female parts. Each strand of corn silk is a pollen receptor for a single **corn** kernel. For a full cob, there needs to be enough pollen around at the right time to pollinate the several hundred kernels on each cob.



Corn pollen is very light and can travel very far, so isolate your corn from other varieties. This can be done with at least 2 miles distance (it is less important if you live in a wooded or urban environment with no giant fields of corn nearby). Or you can grow a very early variety and a late variety for "time isolation." Time isolation is also very useful when you live in a GMO growing region. Extra early **corn** varieties shed pollen earlier than the later tasseling GMO varieties.

Some people eat the first bigger ear on each plant and save seed from the smaller second ear. Others think this selects the lowest quality seed. **We recommend always saving the best ears for seed and the best of the best for *stock seed* for your own seed in the future.**

To save seed from **corn**, leave the ear on the plant until it dries down and the whole plant looks (and is) dead. Pick the cob, peel back the husk and let it dry for a few weeks. When it is crispy dry, thresh the kernels off of the cob with your hand or by rubbing two cobs together. If the germ peals off the kernels they need to dry a lot longer. If the seed shatters and doesn't smoosh when smashed with a hammer, it is dry enough to seal up in a moisture proof container. A dehydrator set below 95° F is very useful for drying corn kernels completely. If properly dried your **corn** seed will be viable for 5 or more years. Flint and flour **corn** types can survive for decades.

EASY seed:

Cucurbits: cucumbers, melons, pumpkins, summer and winter squash, watermelons.

While saving seed from most vegetables and garden fruits (as opposed to tree fruits) is relatively easy, **winter squash** and **melons** are probably the easiest. Both **winter squash** and **melons** are picked when ripe and have mature seeds inside, ready for the spooning out into a bowl, rinsing, and drying.

But while the processing of the seed is easy, the pollination and cross-pollination is a little complicated. If you want to save pure varieties, you need to isolate species (see below). All **Cucurbits** are outcrossing plants with male and female flowers *usually* on the same plant. As a *general* rule the different species do not cross-pollinate. Varieties in a different genus like watermelons and cucumbers certainly will never cross. So you can grow one variety of each species in your garden with little or no crossing. Since you probably don't want the jack-o-lantern doing it with the zucchini without your permission you will need isolation of about 1 mile, as the bees do the pollination with this one.

Melons, watermelons and **winter squash** all contain ripe seed when it is eating time, so just cut your squash-o-melon-like fruit it in half and scoop the seeds out into a bowl, avoiding as much pulp as you can. Rinse the seeds off in a strainer, removing the pulp. With a towel pat them dry, patting through the strainer works well. Leave the seeds out in an airy place until they dry thoroughly. When the seeds are dry, put them in a moisture proof container, preferably in a cool, dry, place, or in the freezer. Truly dry seeds snap in half when bent and they do not bend with dampness.

Don't forget to label them with the type of seed and date.

Summer squash and **cucumbers** are different from **melons** and **winter squash** because they are usually picked as immature fruit. For seed saving they need to be left to fully ripen, preferably until the plant dies in September/October. **Cucumbers** will turn into little orange blimps when the seeds are ripe. The **summer squash** will look like **winter squash** with the requisite tough, dull skin, and zucchini-shaped squash should be about the size of your leg. Or at least as big as your arm. It is also a good idea to let the fruit after-ripen for a week or more after you have picked it before processing for seed. Once fully ripe, seed saving is the same as for **melons** and **winter squash**.

The species rundown is:

- *Citrullus lunatus* (all watermelons and citron melons),
- *Cucumis melo* (all musk melons, cantaloupes and honey dews).
- *Cucumis sativum* (all common cucumbers, except Armenian cucumbers),
- *Cucurbita ficifolia* (fig-leaved gourd, Malabar gourd)
- *Cucurbita maxima* (winter squash with corky stems such as Buttercup, Hubbard, Kuri & Sweet Meat),
- Cucurbita mixta (winter squash such as: Tennessee Sweet Potato, Cushaws and Japanese Pie).
- *Cucurbita moshata* (Butternuts, Cheese, Futsu Black and Tromboncino),
- *Cucurbita pepo* (summer squash such as: Zucchini, Crookneck, and Patty Pan; winter squash such as: Pie and Jack-o-lantern Pumpkins, Acorn, Delicata, Sugar Loaf, and Spaghetti).
- *Lagenaria siceraria* (Bowl/Bottle Gourds, Calabash or Cucuzza)

The different **squash** species *usually* do not cross-pollinate. For more information on how to tell them apart and hand pollination techniques, consult *Seed to Seed* by Suzanne Ashworth (more details in the Read More! section).

If you buy a **melon** or a **winter squash** from the store or the farmer's market and save seeds, you will probably get something entirely different from the fruit from whence it came. Most **squashes** and **melons** grown today are hybrids, and most are grown in fields with other varieties of the same species so there is a good chance they are cross-pollinated. Because **melon** genetics are complicated, you may or may not get something good enough to eat, so save seed at your own risk!

Easy seed:

Annual herbs: Cilantro, Basil, and Dill
Biennial herbs: Celery, Fennel and Parsley

Saving seeds from most **herbs** is easy and beautiful. **Cilantro, dill, parsley** and **fennel** are all in the Apiaceae family. Their flowers form in little umbrella shaped clusters, usually sooner than we, as gardeners, want them to.

Saving seed from **herbs** like **cilantro, dill,** and **fennel** has the secondary benefit of providing you with ample seeds for culinary usage. If you want, you can grind the seeds up in a coffee grinder to get a powdery version of the seed. This works really well for **cilantro** seed (coriander), but maybe not so well for **dill**.

