

# Seed Saving in Schools

Prepared as part of the  
**Food for Life Partnership**



## Acknowledgements

Julie Tant	Project Coordinator and Writer
Neil Munro	Heritage Seed Library Manager
Rachel Crow	Heritage Seed Library Information Officer
Vicki Cooke	Heritage Seed Library Seed Officer
Andrea Jones	Garden Education Officer and Photographer
Malcolm Smith	Lead Garden Education Officer
Anna Corbett Liz Davies Diane Fisher Rosy Grant Ruth Hepworth Paul Sadler Kay Whitfield Liz Woodward	Garden Education Officers
Ray Spence	Photographer
Dave Steele	Graphic Designer
Ron Harries	Proof reader

The Health and Safety advice and guidance offered is intended for general information purposes only and is not intended to be a substitute for professional advice and guidance or training. Garden Organic/Food for Life Partnership disclaim any warranty or representation, expressed or implied about the accuracy, completeness or appropriateness of such Health and Safety advice and guidance for any particular purpose.

*Front cover: Broccoli plant in flower (Photographer, Ray Spence)*



# Seed Saving in Schools

---

<b>1</b>	<b>Introduction</b>	<b>Page 1</b>
<b>2</b>	<b>The Heritage Seed Library</b>	<b>Page 2</b>
<b>3</b>	<b>How to save seed</b>	<b>Page 6</b>
<b>4</b>	<b>Cleaning and storing</b>	<b>Page 11</b>
<b>5</b>	<b>How to hold a seed swap</b>	<b>Page 13</b>
<b>6</b>	<b>Links to the National Curriculum</b>	<b>Page 15</b>
<b>7</b>	<b>Seed saving at Atwood Primary</b>	<b>Page 18</b>
<b>8</b>	<b>Activities</b>	<b>SSI-10</b> <b>Page 21</b>





# I Introduction

---



**A major part of the Food for Life Partnership is to get as many people as possible involved in growing and cooking their own food, whilst raising awareness of where food comes from, healthy eating and sustainability. Saving and swapping seeds helps meet some of the criteria for the Food for Life Partnership Gold Mark Award. It also provides numerous learning and extra curricular opportunities as well as helping with projects such as Eco-schools and outcomes from Every Child Matters.**

Saving seed is one of the oldest agricultural practices. It was a vital activity that took place at the end of the growing season. Seed would be gathered and stored for planting in the spring. Traditionally seed would be selected from plants that had grown the best or had desirable characteristics such as high yields, resistance to drought, pest and disease. Selection was also based on personal preferences such as flavour, shape, colour or family tradition. This has led to a dizzying array of fruit and vegetable varieties, each having a slightly different taste, aesthetic, yield, disease resistance and other characteristics. Sadly, the industrialisation of agriculture has put the emphasis on high yield, disease resistance and crop uniformity. Consumers are offered a narrower band of varieties that are grown on a global scale to keep up with demand. This has resulted in the disappearance of many 'traditional' varieties and to a loss of biodiversity, as farmers opt for new varieties and utilise the latest farming techniques. In many ways saving seed is the gardener's way of returning to traditional sustainable methods.

Saving and swapping seed can easily be integrated into school life, eg through lessons; the exploration of plant development, life cycles and adaptation. All this can be illustrated through growing and studying heritage seeds, thereby providing many practical ways that allow pupils to improve their skills of observation, hypothesis and research.

Seed saving and swapping can also assist with building links with local gardening groups and allotment groups by staging seed swapping events. Such events allow pupils to make a positive contribution to the school and wider community, thereby improving pupils' communication skills, confidence and self-esteem. Often such events can also provide opportunities for pupils to work with members of the community, such as the elderly and people from different ethnic groups. These events also offer exciting opportunities for pupils to become involved in business enterprise schemes. Seed saving can also be used to access and explore wider issues in citizenship. Issues such as sustainability, food security and the GM debate can be explored through the use of seed saving and heritage seed.

This booklet is designed to support schools in saving and swapping seed, and outlines the principles of saving your own seed and how you can help protect heritage varieties. It also includes a number of practical activities that encourage pupils and teachers to explore the fascinating world of seeds.



## 2 The Heritage Seed Library

---



Since the 1970's Garden Organic's Heritage Seed Library (HSL) has collected, conserved and made available a steadily increasing number of historic and heirloom varieties of vegetables to try to reverse the decline in genetic diversity of food crops. Many of the varieties have been developed by gardeners and passed on through the generations until they were donated to the Heritage Seed Library.

### What is the Heritage Seed Library?

Long before seed catalogues were available farmers and gardeners saved seed from one year to the next. The 19th Century saw the commercialisation of the seed trade. Unfortunately, with this came corruption amongst unscrupulous seed companies. To prevent such abuses, new EU Legislation was introduced in the 1970's. This limited the trade to varieties officially listed in the European Common Catalogue. Many heritage varieties could not meet the stringent criteria set down, and small seed companies were squeezed out.

### History of the Heritage Seed Library

The late Lawrence Hills, founder of the Henry Doubleday Research Association (HDRA, now Garden Organic), realised that the new laws would limit the gardeners' choice. He wanted to do something to conserve genetic diversity in vegetable varieties associated with the UK and Europe. Initially, he helped to establish the national gene bank at Horticulture Research International (HRI), Wellesborne, Warwickshire; now part of Warwick University. Creation of the Heritage Seed Library followed. It started life as the Genetic Resources Unit, a tiny collection of varieties grown to raise public awareness and to provide seed for re-sowing. In 1992 Garden Organic formally recognised the importance of the collection and the Heritage Seed Library was conceived.



### What type of seed does the Heritage Seed Library collect?

The Heritage Seed Library maintains a collection of vegetables associated with the UK and Northern Europe that are not readily available in seed catalogues. HSL collect not only the seeds, but also information on their characteristics, history, methods of use, origins, and what this can tell us about our gardening and culinary heritage.

### Keeping the varieties alive

The Heritage Seed Library grows the varieties and makes the seeds available to other gardeners, so that they remain alive and able to adapt to new conditions. Any new characteristics then have a good chance of being spotted and made use of.

The current collection is divided into three main categories and sets the basis for any additional variety that is taken into the collection.

<i>Heirloom variety</i>	A variety whereby seed has been handed down from one generation to the next, their origins often lost in family history.
<i>Ex-commercial variety</i>	A variety once included in the European Common Catalogue, but has been subsequently dropped due to being either not commercially viable or replaced by a 'better' variety.
<i>Local variety</i>	A variety that has particular reference to an area that is perhaps supported by a local tradition, attached to a story associated with the area, or grown by people in a specific locality.

Despite being very much a living collection, we have deposited a sample of each variety held in the collection in storage at Warwick HRI. Here we have access to the facilities to, firstly, dry the seeds to the correct moisture content, and secondly, keep them stored at -20°C, where the seeds will remain viable for up to 50 years.

## Legislation

At present, we are not legally allowed to sell our seed. Under current European law only seed that is listed on a National List (and ultimately the EU Common Catalogue) can be marketed. To be on the list a variety must go through a series of tests, termed DUS tests. See explanation below.

<i>D – distinctiveness</i>	The variety has to be different from any other variety.
<i>U - uniformity</i>	All of the plants produced must be the same.
<i>S - stability</i>	The plants have the same characteristics when grown over generations.

Many of the varieties we look after would not pass these tests, as they are inherently highly genetically diverse.

## Why is it important to conserve these varieties?

There are several reasons to conserve varieties.

<i>Food security</i>	A narrow genetic base can result in crops becoming susceptible to a build up of pests and diseases and offer no opportunities to 'react' to this.
<i>Consumer choice</i>	With the costs incurred in breeding and maintenance of a variety, a large, profitable market is sought. This means that seed companies often decide against maintaining varieties suitable for 'niche markets', gardeners for example, in favour of those more acceptable to large-scale growers.
<i>Small-scale growers</i>	In the case of home gardeners and small scale growers the needs may be very different, such as a lack of pesticide use and a desire to harvest produce over a long period of time.

## Heritage Seed Library membership scheme

The Heritage Seed Library runs a membership scheme. The HSL team produce articles on seed saving, research and the latest on the international seed scene in the Garden Organic and Heritage Seed Library members' magazine, *The Organic Way*.

December sees the production of the Heritage Seed Library Catalogue, which each year makes a portion of the Collection available to HSL members. It contains historical and cultural information about the varieties offered.



