

Cross-pollinating complete - require insects/wind for pollen transfer between plants. Some of this depends on whether or not male and female parts mature at same time, plus other factors (they are sometimes called self-incompatible)-.

**Incomplete Flowers** are the second kind of flower; individual male and female parts are on separate flowers. Again, there are two types:

Male and female flowers may be on **same plant**, e.g., squash (and may or may not be self-compatible), or may be on **different plants**, e.g., some spinach varieties – both require insects and wind for pollen transfer.



### Kinds of Plants

In addition, there are three kinds of plants;

**Annuals** – grow from seed, produce seed, and the plant dies all in one season e.g., beans

**Biennials** – grow from seed first year; produce seed in second year from overwintered root, and then the parent plant dies, e.g., carrots, onions, cabbage.

**Perennials** – grow from seed or plant division; mature plant (may take several years) produces seed; parent plant may survive for many years.

### Summary of Reproduction/Seed Production (Main Forms\*)

1. self-pollinating annual vegetables (complete flowers)
2. cross-pollinating annual vegetables (complete or incomplete flowers)
3. cross-pollinating biennial vegetables (I don't think I have ever heard of these being categorized as complete or incomplete – they all cross-pollinate, and that is the most important thing to know!)
4. vegetative reproduction– tubers, runners, bulbs, etc. Examples are rhubarb, potatoes, Jerusalem artichokes. We won't look at these.

\*Note: some plants that we associate with vegetative reproduction will also reproduce by seed, but seeds are not relied upon by us as a main form of reproduction.

It is EASIEST to start with annual vegetable varieties that don't cross very readily with other varieties, eg peas, beans, tomatoes, peppers – they are 'self-pollinating', with complete flowers, and

don't rely on insects/wind for pollen transfer. BUT, some CAN be cross-pollinated, so it is good to isolate.

### 3. Maintaining the Purity of a Variety

Several things can be done to help maintain the purity of a plant variety .

The easiest way is to plant only one variety of a vegetable each year, but it takes away some of the fun! Even with a single self-pollinating variety, there may be cross-pollination from closely-related weeds (e.g., wild lettuce) by wind or insects. Fruit/seeds will resemble parent; and you won't know until the next year that cross-pollination has occurred, when the new plant or new fruit will be different.

Because of this, protect your variety from accidental cross-pollination; row covers are easiest, to keep out pollen and insects, You can cover individual flowers on a plant, e.g., tomatoes, lettuce, or make rigid plant cages for each plant .

BUT what if the plant needs wind or insects to be successfully pollinated or you want to plant more than one variety?

If you want to plant more than one variety and/or allow wind and insect pollination, you must ISOLATE your varieties by TIME and/or DISTANCE

This is most difficult with wind-pollinated plants.

Maintain recommended spacing between plant varieties, including wild varieties and those in your neighbour's garden! (there are guidelines for distances in seed-saving books).

It has been suggested to plant varieties that produce pollen at different times. It is not so easy here because of our short growing season. Another approach is to remove undesirable pollen sources, either entire plants or just flowers, of a related variety.

You can also use barriers to physically exclude pollen/pollinators and then pollinate by hand.

Never use plastic to exclude pollen/pollinators; the heat will 'cook' your plant and/or accumulate moisture that encourages fungal growth.

Paper bags get wet and fall apart.

Row covers are okay for large areas or entire plants, but you must be careful not to expose too many plants at one time when working with it.

One of the best things to use for individual fruit are old row covers



that can be cut up – it is a great way to extend their useful life – and tied over blossoms.

Remember to isolate both male and female parts of plant that will be used. The male squash flower may be visited by several honeybees which have previously visited flowers of other varieties – pollen will be transferred to male flower – no harm there, but wait until you use that flower to hand-pollinate your intended female squash flower!

If using cheesecloth bags or pieces of row cover; wash them before using on another related plant. Some pollen may remain viable for extended periods.