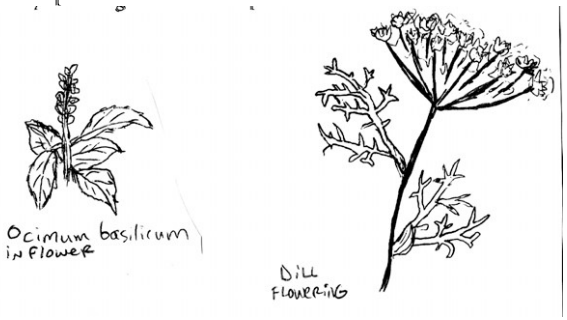
When you grow **cilantro** & **dill** in your garden, they are somewhat quick to go to seed. All umbels are out-crossers, so you get higher quality seed for the coming years by saving seed from more than one plant. You can start garden plants of each of these herbs from seed purchased in the bulk bins at your local natural foods store, or you can buy a specific variety from a seed company.

When the center stalk begins to elongate, just let the plants remain where they are growing. They will soon flower and within a month or two you will have seed dried down and ready to harvest. Once the seed stalk is pretty dry, cut it off at a comfortable length for you to deal with, and put it upside down in a bucket, tote, or paper bag. There may be bugs on it so it might be good to leave it outside (out of the dew) and let the bugs leave. This has the added bonus of letting the seed dry down even more, and it may shatter into the container you have put it in. When the seed is fully dry, thresh by

hitting the seed stalk against the sides of the container. You can also break the seeds free with your hands. This has the added bonus of making your hands smell nice, like the **herbs**.

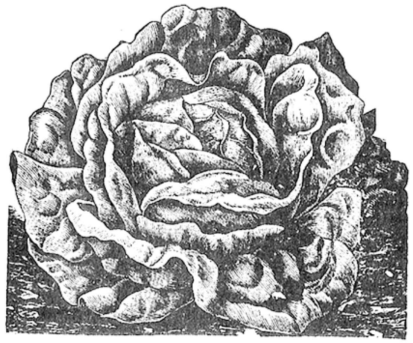
After the seeds are separated from the seed stalk, winnow them free from the rest of the debris by pouring them back and forth between two containers in a breeze or in front of a fan.

Basil is not an umbel and is self-pollinating, but its seeds are processed in the same way as the other **annual herbs**. Grow 3 or more plants and rub the seed free from the seed stalk, once the stalk has turned brown. Varieties should be separated by 150 ft. As with most **herbs,** you can cut some leaves and stems to eat and you can get a seed crop as well.



Celery, Parsley and **Fennel** are biennials, so they usually flower only after going through the winter months. They need several plants to produce good seed, and the tiny seeds can be saved using the same process as the **annual herbs** mentioned above.

With all **herbs**, some seeds are likely to fall off the plant before you process the bulk of the seeds, so you may get some volunteers in the next season, if you're lucky!



Easy seed:

LETTUCE *Lactuca sativa*

The **LETTUCE** available for sale in stores or at the farmer's market is an immature plant that has been chopped off right at ground level. So you have to start with **LETTUCE** seeds or a young plant start. You should probably start with more than one plant, though, so you can eat a few leaves if that is your inclination.

LETTUCE is self-pollinating, so you only need one plant to save seed. All you have to do is put the plant in your garden in the spring, and not eat it, or only eat a few of the outside leaves. After a month or two (depending on the variety and the weather), the plant will start to *bolt*. The center of it will elongate and it will grow to 2-3 feet high and then begin to flower. **LETTUCE** plants make hundreds of small compound flowers, and each makes a cluster of seeds that look a bit like fingernail clippings or mouse poop. The seeds often have little duff parachutes on them. Birds will usually tell you when the seed is ripe, because they will start to eat it. But you will also know because of the duff, which resembles a dandelion, as they are in the same family.

Pull up the whole plants when most of the seed is ripe. Let the plants sit for a day or two on a tarp (optional). This will cause much of the under-ripe seed to after-ripen. Covering the plants with row cover or a sheet will keep the birds from eating the seed. Next take a paper bag or a 5-gallon bucket and break off the top of the

LETTUCE plant into it. Try not to get any dirt into your container. Using a bucket is easy, because then you can grab the bottom of the stem (while the plant is upside down in the bucket, which is right-side up), and whack it against both sides of the bucket. This will shake the seeds out from the plant. Do this until you get all of the seeds off, or as many as you want, and throw the lettuce flower stalk into the compost pile. Alternatively if you have a lot of plants, you can leave the plants on a tarp and whack the seed heads with a stick. This knocks the seed onto the tarp and you can then remove the seedless plants. Now you should have a good amount of seed, duff, and bugs in the bottom of your bucket or tarp.

You may want to take a break at this point to let some of the bugs leave and let the seed dry out a little. Maybe even over night, if you have lots of aphids in there. Lack of critters also makes winnowing easier. Make sure to cover your seed if rain or dew threatens. Next take a handful and rub it between your hands to separate the seed from the duff, and continue until most of the seed is separated.

The last step is to winnow the seeds out from the rest of the junk in the bottom of your bucket. It helps if you have a *light* breeze, but if not you can use a fan. If you use a fan, put it on the lowest setting, because **LETTUCE** seeds are very light and blow away easily. You will need a second bucket or small container. Pour the seed mixture back and forth between the containers, varying the drop distance depending on the breeze. The mature seeds should drop into the other bucket and everything else should float away. You may need to do this several times before the seed is clean. And if you have never winnowed anything before, it might also be good to put a tarp on the ground below where you are working so a slight variation in breeze doesn't blow all of your seeds away, too. Since these seeds are just for you and your friends, they don't have to be super clean – you can stop whenever you have had enough or have enough.