Tomato – Pink Cherry



Spinach – Blight Resistant Virginia



Beetroot – Dewings Early Blood Turnip

We grow some of the seed required at Ryton Gardens, whilst more is grown by Seed Guardians — special members who volunteer their resources to look after and bulk up stocks of selected varieties. It is seeds from both sources that are made available for distribution to our members.

On a regular basis the Heritage Seed Library team also receive seed of varieties from members of the public. These varieties are grown and assessed before becoming formally accepted into the Heritage Seed Library Collection and subsequently made available to members.

## Seed Guardians

Each year the Heritage Seed Library sends out around 40,000 packets of seeds. These are distributed to HSL members who, as part of their membership, have access to the Collection through our annual catalogue.

### *Why have Seed Guardians?*

Although we produce seed at our site at Ryton Gardens, it would be impossible for us to provide for our members and member schools without support from our Seed Guardians. Each Guardian is responsible for taking a small amount of seed from the Heritage Seed Library, growing the seeds and producing a crop every year. This crop is processed and returned to the Heritage Seed Library to re-distribute. Of the 40,000 plus packets of seed sent out each year, 40-50% is supplied by Seed Guardians.

Seed Guardians also provide useful information regarding crop performance in their particular location.

### *What do Seed Guardians do?*

Each year the Heritage Seed Library produces its Orphans List from which the majority of Seed Guardians select what they would like to grow the following season. Varieties included are those which require ‘bulking up’ in order to replenish our stocks. We also offer new varieties that have been trialled by us, but now require multiplying before we have sufficient stock to be able to offer the variety in our annual catalogue.

The Orphans List is compiled in January for distribution to Guardians during February. Each Guardian selects up to three varieties for which they are responsible for growing on our behalf. We offer a selection of vegetables to enable both experienced Guardians, and those that are relatively new to growing for seed, to choose varieties that they feel confident enough to grow.

We also provide a full set of Seed Saving Guidelines to help them decide which vegetables are suitable for their growing environment. The Guidelines include information on growing vegetables for seed production, pollination and isolation, harvesting and storage details.

### *Monitoring variety performance*

We ask Guardians to fill in copies of our Return Forms. This helps us assess how each crop has performed in various locations and if there has been any problems with pests and diseases. It helps us gather details on percentage germination, sowing and harvesting dates, plant height and quantity or weight of seed

produced by a single plant. Most importantly we ask Guardians to comment on appearance, flavour and recipe ideas.

We encourage Guardians to send in photographs of their varieties. These are also used to compile the annual catalogue; any we use are credited to the original photographer.

Some Seed Guardians choose to research the varieties in their care, providing us with additional historical information or details on the previous availability of the variety.

Seed Guardians return their crop and associated information to us in the autumn. Each batch of seeds is checked for signs of disease or pest damage, given a final clean, weighed and recorded on the Heritage Seed Library database. Each is allocated a unique number that stays with that batch until it is dispatched to members. This enables us to trace each batch of seeds sent out to members to its original grower.

Of course, it is possible that a Guardian may have a complete crop failure. However, we never send all of the seed of a given variety to Guardians, and endeavour to allocate each to several Seed Guardians, to safeguard the variety itself. We hope that if Guardians do experience problems that they won't be disheartened, and continue to grow for us for many years.





## 3 How to save seed



Saving seed is an exciting and money saving way to increase your plant stocks by preserving your favourite crops to grow again the following year. Seed can also be swapped with other schools or gardening groups. Saving seed also helps protect local biodiversity and social history. This section outlines the basic principles of saving your own seed and how you can help protect heritage varieties.

### Classification

All living things are classified in a hierarchical system that was developed starting in 1727 by the Swede Carl Linnaeus. Linnaeus used two names for every kind of living thing, eg human beings are *Homo sapiens*, whilst runner beans are *Phaseolus coccineus*. The first name is the genus; plants that are very like one another, eg the runner bean and the French bean share the same genus, *Phaseolus*. The second name is the species; runner beans are *Phaseolus coccineus*, while French beans are *Phaseolus vulgaris*. Because everything has two names, the Linnean system is called the Binomial system.

There are other levels of classification, above and below genus and species. Genera that share similar characteristics can be grouped into families, which in turn can be grouped into orders and then classes. Classes may be grouped into divisions (or phyla). The whole realm of classification is very like the outline of a great tree, with a few great limbs (orders), more branches (genera), and hundreds of thousands of twigs (species).

Below the level of species may be yet another grouping. So beetroot and chard are both *Beta vulgaris*, but beetroot is *Beta vulgaris* var. *conditiva*, while chard is *Beta vulgaris* var. *vulgaris*. Lower still, are cultivated varieties or cultivars. Thus there is a beetroot cultivar called, 'Green Top Bunching' (full name: *Beta vulgaris* var. *conditiva* 'Green Top Bunching') and another called 'Detroit' (full name: *Beta vulgaris* var. *conditiva* 'Detroit').

The level at which Seed Savers are concerned is: the preservation of the essential qualities that distinguish one variety from another.



Chard



Dwarf French Bean



Beetroot

# Plant reproduction

## Flowers

In order to create seeds, a plant must mate. This process involves flowers, which carry the male and female reproductive organs.

Flowers		Description
Single flower	'perfect'	The male and female parts are contained within a single flower, eg pea
Separate flowers	'imperfect' Single plant monoecious Greek: mono = one, oikos = household	The male and female parts are in separate flowers on a single plant, eg squash
Separate flowers	'imperfect' Separate plants dioecious Greek: dio = two, oikos = household	The flowers are formed on separate male and female plants, eg spinach

## Parts of a flower

The male and female flowers have different parts, each of which does a specific job. See table below for explanation.

Male		Female		
Stamen		Pistil		
Filament	Anther	Style	Stigma	Ovary
The number of stamens present is a characteristic of a plant species. Each stamen consists of a filament, at the tip of which is an anther.	The anther produces the pollen grains.	Elongated 'stalk-like' part of the pistil.	This is the part of the pistil that is receptive to pollen grains. It may be a sticky, knob-like structure at the end of the style or it may be a long portion of the style, as in the silken tassels of corn.	The ovary contains one or more ovules, or egg cells.

When a fertile pollen grain lands on a receptive stigma, the pollen grain forms a tube that grows through the style until it reaches the ovary. There it fertilises one of the ovules. Eventually, the ovary forms the fruit or seedpod, while the fertilised ovules develop into seeds.

## Pollination

For seed to develop, pollen must be transferred from the anthers to the stigma.

Pollen and ovules carry the genetic messages from the male and female plants respectively, producing offspring that contain a mixture of traits from 'mother' and 'father'. If pollen and ovules are from different varieties, the resultant seed will be a mixture of those two varieties, rather than a characteristic member of a particular variety (not true to type).

Seed savers must ensure that a variety remains pure by restricting the source of the pollen to the same variety as the ovule.

Some perfect flowers self fertilise. The anther may sweep past the stigma, as they do in the nasturtium, or the stigma may grow past the anthers, as in the tomato. Sometimes fertilisation takes place before the flower opens, as in the pea.

Plants that self-fertilise may make life easier for the seed saver, eg peas and tomatoes generally fertilise

before the flower opens, but can also be cross-pollinated in certain circumstances. Finally a flower may be self-incompatible; it is not capable of pollinating itself and must be cross-pollinated.

Cross-pollination generally requires something to transfer pollen from one flower's anthers to another flower's stigma, eg an animal or the wind.

Wind is the most difficult element to control as pollen is very fine and can be carried long distances. Animals such as bees are easier to manage. Often they can be kept away from flowers with a simple cage or bag. In other cases the seed saver may have to introduce substitutes for the natural pollinators.



## Preserving varietal purity

Over the years plant breeders, farmers and amateur gardeners have produced a vast number of different vegetable varieties. Anyone can preserve these and carry on growing them in the future.

Preservation needs to follow two simple rules:

- Remove undesirable individuals.
- Prevent cross-pollination.

## Roguing

To save your own seed you will need to save seed from open-pollinated varieties. These varieties are capable of producing seeds from this season's plants, which will produce seedlings that will be just like the parent. They are inherently variable, each plant being slightly different from every other plant. It may be useful to think of them as a 'group' rather than a clone. The amount of variation may be slight, as in the case of tomatoes, or quite noticeable, as in some of the Brassicas. This variability is one of the advantages of an open-pollinated variety because it can allow some degree of resistance to diseases, pests and stress. However, if the variability is too wide the variety loses its distinctive character.

