



**The Kitchen Garden Classroom: Educating Children for a Healthy Future
13 October 2008 Abbotsford Convent
Session D3: Seed Saving in the Garden Classroom: Theory and Practice –
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What is a seed?

A seed is a tiny package of genetic information contained inside a protective coating. It's the living equivalent of a flash drive – on which is stored the plans for making a new plant out of air, water and minerals using solar energy for fuel. A flash drive is designed to keep its information safe inside its plastic coating until it is put into a computer, at which point it unpacks its information. Similarly, a seed is designed to stay dormant until conditions are right for a seedling to grow. Only when the correct combination of temperature, moisture and day length are met does it unpack its genetic information and start making a new plant. Seeds are the vehicles by which plants travel from generation to generation and across sometimes vast distances.

The practice of seed saving is an unbroken chain stretching back thousands of years to humankind's earliest attempts at farming. At some point our ancestors realised that if they deliberately saved some seeds from their favourite food plants, they could make them grow where they wanted them to grow the following year and in quantities that were useful to them. It was discovered that if they saved the seeds from their best plant then its characteristics would be passed on to its progeny, and so selective breeding was born. Many of the food crops we eat today have ancient lineages. When we save a seed and pass it on to someone else we are participating in a custom which first started, literally, in the stone age.

In our grandparents' generation, the majority of home gardeners, smallholders and farmers saved their own seeds. This was a necessity in an age when you couldn't just nip down to the supermarket to buy a punnet of seedlings. It is only in the last 50 years that we have got out of the habit of saving our own seeds. But in that short time countless vegetable and grain varieties have been lost – varieties which represent our collective food inheritance. When we lose a variety of vegetable or grain we also lose its unique genetic makeup. These genes are important because they might one day help avert a food crisis like the Irish potato famine of the 19th century which was caused by reliance on potato strains which had no resistance to potato blight.

Heirlooms vs hybrids

This is why the so-called heirloom varieties of vegetables are so important. Heirloom varieties are those which have been passed down through families for generations because of their suitability to local conditions, their vigour and good culinary attributes. Heirlooms are also referred to as open-pollinated varieties, which means

that the pollination is done by nature rather than the hand of man. This means that there is a lot of genetic variability within any heirloom variety which is why heirlooms are so adaptable in the garden. Open-pollinated varieties also come true to type so you can save seed from them year after year and pass it on to future generations.

By contrast, most of the seed varieties for sale today are F1, or first generation, hybrids. F1 hybrids are controlled crosses made by human intervention to give the progeny specific characteristics. F1 hybrids do not come true to type so if you save seed from them the resulting plants will not be the same as the one you saved them from.

There is nothing 'wrong' with hybrid varieties. They are not genetically modified nor is there anything sinister about them. But the dominance of hybrid varieties is a symptom of the commercialisation of food. Hybrid varieties are invariably bred with transportability, shelf life and uniformity in mind. Flavour, texture and other culinary considerations come much further down the list of priorities.

Tomatoes are a good example. The marketplace demands tomatoes which can be packed into crates, transported long distances, put into cold storage for weeks or even months and then tossed onto shelves without bruising. It demands tomatoes which look appealing to consumers regardless of their edibility. As a result of this farmers are obliged to grow a handful of F1 hybrid tomatoes which supermarkets find acceptable. These have been bred to be red in colour to appeal to customers conditioned to think that only red fruits are ripe. They have been bred to look plump and inviting but at the same time to be as hard as rocks for ease of transport. They are generally *determinate* or bush varieties, which bear their crop all at once so they can be harvested by machine. Unfortunately these are the varieties which most seed companies offer farmers and home gardeners alike. The parentage of the hybrid remains the intellectual property of the seed company and since hybrid strains don't come true to type, growers are obliged to go back year after year to buy their seeds.