Put the seeds on a cookie sheet or a plate so they can finish drying thoroughly, if they are not already. Be sure to mouse-proof their location (either by putting them in a jar or a small hard plastic container), as they are a favorite of mice. If it is stored very dry **LETTUCE** seed will stay viable for 5 years or more.

Easy seed:

eggplant, tomatillos, and ground cherries.

The **eggplant** that we eat is the unripe fruit. To save seed it is important to forget to pick a fruit or two early in the season and leave it on the plant until it changes color to a dull brownish-purple (for purple eggplants, at least). Others like green or white **eggplant** turn a kind of dull yellow when ripe. It may be best to wait until the fruit even begin to rot. It is also good to let the fruit after-ripen for a few weeks before you process the seeds, to make sure the seeds have gotten every speck of goodness from the mother fruit.

Processing of **eggplant** seed is the same as for **tomatillos** and **ground cherries** (a sweet relative of the **tomatillos**). Cut the fruit in half and scrape out the seeds and pulp. Put them in a bowl or jar and add water. Stir it up, helping the seed to become free of the pulp by smooshing it with your fingers. When you stop stirring, the ripe seeds should sink and the pulp and immature seeds will float. Carefully pour off (decant) the water, making sure not to go so fast as to pour the seeds that are at the bottom of the jar out with the current. Repeat as many times as you need to, until the seed is clean.

If you have a tea strainer, pour the remaining seeds out quickly into the strainer. With a cloth pat the water out through the bottom of the strainer, then dump the seeds onto a small plate (or yogurt container lid) to dry. Try to keep the seeds only one layer thick to discourage mold. Once the seeds are thoroughly dry, place them in a clearly marked, airtight container. The seeds should last for five years or more.

Easy seed:

Peppers: Hot and Sweet, Fresh and Dried.

Peppers are easy to save seed from. Remember that green **peppers** and some wax/yellow **peppers** are not ripe until they turn a different color. The seeds inside are immature. Also, many commercial varieties are F1 Hybrids, so the seeds will not grow true-to-type. Be sure to select fruit that is fully ripe (usually red, orange, or yellow, and sometimes purple).

To process the seed of fresh **peppers,** begin with an exceedingly ripe fruit. No green on the skin. If you have a bell **pepper,** cut a circle around the calyx and pull out the top. The seed cluster should be attached. Scrape the seeds off the seed cluster, place in a jar with water, mix it up, and proceed as with eggplant seed. The ripe seeds should sink and the immature seeds and whatever other junk you may have gotten in there will float. Decant and refill the water a few times until the seeds are clean.

You can save seeds from dried **peppers** (but not smoked or roasted ones) more easily than you can from fresh fruit, since the seed is already mostly dry. The germination will be lower because you will not have floated off the hollow seeds. Just scrape the seed out, label, dry more if necessary, and store. If the **peppers** have been dried in a high temperature food dehydrator or in an oven, the seeds may have a lower germination rate or be dead.

Remember when working with hot **peppers** to wear gloves. Cut the fruit in half and scrape out the seeds. If you don't have gloves handy, you can hold the fruit down with a fork and use the tip of a knife or tweezers to scrape the seeds from the fruit so you don't get capsaicin on your fingers. If you must touch spicy **peppers** with bare hands, be sure to wash your hands thoroughly several times, and don't touch anyone's sensitive parts (like eyes) for the rest of the day. **Pepper** hotness doesn't wash off easily and can hurt badly.

Easy Seed:

Spinach and **miscellaneous greens**

Most modern varieties of **spinach** were bred by the giant seed producing companies for spring and summer production or year round production on the California coast. These commercial hybrids were also developed for the freezing and canning industries and a few for the new baby leaf salad market. Locally adapted varieties and winter hardy types have almost been completely lost.

There are some great open-pollinated **spinach** varieties out there, but most seed catalogs focus their offerings on commercial hybrid varieties that are not very suitable for seed saving. The 31 open-pollinated varieties that are still available (down from 100 in 1981) are disappearing fast and they need stewards to sweep them up and save them from extinction. Farmers and gardeners who routinely grow **spinach** could benefit from saving their own seed, as succession sowing consumes a lot of seed.

Spinach (*Spinacia oleracea*) is relatively easy to save seed from. Most people who have grown **spinach** in their gardens have had at least a few plants bolt on them. The proper way to save **spinach** seed is the same process as for any dry-seeded plant (see pg. 6), with a few small refinements.

Spinach is an out-breeding, wind-pollinated crop. As such, it needs at least 20 plants (ideally 50-100) and isolation from other varieties by 1/2 - 1 mile, depending on obstructions and the wind. **Spinach** is set apart from most other garden plants because it is dioecious: each **spinach** plant will be male, female, or, rarely, hermaphroditic. Additionally, in the absence of male plants, some females will "revert" and begin producing male flowers.

Male plants are usually the first to bolt and hold their flowers high above the leaves. They are easy to identify because they shed copious amounts of very fine pollen. Female plants tend to be a bit stockier, and hold their flowers in the leaf axils (where the leaf stem meets the main stem).

Aside from planting out **spinach** in the spring and waiting, there is a level of sophistication that many **spinach** seed stewards enjoin. This usually includes over-planting by at least 50% and removing the least desirable plants, including many early bolting males. Only a few males are needed to pollinate a female population, so if you rogue out 90% of the males you will allow the females more space and more access to nutrients, and have higher seed production relative to the total population.