To prevent this happening, when saving seed it is essential to rogue out (remove) those plants that are too far removed from the original average for the variety. This is not a difficult task; all that is required is some careful observation.

When sowing seeds always assume that, for various reasons, you will lose some of the plants, eg to pest and disease, roguing out, etc. In some crops there is a recommended minimum number of plants required to save for seed. So always take these factors into consideration when deciding how much seed to sow.

### Definitions

#### Rogue plant

One that shows an undesirable variation from a standard.

#### Roguing

Removal of diseased or abnormal specimens from a group of plants of the same variety.



Isolation method to keep different varieties from cross pollinating, here lettuce with 'hats' made from horticultural fleece.



Increased plant spacing to accommodate mature radish plants flowering. Other crops may need space two years running.



Carrot plants flowering in their second year. They are 'biennial', so flower and set seed over two seasons.

## Cross-pollination prevention

Keeping pollen from different varieties away from each other is important to keep the purity of the seed.

There are a number of methods you can follow to prevent cross-pollination.

<i>Grow one variety</i>	Even if you only grow one variety, many varieties' pollen can be transported between plants by wind and insects. If a neighbour is growing a vegetable that will cross you will need to bear this in mind. Growing varieties far enough apart can reduce the chance of cross-pollination.
<i>Isolate</i>	Each species has a different growing distance referred to as the isolation distance. This need not just be physical distance but also in time. Grow in different years or sow one variety early and the other later.
<i>Use barriers</i>	Use barriers to prevent wind carried pollen and insects reaching the flowers. Barriers need not cover the whole plant but just the flowers that you wish to save the soon-to-be seed from. Runner beans can have their flower trusses covered for instance.

## Using barriers – problems and solutions

Cages can cause a problem; as they restrict insects from transferring pollen, they also restrict insects from pollinating their flowers. There are a few ways around this.

- **Alternate Day Caging.** If you were growing two varieties of broad beans, for example, you could cage one the first day and then cage the other the next and repeat like this. This would allow pollinators to access both varieties but on different days.
- **Hand Pollination.** Very time consuming but effective as a barrier. However, be prepared for some flowers to abort if you don't do it too well. Use a fine brush to transfer pollen from one flower to another.
- **Introduce pollinators.** You could use captured bees, beehives, mason bees, or flies. The easiest by far are flies. They're not as effective as bees but easier to buy and manage. Bought from an angling shop as maggots (buy 'whites') you put them somewhere warm so as to turn into castors (form a chrysalis); then put into your cage ready for them to become flies. The whole process can take between two and three weeks and needs to be done several times. Again, think ahead; get them before the flowers open.

As soon as you put a barrier over a plant or its flowers you can get other problems. Physical barriers reduce the light and increase the heat, so be ready for a growth spurt from the plant or flowers aborting (dropping off) because they get too hot. Another problem is that the environment becomes ideal for fungal growth, ie wet and warm, and the proliferation of pests with no predator able to get inside (including you). The last real problem is, as mentioned before, making sure the pollinators are up and flying at the time the flowers are open (that includes you – hand pollinating).

Do not expect every flower to be pollinated. That doesn't happen outside and is why plants produce lots of flowers so as to ensure some do get pollinated. In the case of Brassicas, flies will pollinate around 40% of the flowers whereas bees will do much better.

## Materials and construction

There are numerous ways you could devise to make tents and bags. Materials can vary in cost from 99p a metre to £7 a metre. For the amateur grower the most available and cheapest would be close weaved net curtains. These can be used as bags or cages and supported with wire, reinforcing rods for concrete, willow, bamboo or anything else you can think of.

Another thing to think about is rain cover. If, as in the case of leeks, the seed heads are ripening later in the year, rain can inhibit ripening and promote fungal infection. Many people who grow flowers for shows use plastic conical covers to protect the blooms so this could be one potential method.



Plants coming into flower; from left to right: carrot, beetroot, lettuce.

## Planning for seed saving

Seed saving is something all gardeners can do, however, it does require some simple planning. You might just want to save some seed from your favourite vegetable for the next season, or you might like to help preserve a specific variety from a seed library or collection. Below are some of the factors you need to think about.

It is a good idea to mark plants that are to be saved for seed. This can be done simply and cheaply with ribbon. However, there is always the danger that the ribbon will not be noticed or someone will not know what it signifies. The safest way to avoid accidental picking is to have separate seed saving beds. This can aid in maintaining varietal purity and makes an excellent learning aid.

### *Annual/biennial*

One of the chief factors you will need to bear in mind when choosing to save seed is whether the plant is an annual; producing seed in the same year as planting, or a biennial; producing seed in the following year to planting.

### *Spacing*

Some vegetables will take up more room when they go to flower. That little lettuce you grew can stretch up to 1.2m high and 0.5m wide when it puts up flower stalks.

For biennials it isn't only the extra space when flowering but the fact that it will potentially sit in the space for two years, unless you lift it to store over-winter or grow in pots.

### *Pests and diseases*

You may come across some problems you wouldn't have encountered had you just grown for the produce. For instance, the Parsnip Moth is only seen in the second year when it feeds on the flowers. It is not seen in the first year when the parsnip is grown for its roots alone.

Leaving the plants longer in the ground means a pest build-up may be more likely so vigilance against this becoming a problem is needed.

### *Seed viability*

Just because you've got some seed doesn't mean it's viable. You will need to grow-out varieties regularly or check them by using germination tests to make sure you don't lose that cherished variety.



## 4 Cleaning and storing

---



Methods of harvesting and extraction vary for individual plants. For ‘wet’ plants, eg tomatoes, harvest as you would to eat. Squashes, cucumbers and courgettes need to be left to get as big as possible on the vine, then brought in for a while to finish ripening. For seeds that dry on the plant, eg beans, try to harvest on a dry day and if bad weather looms, pull up the entire plant and bring it inside to ripen. These two main methods of cleaning seed are described in more detail in this section.

### *Dry method*

This method is very simple, you simply let the pods or siliques (Brassica seed pods) dry as long as you can on the plant, or hang the whole plant/stem up to dry. Once the pods become leathery or ‘parchment-like’ you can open them or gently shatter them (being careful not to damage the seed inside) and lay the seeds out to dry further.

### *Wet method*

The wet method is also sometimes termed the fermentation method. It is used for fruits such as tomatoes and squashes. The main aim is to separate as much flesh or pulp from the seed as you can. In nature this ‘cleaning’ would be done as the plant rots or more likely by the stomach of the thing that ate the fruit.

You first of all need to extract the seeds from the fruit. In the case of tomatoes you can squeeze them out, put the fruit in a bag and use a rolling pin over them or use a knife, cut the fruit open and pick out the seeds. With squashes you can use a spoon or knife. Be inventive! Everyone will find a different way. You can also put the ripe fruits into a food processor with an equal quantity of water. Process until you have a pulpy mass. The seeds are hard and will not be damaged.

Next try and remove as much flesh as you can and pop the seeds into a container. Put the container into a warm place, where it will begin to ferment. The smell can be overpowering, but it is good for the seeds. Fermentation removes compounds that inhibit germination and it also destroys seed-borne diseases. You are merely duplicating what happens to a ripe tomato in nature.

Stir once or twice a day to promote even drying and prevent clumps of seeds forming. After three or four days, or just overnight for squashes, rinse and repeat until only good, clean seeds remain. Pour the seeds into a strainer and place them on a clean plate or piece of plastic (they will stick to paper). The seeds may germinate if not dried quickly, but do not use direct sunlight or an oven. A cool, gentle breeze is best.

### **Storage**

Within the seed are all the genetic instructions for a particular plant and all the reserves to get the seedling off to a good start. As they are nature’s way of preserving plants they can last a long time. However, they do deteriorate and by storing them in the best ways you can be rewarded with greater longevity.

The two factors that reduce the life of the seed are moisture and warmth. Moisture is probably the most important factor that needs to be controlled. A dry seed will last much longer at room temperature than a moist seed in the fridge. Cool and dry are the two ideals for most of the seed that we are concerned with. As a general rule, the storage life of a seed is doubled for every 5° drop in temperature and 1% drop in moisture content. There is a limit though, and freezing and ultra-drying can be harmful. The best for home growers is 5% moisture content and the temperature of a domestic freezer or fridge.