As consumers we want tomatoes which are soft, juicy, sweet and flavourful. And we want plants which crop successively over several months, not all at once. Luckily heirloom varieties fulfil these attributes. There are an astounding 4000 varieties of tomato in existence. There are red ones, orange ones, yellow ones, green ones with stripes, white ones with peach fuzz on the skin, pink and purple ones, brown ones and black ones. There are tomatoes for slicing, tomatoes for making sauces and pastes, tomatoes for drying and tomatoes that are hollow like capsicums for stuffing. Some taste as sweet as jam, some are meaty and chunky and some tomatoes even taste smoky! Heirloom tomatoes crop heavily over a long season. The best-cropping varieties like Tigerella will produce 20kg per plant over a four-month period! The other great thing about heirlooms is that there are varieties which cope well with less-than-perfect growing conditions such as short, cool summers. Heirloom vegetable varieties are by far and away the best choice for home gardeners.

So how can you save seeds in schools?

Growing, cooking and sharing food are wonderful skills to impart to kids and seed saving is an important step in that process. It is the step that ensures the safety and

continuity of our food supply. One of the great things about getting kids involved with seed saving is that they get a sense of how precious tiny, insignificant seeds are and how tenuous our food supply really is.

Different varieties of vegetables have different seed saving requirements, some quite simple and others quite complex. For individual vegetables' needs, please refer to one of the listed texts. Below is an overview of some of the issues which need to be considered when saving seed.

Pollination

Pollination is the process whereby pollen, which contains the male chromosomes, is united with the sexual parts of the female flower so that fertilisation can take place and seeds can form. There are two main methods by which pollination is effected. The first is by wind. Plants which are wind pollinated produce enormous quantities of pollen which is carried in the air and hopefully lands on another plant of the same species. These are the plants responsible for giving us hayfever! The wind-pollinated vegetables are sweetcorn, a member of the grass family *Poaceae*, and the members of the dock family *Chenopodiaceae* such as spinach, silverbeet, beetroot. Wind-pollinated plants typically have small, drab flowers. The second method by which vegetable flowers are pollinated is by bees and other insects. This includes vegetables from all other families: the *Brassicaceae* – cabbages, broccoli, cauliflower, kale, rocket and all the Asian greens; the *Asteraceae* – lettuces and chicories; *Cucurbitaceae* – pumpkins, melons, cucumbers, squash and zucchini, *Alliaceae* – onions and spring onions; *Apiaceae* – carrots, parsnips and celery; *Solanaceae* – tomatoes, eggplant and capsicums; and the *Fabaceae* – peas, beans and broad beans. Insect-pollinated plants tend to have much bigger, more colourful flowers. Some vegetable varieties are also quite self-fertile, notably tomatoes, beans, peas and lettuce. An understanding of how a particular variety is pollinated is important for maintaining purity of strain.

Purity of strain or trueness to type

Some varieties of vegetable are highly promiscuous and given to hybridisation. In order to keep strains pure, seed growers need to ensure that plants are grown in isolation from other strains with which they might cross. Plants can be isolated by distance, by time or by physical barriers. If you want to grow pure sweetcorn seed you need to separate different strains by a distance 3km, or sow them at different times to ensure that they do not flower simultaneously. For pumpkins and brassicas, you need to separate the strains far enough that bees won't cross-pollinate them; 1.5 km is usually far enough! Or you can grow the plants inside insect-proof cages, which must have a beehive inside put inside to make sure that the flowers get pollinated.

This is really beyond the scope of schools. Luckily, there are quite a few varieties of vegetable which are quite self-fertile and come true to type from saved seed.

Tomatoes, beans, peas, lettuce, silverbeet and beetroot all give reliably true-to-type seed. In any case, it's no great drama if students have crossed strains. It's better that kids get the experience of saving seeds than not, so don't let any of this put you off teaching the subject. In fact, impure or crossed pumpkin strains result in fantastically psychedelic combinations of shapes, colours and sizes so it's all good fun.

Harvest and seed cleaning

Always select your best plant to save seed from. It will confer its good characteristics to its progeny in the next generation. Seed needs to be harvested at the optimum time for maximum viability. There are two types of seed processing: dry processing and wet processing.