These undesirables may include the quicker bolting male plants (when there are enough male or hermaphroditic individuals remaining), off-types or individuals with poor hardiness, color, disease resistance or flavor. Harvest the plants when the seeds are dry and brown. Threshing by stomping in a tote or on a tarp works well just be sure to wear shoes.

Miscellaneous annual greens

Other annual salad and cooking greens are easy to save seed from as well. Greens such as leaf amaranth, orach, elkhorn plantain (*Plantago*) and purslane are all hermaphroditic (male and female flowers on the same plant), so one needs only to allow the plants to do their thing and harvest seed when it is dry. Annual *Brassicas* like arugula; *Brassica juncea* mustards and *Brassica rapa* mustards may be grown for seed as annuals if planted out in the spring, or may be treated as biennials in mild climates. Harvesting seed when the pods are dry (in mid-late summer), threshing and winnowing is a similar process for most "dry seed" species.

The important thing to consider is cross-pollination. A large enough population for genetic diversity is needed and isolation from other varieties of the same species is important.

Plant out a good-sized population of plants (20+) early enough in the season to allow for seed production by fall. We plant out these types of plants in the spring after the last frost or earlier for hardy varieties.

Less Easy Seed:

Biennial roots: beets and chard, carrots, turnips, onions, parsnips, leeks.

Ok, **onions & leeks** aren't actually roots, they are a modified leaf. And of course **chard** isn't a root at all, but it is the same species as **beets** – it has been selected for a larger leaf instead of a bulbous root. And **Beets, carrots, parsnips, turnips** and **onions** are all in different families and have different pollination mechanisms (**beets** are wind-pollinated, preferring at least two miles isolation, and the others are mostly insect pollinated and need about one mile). But their seed is processed in much the same way, so we'll just make a seed saving soup out of them all by putting them in the same pot. Or on the same page, as it were.

All of the plants listed here are **biennials**. As a rule, **biennials** are out-crossers and need large populations (30 - 100 plants) for seed saving to avoid inbreeding depression. Also, most of the commercially available **carrots** and **onions** (and a good amount of **beets**) are F1 Hybrids, so the seed they produce will not be true-to-type. So, if you want to have good seed, start with seed of high quality open-pollinated varieties to begin with.

For **beets** and **chard, parsnips, carrots, turnips, onions,** and **leeks** for seed production, sow seeds as you normally would for these crops, at the same time you would for an autumn harvest. Don't sow **carrots** for seed saving in April; wait at least until June or they will get too big.

It is a good idea to plant two to three times the amount needed for a seed crop so you can have some to eat AND cull out the misshapen or off-type ones. Though it may be tempting to eat the most beautiful **beets** and **carrots**, those are precisely the ones you want to be saving for seed as you steward the variety into its next generation. So eat your edits!

It is good to dig up all of the crop at once in late fall so you can look at all the roots (and taste a small piece if you want). From the hundreds of **beets** or other **biennial roots** at your feet, select the most beautiful and/or vigorous (or whatever you are aiming for) 50 plants. In the Maritime Pacific Northwest you can re-plant right away or in colder climates return them to earth in early spring with at least one foot in each direction.

The plants should settle in easily and start to grow shortly after planting. Sit back and watch as they grow more leaves and then start to bolt, then flower. Then watch the bees visit the flowers, and the birds visit to eat some of the seeds. When the birds have discovered your seed crop, it is usually time to harvest. **Biennial root** seeds need to be dry processed, so make sure the seeds are completely dry on the plant before you harvest them. If the seedy part of the

plant is dead brown and almost crispy, the seeds are ready. If the seeds are mostly dry and a rainstorm is coming, go chop the seed heads off and bring them inside to dry down the rest of the way before processing the seed. It is even better to pull up the whole plants and hang them up in the garage to finish drying. Place a tarp under them to catch the shattered seed.

Seed processing for **biennial roots** is similar to that for lettuce. Chop the seed stalks down into a bucket. Leave the plants in buckets or paper bags for a day or two so they can continue to dry down and the bugs may leave. When you are sure the seed is dry, whack the seed stalk against the sides of your bucket or tote, or dance on top of a pile of seed stalks on a tarp or in a tote. Then winnow the seed from the debris using the breeze or a box fan, as you would with lettuce. For **parsnips** and **onions** it is better to hold the seed head and hit it on the inside of a bucket to collect the shattered seed with as little debris as possible, as it is hard to winnow. Let the seeds dry a little more, and when you are sure they are completely dry, label and store them in a cool, dry place.

Please note that the germination rates of **onions** and **parsnips** drops severely after the first season, so be sure to share or sow all of your **parsnip** and **onion** seeds the spring after you harvest them. If you are unable to do so, storing in the freezer will preserve them for 5 years or more.

Less easy seed:

Brassicas/cole crops:

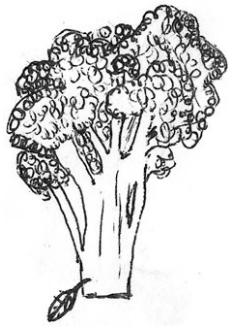
Broccoli, Collard Greens, Kale, Cabbage, Kohlrabi, Brussels Sprouts, Cauliflower, Rutabagas, Turnips, Radishes, Napa Cabbage

Oh! the *Brassicas*. Where would we be without them? What would we make our sauerkraut from, or our kimchee? (Ok, other greens, like pigweed or dock, but that's beside the point.) What would our aloo gobi be made from?