### **Drying**

Water can make up between 10 and 15% of the weight of fresh seed. Drying the seed to reduce some of this moisture content, prolongs the life of the seed. Heat, however, will destroy seeds and they should never be exposed to temperatures greater than 35°C (95°F).

Dry your seeds naturally, preferably not in full sunlight and not somewhere too hot. Unless you are planning to freeze your seeds and save for many, many years then this should be sufficient for short to medium term storage.



### **Storing the seeds**

To save seed until the following year it is sufficient after having dried them to keep them in an airtight container in a cool place. If you want to store them for longer periods a fridge or freezer will be fine. Use an airtight container; a Kilner jar is ideal. This is an ideal way for short/medium term storage and the seed will last for a good length of time depending on the crop.

### **Recovery**

When you remove your seeds from storage do two things.

- Allow the jar and its contents to come to room temperature before opening
- Allow the seeds to 'rest' for a few days at room temperature and ambient humidity before sowing.

Both these factors will allow the seeds to reabsorb moisture and not shock the seeds, giving them a better chance at germinating.



## 5 How to hold a seed swap

---



**Holding a seed swap is an opportunity for schools to make valuable links with the wider community and for pupils to have the experience of organising an event.**

**A seed swap encourages seed saving, helps provide ‘free’ seed in exchange for unwanted excess and can be great fun. All it takes to be successful is a little bit of planning and the presence of some enthusiastic swappers.**

### History of the seed swap

The first ‘Seedy Saturday’ was held in Van Dusen Gardens, Vancouver, Canada in 1989. It was the brainchild of Sharon Rempel, volunteer director of the Canadian Heritage Seed Program, now Seeds of Diversity. This charitable organisation is very similar to the Heritage Seed Library, in that it provides a base through which members can swap varieties and offers information to help them do so. Seedy Saturday is now so popular that it is billed as the ‘Miracle of Seeds’ event, held over two days in Victoria, British Columbia.

The idea spread across North America and eventually to the UK in the form of ‘Seedy Sunday’, Brighton [www.seedysunday.org](http://www.seedysunday.org). The first event was held in 2002 and has rapidly grown in popularity, inspiring seed swap events all over the UK.

### Reasons to hold a seed swap

Seed swaps are a great place to meet like-minded gardeners and growers and swap, not only seed, but also ideas, information and anecdotes. These events encourage biodiversity and sustainability. They help to prevent varieties from becoming extinct as they encourage the sharing of varieties that may no longer be available commercially. Swapping seeds on a local scale helps to preserve regionally important varieties and provides gardeners and growers with vegetables selected over many generations to suit their locality. Why buy new seed each year when your crops can provide all you need for next year, and be swapped for new varieties?

### Seeds

Most seed swaps are held in spring or autumn, when gardeners are deciding what to sow in the new year or harvesting their annual crop. For either a spring or autumn event it is sensible to get advertising material in place during the previous July or August, to remind any potential collectors to save their seed from open pollinated varieties.

Remind them to label their seed clearly. If the seed has been organically produced, by following the organic principles, ensure that this is stated on the seed packet (see the Organic Gardening Guidelines [www.gardenorganic.org.uk](http://www.gardenorganic.org.uk)).

It is always worth identifying the variety and where possible provide horticultural notes and background information. This will not only help new growers, but can also attract people to a particular variety because of its history.

When preparing seed for swapping it is important to make sure the seed is not discoloured or diseased. It is a good idea to make packets of seed for swapping rather than have open containers. Open containers can easily spill, it is difficult to keep track of the number of seed taken and seed can be accidentally mixed together. Small envelopes make ideal packets for holding seed. They are cheap to buy, easy to store, can be homemade and are easily labelled. Organise packets of seed by type of crop; this will make it easier for visitors to browse seed.

## Volunteers

It would be impossible for a school to grow all the seeds necessary for a big seed swap. Therefore it is worth recruiting volunteer seed collectors, eg parents and local allotment groups, who would be willing to grow crops for seed saving. Seed saving and horticultural forums, as well as social networking sites, are excellent places to look for seed collectors. Once you have recruited seed collectors make sure you keep in regular contact. This ensures that the correct seed is grown for and collected, and will show the seed collector that their work is appreciated. It also allows for contingency planning in case of outbreaks of diseases, pests or other factors that could affect seed supply.

As well as seed collectors other volunteers will be needed to help with other aspects of the seed swap, such as seed cleaning and packing, helping on the day, etc.

## Planning the day

<i>Venue</i>	A school is an ideal location as it is usually at the hub of a community. The event can be held indoors or outdoors. Make sure you have enough tables and chairs for the stallholders to use. The venue should be big enough to accommodate all the participants. Work out numbers attending the event. If the event is held indoors be aware that the number of people using a room is limited by fire regulations.
<i>Refreshments</i>	Decide what refreshments are to be provided, eg tea and coffee, snacks, sandwiches. The provision of any special dietary requirements should always be checked in advance with those preparing the refreshments. There should always be a vegetarian choice.
<i>Volunteers</i>	Potential volunteers could be the parent/teacher association, pupils, school catering staff, teaching staff, etc.
<i>Facilities</i>	Other things to consider are car parking arrangements, suitable access/facilities for the disabled, toilet facilities, etc.

For more in depth information on holding an event see the 'Community Engagement' booklet [www.gardenorganic.org.uk/growyourown/posters-resources.php](http://www.gardenorganic.org.uk/growyourown/posters-resources.php)

## Publicity

There are many methods available for advertising including the following.

Be sure to include all the vital information, eg type of event, venue, date, times, etc. For further information

- Advert in local newspaper
- Posters
- Local radio
- Local organisation newsletters
- Letter to parents/guardians
- Word of mouth
- School newsletter/website

on planning advertising see the Food for Life Partnership Food Growing Manual Silver and Gold booklet pages 103-104 [www.gardenorganic.org.uk/growyourown/activities.php](http://www.gardenorganic.org.uk/growyourown/activities.php)



## 6 Links to the National Curriculum



The introduction of the National Curriculum in 1999 detailed the study of plants as part of the new science programme of study.

As a result of this and other changes such as the Every Child Matters initiative, teachers have seen that many of the criteria can be met through the use of growing activities and the school garden has become valued as an outdoor learning environment.

For the primary age range the 'nature table' with its spring sticky buds or autumn conkers and sycamore seeds was replaced with a detailed study of the life cycle of living organisms. Growing seeds in the classroom proved to be a good experimental approach to understanding this process.

The science curriculum was very specific in what should be taught. The science guidelines stated that the following was to be studied.

- Life processes in animals and plants.
- Similarities and differences in living things.
- Causes and variations in animals and plants.
- Ways in which animals and plants are suited to the environment in which they live.
- Ways in which animals and plants depend on each other.

In the infant phase this was interpreted as watching seeds germinate, ie mustard and cress seeds grown on kitchen roll, bean seeds in jam jars supported by blotting paper.

The junior school could be more ambitious, dissecting daffodil flowers to identify the component parts, growing quick germinating seeds in a variety of situations – fridge, windowsill, dark cupboard, etc and monitoring their progress.



*Established school garden*

Some schools already had gardens for the children to grow vegetables or flowers but in the early years of the national curriculum many fell into disuse because there simply wasn't enough time to spend in them except as a lunch time club or after school activity. Also the emphasis seemed to be more theoretical, and the sheer quantity of topics covered put huge pressure on the timetable.

For the early years in secondary school, experiments became more focused to meet the requirements.

- Life processes are supported by the organisation of cells into tissues, organs and body systems.
- All living things show variation, can be classified and are interdependent, interacting with each other and their environment.

Again the emphasis was on using the recommended text books, with the occasional practical experiment, often replicating those of the primary school but with the advantage of more precise methods of measuring change and differences. The emphasis changed to students conducting their own investigations to develop their scientific skills. The new Key Stage 3 curriculum guidelines are more specific. Students must be given the opportunity to cover the following.

- Research, experiment, discuss and develop arguments.
- Pursue an independent enquiry into an aspect of science of personal interest.
- Use real-life examples as a basis for finding out about science.
- Study science in local, national and global contexts, and appreciate the connections between these.
- Experience science outside the school environment, including in the workplace, where possible.
- Use creativity and innovation in science, and appreciate their importance in enterprise.
- Recognise the importance of sustainability in scientific and technological developments.
- Explore contemporary and historical scientific developments and how they have been communicated.
- Prepare to specialise in a range of science subjects at Key Stage 4 and consider career opportunities both within science and in other areas that are provided by science qualifications.