It is best to transfer pollen early in morning when flowers are young and pollen is fresh. Remember to re-cover the female flower so that can't be pollinated again.



## 4. Seed Processing, Drying and Storage

There are two main kinds of Seed collecting and processing  
**Dry-collected seeds** – e.g., peas, beans, carrots, lettuce – collect mature seeds (brown, dry); finish drying dry first, clean later  
**Wet-collected seeds** – e.g., peppers, tomatoes, cucumbers, squash – collect fruit that has overmatured on plant; clean first, then dry. Some of these seeds will just need washing to remove fleshy debris (which can become mouldy), some require fermentation to destroy seed-borne diseases, and to remove germination inhibitors which prevent seeds from sprouting inside mature fruit. BUT, you can over-process by soaking or fermenting for too long. Seed won't be able to germinate.

Seeds are alive, but dormant, and you want to keep them that way. However, seeds also will grow if conditions are right (moisture, air, warmth), and we have to prevent that. Beware of MOISTURE; after gathering, seeds should be dried in a warm dry space with good air circulation (a fan is good, especially if the humidity is high) to prevent mould. Good places are over a frig, in a food dehydrator, or in an oven with the light on. In all cases, the temperature should never go above 35 deg C., or 95 deg F, or the seed will be damaged. Do not prolong drying; seed that has NO water is dead.

DO NOT save seeds from plants that exhibit undesirable traits, e.g., lettuce or spinach that bolts to seed quickly; you will be selecting for that trait. In this case, it's not desirable to save the earliest-produced seed!

Do not save seed from plants that do not exhibit obvious characteristics of the variety that you are growing. You can often see this before the plant bears fruit. For instance, there are different kinds of tomato leaf, the 'normal' tomato leaf vs a 'potato'-shaped leaf. If your variety is known to be a potato-leaved variety, 'rogue out' (remove) normal-leaf seedlings as they become obvious. Some peas have purple flowers, or purple pods – remove white-flowered plants, or in the second case, green pods because they are not typical of the variety.

All of this helps to maintain purity of the variety, since sometimes this variation is due to cross-pollination from a closely-related variety (see below), not just a variation within the variety.

In instances where varieties are known to easily cross pollinate, remove unwanted plants BEFORE flowers/pollen are produced, or as soon as the difference is obvious.

Don't get discouraged, EXPERIENCE will teach you how to achieve the delicate balance between maintaining genetic diversity and selecting for desirable characteristics.

## 2. Kinds of Plants, their Flowers and Pollination



### Open-pollinated vs Hybrid Plants: Varieties to Save

Save only open-pollinated or non-hybrid varieties. Why? Because non-hybrid varieties will produce offspring that are the same as the parent. Hybrids are a mix; they won't produce the same plants. Offspring from seeds may be the same as one or the other parent, plants often are less vigorous, seed may be sterile.

### Kinds of Flowers (Reproduction)

There are two kinds of flowers; **Complete Flowers** – have both male and female parts in one flower. This group is further divided into two types:

Self-pollinating complete – pollinate themselves e.g., beans (sometimes called perfect flowers), or

## 1. Introduction

### Why save seeds?

Main reason (once upon a time!) was to have some for next year – security.

Also,

- to preserve a variety and its diverse genetic traits to develop/select for certain traits that you want



### Two Purposes of Seed-saving:

#### Maintaining genetic diversity of a variety vs selecting for a desired trait.

Open-pollinated varieties always show a certain amount of diversity, or variation (as opposed to hybrids, which are bred for uniformity, among other things!). They have the potential to adapt to a range of conditions, most obvious is climate.

This diversity is expressed as variabilities within each strain, eg, beans from different plants of a single bean variety will have differing colouration, not all tomato plants of a single variety will ripen at exactly the same time. These are obvious indicators, but not all variability is as easy to detect, e.g., salt tolerance.