Brassicas are one of the most important vegetable plant families in our diets today. They are nutritious, delicious, and productive. In the past 100 years, we have lost up to 90% of the **cabbage** and **cauliflower** varieties I the US, as well as huge percentages of other *Brassicas* that were once available through seed companies. This is partly because of the massive consolidation in the seed industry, and partly because of the shift within the industry towards F1 hybrids whenever possible. *Brassicas* are outbreeders and lend themselves easily to being hybridized. This hybridization is good for the seed companies because hybrids produce a uniform crop, perfect for industrial agriculture. Furthermore, the seed from F1 Hybrids does not come true-to-type, so if you save seed from a hybrid you may get something very different from what you hoped for. This in essence provides a proprietary mechanism for the control of the seed.

These factors combine to make *Brassicas* one of the most important threatened food plant families to save seeds from in our gardens. If we don't, the seed companies won't, and then we are in danger of losing very valuable food sources. For seed saving, they are a little more complicated than tomatoes and beans, but the effort is well worth it!

Most of the *Brassicas* we eat in the US are biennials (flowering and producing seed their second year), and most of them are *Brassica oleracea*. If you leave a **broccoli,** a **collard,** a **cabbage,** a **Brussels sprout,** and a **cauliflower** in your garden, let them flower, and let the bees do their part, you will wind up with hundreds of different *Brassicas*. It is pretty likely none of the next generation will look like what you started with, due to crosses from such diverse parents. **Brussels Sprouts** on a giant **kohlrabi** base? A **collard-**leaved **cauliflower**? A hairy **kale**?



(Chewbroccoli)

If you want to save seed from any of these, and you are concerned with getting the seed to produce the same sort of plant you started with, there are three things to know before you start. One is, most Brassicas on the market now are hybrids, and if you save seed from them you WILL NOT get the same variety. Secondly, if you are saving a particular variety of *Brassica oleracea*, you need a large population (50 plants minimum) to maintain a healthy genetic variability.

If you want to cross a **Brussels sprout** with a **kale**, you can use fewer plants because these two parents are very genetically different from each other. Third, all *Brassica oleracea* will cross with each other, so you must be sure your neighbors aren't letting their **collards** flower when you are trying to save a Purple Sprouting **broccoli** seed crop. Unless of course your goal is Purple Sprouting **collards** (that would be awesome).

For most Brassicas you need to start with seeds or from garden starts. If you sow the seeds in late July, plant the seedlings out by late August, the plants will have sized up enough by fall to hold through the winter and produce flowers the following spring (late April-June). In harsher climates you will have to dig up the plants and store them potted up in a root cellar or green-house. The seed usually dries down by August, and forms in dried seed pods all along the branches. If the seed is close to dry and the rains are coming, go clip off the plants and bring them inside. We once lost an entire **broccoli** seed crop because the seed didn't ripen before the rains came.

To clean the seeds, just clip off the tops of the plants into a bucket or tote, strip the seed pods from the branches, and dance around in the mess you've made in the bottom of your tote. The dancing should open the seed pods and the seeds should all fall out, especially if you do the twist. Get another tote or a bucket, and winnow the seed by pouring it from one container to another in a breeze (or in front of a fan), allowing the chaff to float away.

For species isolation please note:

Brassica carinata = Ethiopian/Abyssinian mustard, Texsel greens.
Brassica juncea = Indian mustards (like Green Wave & Red Giant)
Brassica napus = Rutabagas, Russian & Siberian Kale.
Brassica oleracea = Broccoli, Brussels Sprouts, Cauliflower, Cabbage, Collards, Kohlrabi, Scotch & Tuscan Kale.
Brassica rapa = Turnips, broccoli raab and Asian mustards (like Pak Choi, Mizuna, Tatsoi & Napa cabbage)
Raphanus sativus = Radishes (may be biennial or annual)

Crosses between species happen very rarely, but you may flower multiple species at the same and have isolation. Remember to check what your neighbors are growing and letting flower. See *Seed to Seed* by Ashworth for more depth on *Brassicas*. Details in the Read More! Section.

Guide to Jargon (Glossary)

Adaptivar – Usually describes a population of an out-crossing species, such as kale or melons, in which many distinct varieties have been allowed to flower together and pollinate each other to create a diverse gene pool. The seeds of an adaptivar produce many unique plants which themselves may or may not produce similar offspring. Essentially, an adaptivar is a collection of many varieties that continually hybridize with each other. The population is stewarded by human and/or natural selection to increase the frequency of desirable traits, such as disease resistance or flavor. Also see: Grex and Landrace.

Agricultural Biodiversity – The diversity of crops grown in an agricultural situation. High agricultural biodiversity is achieved when farmers plant multiple varieties of multiple species on their farms, as in a diverse organic vegetable farm. The cornfields of Iowa do not represent good agricultural biodiversity.

Annual - A plant that completes its life cycle and dies in one year, such as lettuce, squash, or (in our climate) tomatoes and peppers. Also see: Biennial.

Biennial - A plant that requires two growing seasons to complete its life cycle (produce seed and die), such as carrots, beets, onions, or cabbages. These plants all require a vernalization period to trigger bolting. Also see: Annual.

Biodiversity – The variation of life forms within a given ecosystem, or for the entire earth. Biodiversity is often used as a measure of the health of a biological system. Often biodiversity is measured in the number of species present.

Bolting – When a plant elongates to begin flowering.