However, technology has changed the way in which the curriculum can be delivered. The growth of the use of the Internet in all schools has had a huge impact. Children can watch video clips of seeds germinating, watch farmers growing their food, see how seeds are dispersed through slow motion film photography or even 'google' the effects of climate change on crops. The introduction of the interactive white board has made science study far more visual and has the potential to really inspire young scientists using programmes like Primary Resources, BBC Schools or on line reference banks like 'Expresso'.



*Making a ladybird house.*



*Harvesting fresh produce.*



*Building a raised bed.*



*Sixth form pupils' business enterprise scheme.*

But one of the biggest changes has been the development of the creative curriculum, especially in response to 'Every Child Matters', the key educational strategy of recent years. Schools must show that they have responded to the five 'strands' of the report, encouraging children to:

- be healthy
- stay safe
- enjoy and achieve
- make a positive contribution
- achieve economic well-being.

As a result the school garden has made a spectacular comeback. Schools have realised that growing flowers and vegetables, and maybe selling them to parents or taking them to the local care home has allowed children to be more aware of healthy eating, how their food is produced, how different groups contribute to make a cohesive society and because it is fun!

Schools have been encouraged by national schemes run by supermarkets, national newspapers, wildlife charities and the BBC where grants have been available to establish gardens. Schools have also realised that saving and storing seeds is also a key component of being an efficient gardener. Encouraging children to harvest seeds and perhaps swap them within their friendship group is just beginning to become the next step in widening student interest and skills.

Schools are now developing more creative curriculums, more suited to the individual needs and interests of their students. Building gardens in schools is now a key development strategy for most schools, whatever their age ranges. A visit to any prestigious flower show such as Chelsea or Hampton Court, or more especially, local village or country fairs, now includes sections for schools to enter, which are seeing a huge rise in entries.

Saving and swapping seeds is the next logical progression and with access to the relevant advice, support and resources schools will feel more confident in teaching and inspiring pupils in sustainable growing.



# 7 Seed saving at Atwood Primary



Seed saving is an exciting and money saving way to complete the growing cycle. It lets you preserve your favourite fruit or vegetable varieties to grow again next year or swap with other schools or gardening groups. This case study describes one school's journey to successful seed saving.

## Atwood Primary School, Croydon, South London

Atwood is a Food for Life Partnership Flagship school, with approximately 500 pupils including the Nursery. All classes are organised as mixed ability groups of boys and girls, and normally with a maximum of 30 pupils in a class.

It received 'Outstanding' from Ofsted in December 2008. This report stated that they had the capacity and desire to take on new initiatives. The garden was originally developed by Year 6 students in order to grow a variety of organic produce. The aim was for all the children in the school and the school community to understand more about healthy, fresh, local and organic food. The children learned basic woodworking skills from the Deputy Head, Rob Veale, who has led the Growing Skills Programme. They built their own raised beds and with appropriate support constructed a garden shed. They even helped with erection of the school polytunnel. They have their own chickens and have been one of the first schools to not only train a number of children as compost monitors, but also introduced the subject of composting into the curriculum and into the school's daily routine. They have fully integrated a progression of organic food growing skills and knowledge into the whole school curriculum. When the children eventually leave Atwood, they will have learned the essential skills required to successfully grow organic vegetables, fruit and herbs. These skills include planning what to grow, soil care, seed sowing, transplanting, growing on, harvesting and correctly saving seed for the next growing season.

With support from teaching staff and parent governor Sue Skinner, seed saving has been undertaken by pupils across the school, including members of the Gardening Steering Group and Gardening Club. A large amount of seed has been saved from different varieties, as outlined in the table at the end of this case study.

### *The process*

The children carried out the following procedure to save seed. The pods/flower heads were allowed to become well matured on the plant. These were then picked and put into separate pots or trays and labelled. They were allowed to dry out, either in the school polytunnel, on a windowsill or in the porch.

Once seed was extracted, it was allowed to dry out further in pots on a windowsill and then counted into labelled paper envelopes. All seed was stored in a metal biscuit tin in the school shed, where it was cool and dry.

The school found the procedure easy but it was time consuming and it could be fiddly. Therefore, the pupils had not managed to collect all seed this year, as it would have taken a lot of classroom time and/or adult support.

### *Challenges*

It became apparent that some seed required slightly different saving procedures. Some dried better on

kitchen roll paper than in pots because they remained separate during the drying process.

For the second year, tomato seed spent the winter stuck to kitchen roll paper, as this had been found to work in the previous year. When planting in the spring the kitchen roll paper is roughly divided up and planted out with the seed attached.

The bean seed found the porch too cold and damp (they started to go mouldy) and the kitchen too warm and humid. They were relocated to a more suitable site where once removed from their pods they dried properly.

### **Growing from saved seed**

As it was the first time the school had tried growing plants from its own saved seed, everything was very experimental. Newly purchased seed of the same plant type was sown in order to compare the success rate. They did not want to rely on the growth of plants from the saved seed in case they ended up with nothing, which would have been a big disappointment to the Year 2 children involved in the exercise. The plants that were grown from bought seed were in many cases given priority over the 'saved seed' plants.

It was observed that the plants grown from saved seed were identical to the parent plants and were able to generate fruit successfully. In the case of the sweet peas and broad beans, when it came to potting up, the plants grown from saved seed were seen to be far healthier (stronger and with more foliage) than the plants grown from newly purchased seed.

The dill did not grow too well but it was felt that this was more to do with the care of the seed once they were planted than the saving and storage process.

The school is investigating the idea of selling plants grown from saved seed to parents who wish to have a go at growing these at home with their children. This would raise funds for the school to spend on future gardening projects, providing them with a sustainable garden.

### **Linking to the curriculum**

At the time of writing the school had completed only one full year's cycle of seed saving, so everything for the staff and children involved was experimental.

The whole process was undertaken by a series of class based activities along with children choosing to garden in their own time ('golden time', break and lunch times) and Gardening Club.

In September 2009, the two classes involved examined the plants they had grown in Year 1 and the seed that was available to be saved. They had a class discussion about this and what was likely to happen next.

In February 2010, two classroom activity afternoons were run where the seed involved in the experiments, plus the seed they wanted to grow for other purposes, were all sown.



**“After planting our seed early in February they were found by a family of mice.”**

“So sadly, many of our saved sweet pea seeds became a mouse’s dinner. Fortunately they left the four broad bean seed alone.”

Parent Governor, Sue Skinner



**“We now know our tomatoes would have done very well, but they were the last things on the list for potting up and didn’t get planted out until mid-July (we still got a crop from them!).”**

“Runner beans and butter beans were also last minute plantings, and were planted out mid-July. So the 110 butter bean seeds saved from these plants this year were a particular triumph.

All things considered, we were so delighted with the high success rate of plant development when we grew 2009 seeds in 2010, that in 2011 the plan is to make the seeds saved in 2010 our main planting stock across all years in the school.”

Deputy Head, Rob Veale

In April, the children attended an outdoor session to see how all the plants they were growing were doing and to find out what was going to happen next.

Also in April, the children worked in small groups to pot up their plants.

In May-June, children worked in small groups to plant out their plants and observe the progress of the experimental plants.

From June onwards, children came along informally during the 'golden time' and often at lunchtime to water, pick, weed and observe.

In September, the keenest gardeners came along at break time and lunchtime to water, harvest, collect seed and observe.

The Year 2 topic in the summer term was 'Global Garden' so the growing activities they did could be related to other classroom work they were doing. They also went on a school visit to Wakehurst Place and brought back some sunflower seed. This was sown in the school garden and from which seed was saved for planting the following year.

The following table shows the variety and number of seed the pupils had saved.