Dry processing is used for vegetables which bear their seeds in dry pods like peas, beans, lettuce, carrots and brassicas. After you've selected your best plant, wait until the maximum number of seed pods are starting to yellow and dry but before the seed heads shatter and lose their seed. Lift the whole plant, roots and all, put an old pillowcase over the top of it and hang it upside down somewhere dry and warm so that as the seeds ripen and fall into the bottom of the pillowcase. With some varieties you might need to give them a hand by beating the pillowcase against the ground on a hot dry day and walking on top of it, or in the case of big pods like beans, opening the pods and extracting the seeds manually. You then need to separate the seed from any chaffy foreign material before storage. This is done by *winnowing* which means pouring the seed into a bowl and shaking it up and down in a breezy area. The breeze blows away the light chaff and the heavier seed falls back into the bowl. For very light seed like lettuce it's better to do the blowing yourself so the wind doesn't blow away your lettuce seed. It takes practice. Eventually, you will be left with clean, pure seed ready for storage.

Wet processing is used for vegetables which bear their seeds inside fleshy fruits – tomatoes, eggplants, capsicum, pumpkins, zucchini and melons. This involves scooping the seeds out of the fruit, mixing them with water in a bowl and mixing them thoroughly. Fruit pulp and infertile seeds will float, leaving the fertile seeds on the bottom. Carefully pour off the floating material, leaving the fertile seeds in the bowl. Repeat this several times until you are left with pure seed. Then strain the seed through a sieve, removing as much water as possible. Put the seed onto a smooth flat surface like a sheet of glass or a baking tray and dry it as quickly as possible. Seed which remains moist for too long is liable to germinate, so make sure you put it somewhere very warm and breezy so that it dries quickly. Some people dry wet-processed seed on kitchen paper or tissues, but the seed sticks and makes it a bit tricky to handle when it comes to sowing time.

Some fleshy-fruited vegies like tomatoes, rockmelons and cucumbers have a kind of jelly around their seeds. This jelly contains a germination suppressant which is designed to be broken down by fermentation, either in animal's gut or by rotting inside the fruit. This is why the best tomato seedlings always seem to pop up in the compost heap. This jelly needs to be removed before storage. You can do this by putting the seeds and jelly pulp into a glass, sitting them on a sunny windowsill for 3 or 4 days and letting them ferment. When white mould has formed on the surface you can rinse the seeds, give them a good clean and dry them as described above. This will give you much better germination rates for seeds of this type.

Storage and viability

Seeds store best in cool, dark, dry conditions. It is important to keep the temperature and humidity constant. When humidity and temperature rise, the seeds wake up from dormancy a little bit and then go back to sleep again when humidity and temperature drop again. Every time this happens, the seeds use some of their stored energy and their viability is compromised. The worst place to store seeds is in the garden shed.

Temperatures can reach the 50s during summer and plummet below zero in winter. The air gets damp when it rains and dries out in summer. The best place to store seed is in paper envelopes in a screw top jar in the fridge. A sachet of silica gel will help to maintain a dry atmosphere in the jar.

Seeds have varying viability times. Members of the carrot family have extremely short viability. Parsnips, for example, lose viability quickly after one year. Whereas date palm seeds have been known to remain viable for a couple of thousand years. So make sure you clearly label and date each variety of seed before you store it.

Easy seeds to save

These seeds are easy for beginner seed savers to start with because they are large and easy to handle and don't require any special tricks!

Beans

Peas

Broad Beans

Silverbeet

Capsicum or chilis

Pumpkins, watermelon and corn are also fun but they probably won't come true type if you save your own seed.

For a bit more of a challenge, try tomatoes, cucumbers, and melons

Some varieties will self-seeding reliably in the garden – you don't even need to collect and store the seed.

Lettuce

Parsley

Parsnips

Rocket

Carrots

Further reading

Ashworth, Suzanne (1991). *Seed to Seed*. Seed Saver Publications, USA.

Fanton, Michel & Jude (1993). *The Seed Savers Handbook*. ISBN 0 646 10226 5

Stickland, Sue (1998). *Heirloom Vegetables: A home gardener's guide to finding and growing vegetables from the past*. Fireside Books, USA.

www.seedsavers.org

www.seedsavers.net

www.diggers.com.au

www.edenseeds.com.au