Brassica – A kind of pet name for any member of the Brassica genus and sometimes members of the wider brassica family (Brassicaceae). A cabbage or mustard relative.

Calyx – The ring of leaf-like sepals that surround, protect, and support a flower or fruit. Plainly visible on the tomatoes pictured to the left.

Chaff – the inedible, dry, scaly protective casings of the seeds of cereal grain, or similar fine plant material

Common Catalogue - The compilation of National Lists in the European Union (EU). If a seed is not in the Common Catalogue, it is illegal to be sold or traded within the EU. For inclusion on the Common Catalogue, a seed must go through rigorous tests and a process that costs 15,000 Euro. For a seed to remain on the list, fees are more than 2,000 Euro per year. This type of legislation destroys biodiversity, limits seed sovereignty and may be headed for the United States.

Cross-pollinator - A plant that readily shares and accepts pollen with other plants of the same species, sometimes requiring pollen from another plant to set viable seed. This includes corn, carrots and cabbage among others. Often referred to a "crosser" or "out-breeder". Also see: Self-pollinator.

Durable local food systems - A system of food production and distribution that is resilient and successful, and can function well under challenging social and environmental conditions, such as an EOW event or the disappearance of cheap oil. A durable food system might require a bioregional focus which is self-sufficient in fertility and seed production.

Ecotype - A local variant produced through selection pressures of the local ecology. A locally adapted variety is often developed when a seed is saved and stewarded though multiple seasons. The result of a microevolution that adapts a seed variety to its bioregion or microclimate. Also see: Selection, Adaptivar, Stewardship.

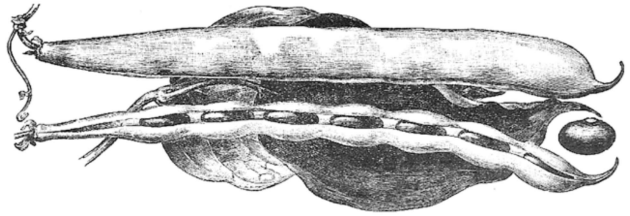
EOW event - End Of the World event, such as the asteroid hitting or John McCain winning the presidency.

F1 - Refers to the first generation after a cross has been made. See Hybrid.

Foodshed - Borrowed from the concept of watershed, coined as early as 1929 to describe the flow of food from the area where it is grown to the place where it is consumed. Recently the term has been revived as a way of looking at local sustainable food systems. (Definition taken from the Wisconsin Foodshed Research Project.)

Fruit - The seed-carrying part of a plant.

Genetic Diversity – Genetic diversity means that the individuals in a population differ in their inherited attributes. Wild plant populations are typically genetically diverse. A genetically diverse population has the flexibility to adapt.



Germ – the embryo of a seed where much of the fats and minerals are stored.

Germplasm -A term used to describe the genetic resources for an organism, such as the characteristics of seeds or nursery stock.

Grex - An interbreeding population of many distinct varieties. Possibly from the Greek for "Herd". Also see: Adaptivar and Landrace.

Heirloom - An open-pollinated variety that has been passed down from generation to generation, though there is disagreement as to how many generations (plant or person) is necessary.

Heterosis – Increased vigor of a hybrid when compared to its parental lines. The parental lines are often very inbreed, therefore the vigor may not be higher than a similar non-inbreed open pollinated variety.

Horizontal Resistance - A combination of genes that act together to combat various pathogens or predators, cannot be isolated, and can adapt when those predators adapt. As opposed to Mendelian genetic theory of single gene resistance that can break down rapidly when predators adapt.

Hybrid (F1) - A variety of a plant created by crossing two (usually inbred) parent lines. Due to the genetic trick of heterosis a hybrid plant is often more uniform and the seed saved from a hybrid (the F2) will segregate and produce plants that do not resemble its parent. Hybrid seed is claimed to be higher yielding and more disease resistant. *This is often not true!* A primary reason for a company to create a hybrid is to establish proprietary control over their seed and prevent seed saving.

Inbreeding Depression - A lack of vigor caused by saving seed from too few plants of an outbreeding species. Just like the Hapsburgs.

Insect-pollinated – A term used to describe plants whose flowers are or can be

pollinated by insects, such as carrots, broccoli, or onions.

Isolation Distance - The distance required between two varieties of the same species in order to save seed that maintains varietal integrity. For wind-pollinated species, this can be 4 miles or more. For insect pollinated species, it is ½ to 1 mile.

Landrace – A cultivated plant population that is genetically diverse and genetically flexible. A landrace can respond to selection pressures during cultivation. Prior to the pure line plant breeding begun in the early 1900's, most crop varieties grown in the industrial world were landraces. Most subsistence crops grown in the non-industrial world are still landraces. The heirloom equivalent of an adaptivar.

Milk Stage – The point at which a grain kernel is filed with sugary milky liquid.

Open-pollinated (OP) – A term used to describe a plant whose flowers are fertilized by natural means. A variety that, if properly isolated, will breed true to type when saved to plant the following year. An Heirloom variety is an example of an OP variety. See also: Hybrid.

Open Source – A condition where the ability to use, distribute and duplicate something is not limited by proprietary controls. In addition, the underlying information or code, genetic, analog or digital is not kept secret or copyrighted. See also: Public Domain.

Outbreeder – See cross-pollinator.

Perennial - A plant that lives for three or more years and does not die after it sets seed. Fruit trees are an easy example.

Perfect flower - A flower that contains both male and female parts: Perfect flowers are Bi-sexual.