**2009 seeds, saved by Year 2 at the start of their school year from plants they had grown in their Year 1 'golden time'.**

Variety	Approximate number of seed saved
Broad beans	4
Butter beans	16
Dill	200
Mixed lettuce and Rocket	100s
Radish	20
Runner beans	5
Sweet Peas	54
Tomatoes	20

**2010 seeds, saved mainly by Year 2 at the end of their school year to be grown by the whole school in 2011**

Variety	Approximate number of seed saved
Broad beans	Some are second generation
Butter beans	110 (all second generation)
Calendula	A few
Cornflower	Lots – too small to count
Courgette	12
Dill	A few
Mange tout	145
Marigolds	Lots – too small to count
Pansy	Lots – too small to count
Peas	480
Runner beans	82 (some are second generation, but no differentiation now possible)
Sunflowers – different varieties	Thousands, but only keeping 50-70 of each variety
Sweet peas	1,300 (84 are second generation, ie saved from 2009 saved seed)
Tomatoes	160
Violas	Lots – too small to count

**2010 seeds, saved mainly by the Gardening Club and Steering Group at the end of their school year to be grown by the whole school in 2011**

Variety	Approximate number of seed saved
Broad beans	30
Runner beans	30
Sunflowers – different varieties	50
Tomatoes	100

## 8 Seed saving in schools – Activities SSI-10



This section includes some practical, educational and fun activities to help you get started saving seed. These include topics suitable for in and outdoor sessions. Activities 6-10 give seed saving instructions for major crops, building on information provided in sections 2-4 of this booklet.

<b>SSI</b>	<b>Up or down</b>	<b>Page 22</b>
<b>SS2</b>	<b>Design a seed</b>	<b>Page 23</b>
<b>SS3</b>	<b>Autumn seed walk</b>	<b>Page 25</b>
<b>SS4</b>	<b>Make your own seed packet</b>	<b>Page 26</b>
<b>SS5</b>	<b>Fast seed saving practice</b>	<b>Page 27</b>
<b>SS6</b>	<b>Pea and bean seed saving</b>	<b>Page 29</b>
<b>SS7</b>	<b>Tomato seed saving</b>	<b>Page 35</b>
<b>SS8</b>	<b>Cucurbits seed saving</b>	<b>Page 37</b>
<b>SS9</b>	<b>Onion and leek seed saving</b>	<b>Page 40</b>
<b>SSI0</b>	<b>Beetroot and chard seed saving</b>	<b>Page 42</b>



# SSI Up or down



**Up or down - does a seed know which way to grow? Sow some bean seeds in glasses and leave some but turn the others by varying degrees. Do they grow up, down or sideways? Have you confused them?**

**This activity looks at seed germination and the effect of light on plant growth.**

## Resources

- Seeds, eg supermarket dried mixed beans
- Straight sided glasses
- Kitchen paper

## Activity

- 1 Place a selection of dried bean seeds in a glass.
- 2 Fill the glass with water and soak them overnight.
- 3 Prepare three other glasses by filling the glass with damp kitchen paper (leave room for the seeds).
- 4 When the bean seeds have finished soaking, carefully place a selection of bean seeds around the edge of each glass.
- 5 Keep one glass upright, turn another glass upside down and the third glass on its side.
- 6 After about two days the seeds will begin to sprout.
- 7 Remember to keep the paper moist in each glass.
- 8 Observe the growth of the beans and see which direction the shoots and the roots are growing.

## Extended activities

- 1 Place one bean in the bottom of a glass with kitchen towel on the top. Place the glass on its side, and rotate the glass a little every day. Observe the direction of the growth.
- 2 Place a cover over the beans and remove for one hour every day. What effect does this have on the growth? (How does light affect growth?)

Top tip



### Soaking seeds

Make sure you cover the seeds when you soak them and make sure you keep the kitchen paper moist.

## Health & safety

Make sure the glass won't roll, when on its side, and take care when working with glass. Recycled squash bottles can be used instead if trimmed carefully.



## SS2 Design a seed

---



Have you ever wondered why a seed looks the way that it does? Seeds come in all sorts of shapes and sizes, round, flat, smooth, rough, some even have bits which help them to fly or stick to passing animals. This activity looks at seeds and different methods of seed dispersal.

If you were going to design a seed the way that nature has, what advantages could you give it to increase its chances of survival?

### Resources

- A variety of packets of seed
- Fresh fruit and vegetables
- Magnifying glasses
- Knives
- Chopping boards
- Paper and pencils
- Paper bags
- Waste materials

Top tip



#### Save seed

Keep some of the seed you have collected. You can create some germination experiments to see how well they grow.

### Activity

- 1 Plan an expedition around your school grounds or local park to look for wild seeds from plants and trees or have a collection of dried seeds available.
- 2 Take these back to the classroom to discuss how these seeds might disperse, eg by wind, animals.
- 3 Compare these seeds with some of the seeds found in your fruit and vegetables, or from the seed packets.
- 4 Consider how you think fruit and vegetable seeds might disperse themselves.
- 5 After finding out how seeds might disperse naturally, working together in small groups think of some other ways seeds may disperse themselves.
- 6 Draw ideas on paper or get the pupils to make their seeds out of waste materials.
- 7 Look at each other's designs and decide which ones would survive best and why.



## Extended activities

- 1 Get students to discuss what conditions their seeds need to survive the winter and how they achieve this.
- 2 Students could develop an art project using seeds, patterns and natural plant cycles.
- 3 Write a story about the life of a seed and all the adventures which happen to it.
- 4 Look at patterns, eg the seeds in a Sunflower head are in a repeating spiral know as Phyllotaxis. Look at other patterns in the plants and seeds you have collected. This could then extend into mathematical principles and patterns.

### Health & safety

Be aware of the plants you are collecting seed from. Some of them may have poisonous berries, make sure nobody eats any of the collected seeds.  
Safe use of knives; ensure adult supervision.



## SS3 Autumn seed walk



Walk around the wood during the autumn as this is when most plants set seed. Seeds transport themselves around the forest in different ways. One way is by clinging onto the fur of animals. This activity mimics the animal movement throughout the forest.

### Resources

- Fun fur strips with Velcro or ties, or strips of Velcro
- A local wood or forest
- Newspaper sheets

### Activity

- 1 Fix the strips of fun fur to the ankles.
- 2 Walk around the wood during the autumn as this is when most plants set seed.
- 3 Behave as naturally as possible, so wander around, have some fun and try not to stick to the paths.
- 4 When you return to base, take the fur off and place on the newspaper sheets, and remove all the seeds that you have collected.
- 5 Observe the different shapes and sizes of seeds collected and their methods of sticking to fur. Do you know which plants they are from?

### Extended activities

- 1 Check everyone's hair and clothing for other seeds that have attached themselves and discuss the different ways that the seeds have been transported.
- 2 Look under a magnifying glass and make drawings of the different seed shapes.
- 3 Are there any other things that you have picked up other than seeds?
- 4 What type of animals have you observed today?

### Health & safety

Make sure everyone wears appropriate footwear in the wood. Some seeds are spiky or poisonous so take care when taking the seeds off the fur and do not eat any seeds or berries whilst in the wood. Take care on uneven ground.

### Top tip



### Poisonous berries

Some seeds and berries are poisonous so make sure not to eat any that you find on your seed walk.

# SS4 Make your own seed packet



Most seeds are kept in paper packets so that the seeds can breathe. Write the information on vegetable type, variety and the date it was saved. You can make your own seed packets so that you can add the information on the seeds you have saved. You could then swap them with friends and family.

## Resources

- Paper
- Glue or sellotape
- Seed packet template
- Scissors
- Pen or pencil

## Activity

- 1 Trace around your template, or print out one from the Internet.
- 2 Cut around the template outline.
- 3 Stick it together.
- 4 Write the information about the seeds on the packet. This should include:
  - Seed type (eg tomato)
  - Variety (eg Tigerella)
  - Date collected (eg September 2010)
- 5 Put the seeds into the packet, and seal carefully.

## Extended activities

- 1 You can design your packets with pictures or any other decorations.
- 2 You can put small amounts of seed in each packet, and swap with each other.
- 3 Develop your own seed swapping circle.
- 4 Research, and add growing instructions to your seed packets.

### Health & safety

Younger children need to be under supervision when using scissors.

### Top tip



### Templates

There are lots of templates available, you can look on the Internet, make one up or take an envelope apart and use it as your own template.



# SS5 Fast seed saving practice



Some seeds will grow and go to seed really quickly and some take up to two years. Two crops that will go to seed in about a term are rocket and mustard. You can use these to practise seed saving techniques.