To maintain genetic diversity, it is important to plant enough seed so that there is a representative population (if possible) of variabilities, or characteristics of the strain – this is most important when attempting to maintain genetic diversity. It is also important to save enough seed so that there is a representative population for the next year – growing conditions are not always the same! For example, one year may have a cold wet spring; the next year may have a hot, dry one. Not all seeds will germinate and survive, but some will, if there is enough variation within the strain.

As for selecting for certain traits, we are always selecting for certain traits, even if we are not aware that we are. Climate is a BIG factor. In Thunder Bay, we have a short season, so we save seed from whatever ripens; we are selecting for early maturity. This is a form of natural selection.

We may want to select seed for other reasons, for example, stockiness of a plant which makes it resistant to wind damage, 'bushiness' of peas and beans, smaller plants for pots, or selection of a favourite colour in flowers.

No matter what the reason for saving seeds, it is important to save seed from healthy, non-diseased plants.

Silica gel can also be used, but you still have the possibility of overdrying seeds.

There are several ways to check if seed is dry – if the seed is large and flat, try to bend it; if dry, it will either break or split. If too moist, it will bend or squash. With small seed, or large round seed, hit it with a hammer; if dry, it will burst into fragments. If too moist, it will squash. The right 'feel' will come with practice. It is difficult to tell if the seed is too dry, but if heat isn't used in the drying process, chances are that the seed will still have moisture. Immediately after drying your seed, transfer to airtight jars which prevent reabsorption of moisture which may trigger germination or mould growth.

At the very least, store in a cool dry place away from light.

For longest life, store seeds in airtight container in freezer (increase in length of viability can be up to 5 times!). Make sure seeds are dried. Freezing of water in moist seeds will rupture and kill cells! Freezing also kills insects and their larvae.

Next best is a refrigerator. In all cases, if storage temperature is significantly colder than the room temperature, let seeds come to room temperature before opening the jars. Condensation on cold jars and seeds will affect their viability.

Minimize the number of times that you open your cooled or frozen seeds – temperature fluctuations are also detrimental to seed viability.

The more of these requirements that you can satisfy, the longer your seed will remain viable.

There is no need to be quite as stringent if you are growing your seeds out every year or every few years. Just keep your seeds cool and dry.

## 5. Testing Germination



Many gardeners don't have enough seed to do germination tests. Some gardeners save seed from just one variety of each vegetable per year to avoid lots of work. If seeds aren't saved yearly, they should be tested to ensure that viability is still okay. This is usually done in the late winter or early spring, since gardeners are usually far too busy in the fall, so it's a little out of context here. However, it can be done at any time, since most vegetable seeds don't need a 'rest'.

You can test the viability of old seed, or to determine if the seed you have collected is viable - you may have accidentally collected hybrid, immature seed, non-pollinated or improperly pollinated seed.

Basically, you are looking at percentage of seeds that germinate; e.g., 90% = 9/10, 90/100. Most commercial seed will have germination rates on the package.

You can use the same approach for all, that is, place seeds in wet paper towels, wrap loosely in plastic food bag or other waterproof container, place in the appropriate temperature with or without light, as indicated in the original instructions, and allow the seeds to germinate. There will be some variability in time, but most seeds will germinate within a couple of days of each other.

The easiest technique for larger seeds is to use a seed sprouter, if seeds are suitable, you can eat the results of your germination tests!

**NEVER PLANT ALL OF YOUR SEED!!!!**



**LABEL EVERYTHING; USE  
WATERPROOF LABELS!!!!**



**KEEP NOTES ABOUT EVERYTHING!!!!**

For more information, refer to Seeds of Diversity's most recent edition of How to Save Your Own Seeds: a handbook for Home Seed Production, 5<sup>th</sup> Ed., 2005, available through their website, [www.seeds.ca](http://www.seeds.ca).

For other events and to get involved contact:  
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# Saving Your Own Seeds