Plant Variety Protection (PVP) - A form of patent on open-pollinated varieties of plants. If a plant has been registered for PVP protection, it is illegal to save seed to grow out yourself. You must buy seed from a licensee or pay royalties to the license holder. Kamut is a PVP grain. We save seed from these varieties out of anti-authoritarian principles.

Pollination - The transfer of pollen from a plant's male sex organ to the female sex organ of the same or another plant. Pollination is required to create viable seed. Also known as plant sex.

Public Domain - Anything that ownership of is released to the public domain, for the general public good. Not under copyright or other proprietary protection. Sometimes referred to as anti copyright or a form of copy-left. See also: open source.

Roguing - The negative selection event of removing inferior plants from a population to help improve or maintain a variety. See also: Selection.

Seed Saver's Exchange (SSE) - A network of people committed to collecting, conserving, and sharing heirloom seeds and plants. The organization, which was founded in 1975 and is based out of Decorah, Iowa, publishes a Yearbook wherein members list the seeds they have available to share with other gardeners.

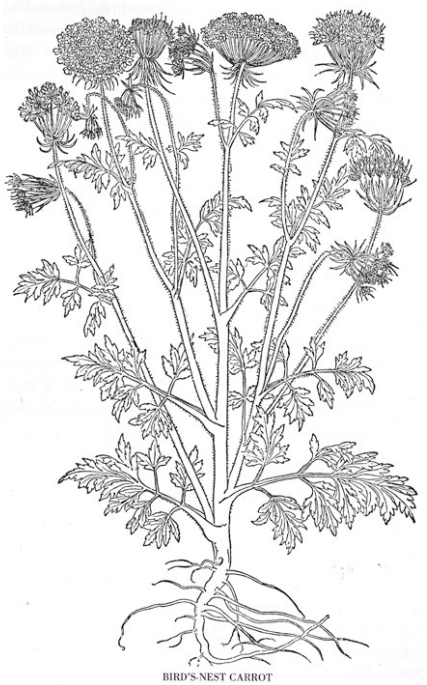
Seed Swap - A gathering of gardeners and seed savers where seeds are freely exchanged. There are many models for Seed Swaps, with some (as in the UK, where they are called Seedy Sundays) charging a small entry fee and a small fee (50 pence) for seeds that are not directly exchanged for other seeds. Here in the Eugene area, seed swaps are much less structured. People bring seed, tubers, plants, or nothing at all, to place on tables, and all are free to help themselves to whatever they think they can use. National Seed Swap Day is January 31. Start a Seed Swap!

Selection - Choosing the most vigorous or most well formed plants out of a population for seed saving purposes. If you eat the plants that are less than optimal, and leave the rest for seed production, you ensure the best genetics for seed. Also see: Roguing.

Selection Event - Conditions that eliminate part of a planting of a specific variety, such as extreme cold, heat, dampness, drought, or pest infestation. For seed saving purposes, selection events can help a population of plants to evolve under pressure.

Self-pollinator - A plant with perfect flowers that usually pollinate themselves and rarely crosses with other plants. This includes wheat, beans, tomatoes, and lettuce, among others. Often referred to as a "selfer". (See also: Cross Pollinator.)

Shattering - The breaking open of the seed pod or process by which ripe seeds separate from



BIRD'S-NEST CARROT

the seed stalk of a plant when they are dried. Usually, a seed saver wants to harvest and process the seed shortly before this occurs, lest they lose their seed.

Species – A population of organisms capable of interbreeding in nature. (Interbreeding refers to producing the normal number of fully fertile offspring.)

Stewardship - The mindful care of a place, plant, or anything else. For seed saving purposes, stewardship is the process by which an open-pollinated variety is maintained or improved through the careful selection of plants from which to save seed.

Stock Seed – A special selection of seed that is prime quality and has had extra effort selecting it for the traits desired. Usually used by seed companies as the seed sent to the big seed growers to increase to giant quantities for sale. Our stewardship goal, on a non-industrial scale, is to make all the seed we save stock seed quality.

Stratification – The process some seeds must go through for successful germination, in which the seed is kept cold and sometimes damp for a period of time before sowing. This may include freezing or refrigeration. The time involved may be a few weeks to a year. Usually it is for a few months.

Thresh - To break seeds free from the plant, seedpods or hulls.

Time Isolation - Isolating seed varieties by planting so that pollen is not being shed by different varieties at the same time. This can successfully be done with corn, some mustards, and an annual *Brassica* with a biennial variety of the same species. A summer with a winter radish for example.

Variety - A type of plant, for example a tomato, which can be distinguished from other types of the same species. A yellow Galina cherry tomato is a different variety than a red Peacevine cherry tomato.

Vegetable - Any part of a plant that you eat that is not the fruit or seed. Sometimes the botanical fruit is referred to as a vegetable when it is used like a vegetable, such as zucchini.

Vegetative – The growth stage of a plant that is typically characterized by leaf and stem growth. The other stages of plant growth that are not considered vegetative are flowering & fruiting. However, there is typically some vegetative growth during flowering and fruiting stages.

Vernalization - A period of cold (the winter months) that a biennial must go through before it is triggered to produce flowers (and then seeds). Also, some seeds must go through a vernalization process (known as stratification) before they can germinate.

Volunteer - A plant that grows without having been deliberately planted. Also

known as a weed. Volunteers are usually garden plants that we like, though, as opposed to grass or thistle or other things we don't want in the garden. They usually occur when a seed crop has been grown in the vicinity the previous year and some of the seed shattered before being harvested. They are also common when fruit (such as a tomato) is allowed to fall off the plant and rot on the ground, or in the compost pile when fruits such as winter squash have been composted. A volunteer is usually different than its parent, unless it is a heavily self-pollinating species.