## Resources

- Mustard and rocket seed
- Peat-free compost
- Pots
- Tray or saucers
- Newspaper
- Paper bags
- Pillowcase (optional)
- 2 x containers to winnow
- Tarpaulin or old sheet

## Activity

- 1 Fill the pots almost to the top with compost and firm down.
- 2 Sow a good pinch of seed on top, cover with 0.5cm of compost and water well.
- 3 Keep the soil moist and the seedlings should soon germinate and grow.
- 4 Let the leaves grow fully, and they will put out flowers, and these will eventually produce seed pods.
- 5 Let the pods develop and go brown.
- 6 Once the pods are turning brown, place the pot onto a large sheet of newspaper to catch any stray seeds.
- 7 As the pods develop and turn brown and crispy, break off the pods and put into paper bags.
- 8 Once all the pods are collected, either break the seed out of the pods by hand, or put into a pillowcase and stomp on the pillowcase to crush the pods.

### Top tip



### Fast growing seed

As rocket and mustard are fast growing, you can use the saved seed for growing as soon as the seed has dried.



Rocket

## Extended activities

- 1 To winnow the seed away from the pod debris, pour the seed from one container into another in a light breeze. The breeze will blow away the lighter pods and the heavier seed will drop into the container. Do this over a sheet or tarpaulin to capture any stray seed, until the seed is completely clean.
- 2 Put your seed into your own seed packets and label them with the type and the date you harvested the seed (see Activity SS4).
- 3 Try a germination test by putting some of the seed onto damp kitchen roll, roll this up and keep in a plastic bag/container and check every day to see if the seed has germinated

### Health & safety

If there is a lot of dust when breaking the seed pods or winnowing, make sure you wear a face mask.

### Further information

This is just one way of saving seed, to do it with other crops see the Heritage Seed Library Seed Saving Guidelines [www.gardenorganic.org.uk/members/seed\\_saving](http://www.gardenorganic.org.uk/members/seed_saving) and Activities SS6 through to SS10.

Winnowing: This is an ancient agricultural method of separating the grain from chaff.



## SS6a Pea seed saving



Peas, *Pisum sativum*, are from the Leguminosae family, and are annuals, which means that they produce seed the same year as they are planted.

There are three groups of peas. Smooth-seeded peas are starchier and hardier than wrinkled-seeded peas; edible-podded peas are more commonly known as sugar peas or mange tout. Most peas today are eaten fresh, but some are grown for drying.

Pea flowers are perfect and self-pollinating. The flowers open early in the morning and do not shut. The anthers shed pollen the night before the flower opens, but this does not reach the stigma until the flower is tripped, usually by the wind.

### Resources

- At least ten pea plants
- Somewhere to grow your plants
- Somewhere to keep the peas until they dry out completely
- For large amounts, a pillowcase, tarpaulin and trays to winnow your peas
- Tray to collect your seeds
- Label for the tray whilst drying
- Seed envelopes or packets

### Activity

- 1 Grow your peas as you would for an edible crop. However, you should make sure the growing season is as long as possible to allow the pods to mature and dry.
- 2 Save seeds from the plants that show normal growth and leaf patterns, some plants may show noticeably different foliage or pods; don't save from these plants. If the plants are close together, draw a cross on them with felt pens to show that you are not going to use these pods.
- 3 Once the pods dry out on the plant, take them off and leave inside on a tray to dry out completely.
- 4 If the weather looks as if it is going to turn, eg a frost or a long period of rain close to the end of the season, lift the whole plants and leave them somewhere warm and dry to continue to dry off.

#### Top tip



#### Pea moth

If your plants are prone to pea moth, cover the plants in fleece or mesh in early July to prevent the moths from being able to burrow into the pods.



- 5 Once all the pods are dried, either break the seed out of the pods by hand, or put into a pillowcase and crush the pillowcase to break the pods.
- 6 Collect the dry seeds and store in a labelled envelope.
- 7 Seed should last in a cool dry place for at least three years.

## Extended activities

- 1 To winnow the seed away from the pod debris, pour the seed from one container into another in a light breeze. The breeze will blow away the lighter pods and the heavier seed will drop into the container. Do this over a sheet or tarpaulin to capture any stray seed, until the seed is completely clean.
- 2 Put your seed into your own seed packets and label them with the type and the date you harvested the seed (see Activity SS4).
- 3 Roguing. The characteristics of seeds – size, shape and colour – should be more or less uniform and the same from generation to generation. There will be no visible signs of crossing until the second generation, so go back to the seeds saved from two harvests previously for seed that should be pure.

### Health & safety

If there is a lot of dust when breaking the seed pods or winnowing, make sure you wear a face mask.

### Further information

Winnowing: This is an ancient agricultural method of separating the grain from chaff.



## SS6b French bean seed saving



French beans, *Phaseolus vulgaris*, are from the Leguminosae family, and are annuals, which means that they produce seed the same year as they are planted. French beans are either dwarf or climbing (bush or pole in the United States), but many dwarf varieties put out a few long, climbing shoots.

Different varieties have been selected to be eaten at different stages; immature pods of snap or green beans, fresh swollen seeds (often called haricots) removed from their pods, and dried mature beans. Some are stringy, others stringless. The colour of the pods varies from yellow through to green and purple, and some are beautifully marked. The bean seeds themselves come in a bewildering array of shapes, sizes, colours and patterns.

The flowers are perfect, self-compatible and predominantly self-pollinating.

### Resources

- At least 20 bean plants of the same type
- Somewhere to grow your plants
- Somewhere to keep the beans until they dry out completely
- For large amounts, a pillowcase, tarpaulin and trays to winnow your beans
- Tray to collect your seeds
- Label for the tray whilst drying
- Seed envelopes or packets

#### Top tip



#### Bean weevil

Some beans can be attacked by these bugs. Hand podding allows a visual inspection (discard affected seeds) or freeze the beans for 7-10 days to kill off any beetles if unsure.

### Activity

- 1 Grow your beans as you would for an edible crop. However, you should make sure the growing season is as long as possible to allow the pods to mature and dry.
- 2 As French beans rarely cross-pollinate, it is not usually a problem, however to ensure no cross-pollination, either isolate the beans by several metres or just grow one variety.
- 3 Save seeds from the plants that show normal growth and leaf patterns, some plants may show noticeably different foliage or pods; don't save from these plants. If the plants are close together, draw a cross on them with felt pens to show that you are not going to use these pods.



Dwarf French bean pods

- 4 Once the pods dry out on the plant, take them off and leave inside on a tray to dry out completely.
- 5 If the weather looks as if it is going to turn, eg a frost or a long period of rain close to the end of the season, lift the whole plants and leave them somewhere warm and dry to continue to dry off.
- 6 Once all the pods are dried, either break the seed out of the pods by hand, or put into a pillowcase and crush the pillowcase to break the pods.
- 7 Collect the dry seeds and store in a labelled envelope.
- 8 Seed should last in a cool dry place for at least three years.

## Extended activities

- 1 To winnow the seed away from the pod debris, pour the seed from one container into another in a light breeze. The breeze will blow away the lighter pods and the heavier seed will drop into the container. Do this over a sheet or tarpaulin to capture any stray seed, until the seed is completely clean.
- 2 Put your seed into your own seed packets and label them with the type and the date you harvested the seed (see Activity SS4).
- 3 Roguing. The characteristics of seeds – size, shape and colour – should be more or less uniform and the same from generation to generation. There will be no visible signs of crossing until the second generation, so go back to the seeds saved from two harvests previously for seed that should be pure.

### Health & safety

If there is a lot of dust when breaking the seed pods or winnowing, make sure you wear a face mask.

### Further information

Winnowing: This is an ancient agricultural method of separating the grain from chaff.



## SS6c Runner bean seed saving



Runner beans, *Phaseolus coccineus*, are from the Leguminosae family, and are annuals, which means that they produce seed the same year as they are planted. Most runner beans are tall, climbing plants, but there are dwarf varieties and some, called half runners, that are bushy with one or two long shoots. They need a long growing season to get dry pods.

The flowers are perfect and self-pollinating, but have to be tripped (eg by bees) to set seed.

- Black runners have intense red flowers and black seeds.
- Scarlet runners have red flowers and purple or mauve seeds with black blotches.
- White runners have white flowers and white seed.

### Resources

- At least 20 bean plants of the same type, preferably 30
- Somewhere to grow your plants
- Somewhere to keep the beans until they dry out completely
- For large amounts, a pillowcase, tarpaulin and trays to winnow your beans
- Tray to collect your seeds
- Label for the tray whilst drying
- Seed envelopes or packets

#### Top tip



#### Pinch out

Pinching out is cutting off any growth above the top of the canes and those pods that form too late for seed saving. This should help the plant put its energy into seed saving.