Wind-pollinated - A term used to describe plants whose pollen is distributed through the wind. This includes beets chard, corn, spinach, and rye grain.

Winnow - To separate the seed from the chaff, usually using wind or a fan.

Read More!

Seed Saving and Stewardship

** *Breed Your Own Vegetable Varieties.* Carol Deppe. 2000. Chelsea Green.

** *Seed To Seed: Seed Saving and Growing Techniques for Vegetable Gardeners.* Suzanne Ashworth. 2002. Seed Savers Exchange.

- *Back Garden Seed Saving: Keeping Our Vegetable Heritage Alive.* Sue Stickland. 2001. Ecologic Books, England.

- *The Wisdom of Plant Heritage: Organic Seed Production and Saving.* Bryan Connolly and C.R. Lawn. 2004. Northeast Organic Farming Association.

- *Garden Seed Inventory. Sixth Edition. An Inventory of Seed Catalogs Listing All Non-Hybrid Vegetable Seeds Available in the United States and Canada.* Joanne Thuente. 2004. Seed Savers Exchange.

- *Seeds of Kokopeli,* Dominique Guillet. Availible from Kokopeli Seed Foundation.

Cornucopia II: A Source Book of Edible Plants. Stephen Facciola. 1998. Kampong Publications.

Plant Breeding and Stewardship

- *Return to Resistance: Breeding Crops to Reduce Pesticide Dependence.* Raoul A. Robinson. 1996. AgAccess.

- *Principals of Plant Breeding, Allard, R.W.*, 1960, First edition, not the second edition. (Ou of print, find it used online.)

Seed Ethnobotany and Politics

- *Enduring Seeds: Native American Agriculture and Wild Plant Conservation.* Gary Paul Nabhan. 1989. North Point Press.

- *Manifestos on the Future of Food and Seed,* http://www.future-food.org

- *Shattering: Food, Politics, and the Loss of Genetic Diversity.* Cary Fowler and Pat Mooney. 1990. University of Arizona Press.

- *Buffalo Bird Woman's Garden.* Gilbert L. Wilson. 1987. Minnesota Historical Society Press.

Seed Starting and Plant Propagation

- *Plants a Plenty*. Catharine Osgood Foster. 1977. Rodale Press

- *The New Seed-Starters Handbook*. Nancy Bubel. 1988. Rodale Press

- *Seeds: The Ultimate Guide to Growing Successfully from Seed*, Jekka McVicar. 2003. The Lyons Press

Other Important Organic and Heirloom Gardening Books

- *Oriental Vegetables*. Joy Larkcom. 1991. Kodansha International.

- *Growing Organic Vegetables West of the Cascades*. Steve Solomon. 2007. Sasquatch Books.

- *How to Grow More Vegetables*. John Jeavons. 7th edition, 2006. Ten Speed Press.

- *Heirloom Vegetable Gardening*. William Woys Weaver. 1997. Henry Holt and Company.

- *Perennial Vegetables*. Eric Toensmeier. 2007. Chelsea Green Publishing

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The Seed Ambassadors Project

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If you would like to tell us what you think about this 'zine please do. We are always looking for input of wisdom and corrections. It would also be great to hear how you've put it to use.

See www.seedambassadors.org for more information on The Seed Ambassadors Project.

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℗ 2010

Keep a look out for the next updated edition!
Thanks for reading and saving seeds.

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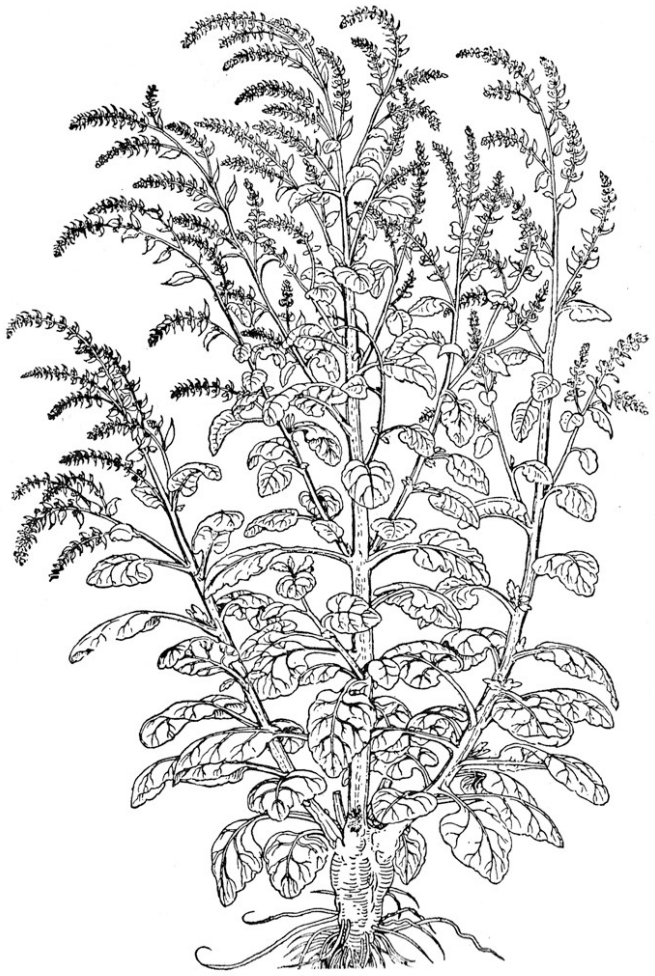

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