### Activity

- 1 Grow your beans as you would for an edible crop. However, you should make sure the growing season is as long as possible to allow the pods to mature and dry.
- 2 Runner beans are pollinated by bees. They will cross with other runner beans quite readily though they cannot cross with other types of beans. We recommend a minimum isolation distance of 800m between runner bean varieties to be certain of maintaining varietal purity. If other runner beans are being grown within 800m of your plot, or if you wish to save seed from two or more types of runner bean on your own plot, isolate varieties either with a fleece bag around each truss or with a large insect proof cage around several plants. It may be easier to cage a tepee rather than a row. Alternate day caging is another useful method.
- 3 If insects are completely excluded from the flowers you must hand pollinate each newly opened flower with a thin paintbrush. Do this each day, simply pressing down on the lower left keel of each newly

opened blossom to mimic a bee landing. Then use the paintbrush to transfer the pollen from anther to stigma. You should use pollen from another plant of the same variety rather than from the same flower or plant. If you are growing more than one variety, remember to wash and dry the paintbrush between varieties or use a different brush for each variety.

- 4 Save seeds from the plants that show normal growth and leaf patterns, some plants may show noticeably different foliage or pods; don't save from these plants. If the plants are close together, remove any plants where the flower colour is not true to type or the plants will cross fertilise.
- 5 Once the pods dry out on the plant, take them off and leave inside on a tray to dry out completely.
- 6 If the weather looks as if it is going to turn, eg a frost or a long period of rain close to the end of the season, lift the whole plants and leave them somewhere warm and dry to continue to dry off.
- 7 Once all the pods are dried, either break the seed out of the pods by hand, or put into a pillowcase and crush the pillowcase to break the pods. Reject any that have atypical markings.
- 8 Collect the dry seeds and store in a labelled envelope.
- 9 Seed should last in a cool dry place for at least three years.

## Extended activities

- 1 To winnow the seed away from the pod debris, pour the seed from one container into another in a light breeze. The breeze will blow away the lighter pods and the heavier seed will drop into the container. Do this over a sheet or tarpaulin to capture any stray seed, until the seed is completely clean.
- 2 Put your seed into your own seed packets and label them with the type and the date you harvested the seed (see Activity SS4).
- 3 The characteristics of the seed – size, shape, colour and markings – should be more or less uniform and the same generation to generation. A change indicates that crossing has taken place, but the lack of any visible sign of variation is no proof of purity because the seed colour and markings are inherited from the mother. Crossed seed will usually reveal itself in the next generation as a visible increase in the variability of the plants. Always keep the seed from different years separate. If you discover evidence of crossing discard the harvest from that year and the year before. Seed from two generations ago should be pure.
- 4 Runner beans are very tender and may be killed by early frosts before seeds are mature. Fortunately they are also perennial, forming a (poisonous) underground tuber. These tubers flower sooner than plants grown from seed, so if your growing season is short dig up the tubers and store them over winter, planting them out once the danger of frost has passed.
- 5 Overwintering roots can also be a useful tool for maintaining varieties. The roots will give plants that are true to type even if there have been off-types, or plants of different varieties flowering nearby the preceding year. You can therefore select the typical best plants one year, and save the roots to grow on for seed in isolated conditions the following year.

### Health & safety

If there is a lot of dust when breaking the seed pods or winnowing, make sure you wear a face mask.

### Further information

Winnowing: This is an ancient agricultural method of separating the grain from chaff.



# SS7 Tomato seed saving



Tomatoes, *Lycopersicon esculentum*, are from the Solanaceae family. In the UK they are treated as annuals which means that they produce seed in the same year that they are planted. Tomatoes are generally divided into bush or cordon types. Bush tomatoes, as the name implies, have several branches, each of which terminates with a flower truss. Cordons generally have a single major shoot, from which trusses (and side shoots) grow in the axil between leaf and stalk. The main shoot may form a very long vine.

Both these classifications (like the distinction between greenhouse and outdoor) are somewhat arbitrary. Tomatoes are easy to save seed from and, with a few exceptions, easy to keep true to type as they self-pollinate.

## Resources

- At least two or three, preferably six tomato plants
- Mesh cage or bags
- Method A – kitchen towel
- Method B – jam jar, water, plate
- Seed envelope
- Labels

### Top tip



### Isolation

Currant tomatoes, potato leaved and 'double blossoms' on beefsteaks will need isolation or you may risk cross-pollination.

## Activity

- 1 Grow plants as you would to produce tomatoes for eating.
- 2 If the plants need isolating, grow them in a flower cage, use mesh bags or restrict to one of these types each year.
- 3 Allow the tomatoes to ripen for as long as possible on the plants or bring them indoors to finish off ripening.
- 4 Method A – for a small amount of seed. Remove seeds from the fruit and rinse in a sieve under cold running water, rubbing them against the sieve to remove the gel. Spread on paper towel or kitchen paper, label, and leave to dry. In spring you can plant the paper towel with the seeds attached into moist compost in a seed tray to germinate.
- 5 Method B - Fermentation method. Place seeds from ripe tomatoes into a suitable container (eg large yoghurt pot). You can process ripe fruits in a food processor with an equal quantity of water until you have a pulpy mass (we recommend that you remove the skins before doing this). The seeds are hard and will not be damaged. Put the container into a warm place to ferment. It may smell bad but it is good for



*Method A: rinse seeds in a sieve under cold water*

*Method B: seeds fermenting in glass jar*

*Tomato seeds after fermentation*

the seeds. Fermentation removes compounds that inhibit germination and destroys seed-borne diseases. It duplicates what happens in nature. After three or four days, when it is covered by a mass of mould, add plenty of water and stir vigorously. Good seeds will settle to the bottom so you can tip the rotting mass off. Rinse and repeat until only good, clean seeds remain. Strain the water off the seeds then place them on a clean plate or piece of glass (they will stick to paper). Stir once or twice a day to promote even drying and prevent clumps of seeds forming. Dry quickly, but avoid either direct sunlight or artificial heat. A cool, gentle breeze is best.

- 6** Collect the dry seeds and store in a labelled envelope.
- 7** Seeds will store in a cool dry place for about six years.



## SS8 Cucurbit seed saving



Cucurbits are from the *Cucurbitaceae* family, and are annuals, which means that they produce seed the same year as they are planted.

**Squash** – *Cucurbita maxima, mixta, moschata* and *pepo*

**Cucumber** – *Cucumis sativus*

**Melon** – *Cucumis melo*

**Watermelon** – *Citrullus vulgaris*

The cucurbits all have fleshy fruits surrounding large seeds. Cucumbers and melons are easily recognisable, but there can be some confusion over squashes. Pumpkins, marrows and squashes are all members of the same genus *Cucurbita*; for convenience, we refer to them all here as squashes. Summer squashes (including courgettes) are often intended to be eaten immature and do not store well even when mature. Winter squashes (including pumpkins) are eaten after they have formed a hard skin and can be stored for long periods.

Provided you have a long enough growing season squashes are easy to grow and harvest seed from. Pollination is generally by bees and some other insects. Great care is needed to keep varieties pure.

### Resources

- At least one plant of each type
- Masking tape
- Canes
- Squash: colander, sieve, flat tray, fan
- Melon or cucumber: bowl, water
- Plate or tray
- Label for the tray whilst drying
- Seed envelopes or packets

### Activity

- 1 The plants can be grown as you would for a crop grown to eat.
- 2 Allow as long a season as possible so the fruits can develop to maturity. Squashes grown for eating are normally picked when still immature. Protection from spring and autumn frosts with fleece or cloches will help lengthen the growing season.
- 3 Rogue out plants whose foliage is very different from the rest. Remove plants that look unhealthy. Crumpled and/or yellow mottling on leaves may indicate cucumber mosaic virus, which can be seed borne.
- 4 For successful hand-pollination, select at dusk a female and male flower that are both about to open. It is

best if the flowers are from different plants but they must be of the same variety. Flowers that are about to open may be very slightly split — they are still quite green and show a lot of orange colouration around the tip of the unopened petals. If the flowers are completely orange and slightly curly, they are past the viable stage. With a piece of masking tape, seal the flowers to prevent them opening and mark them with a cane so you can easily find them again.

- 5 Next morning, remove the male flower with its stalk and carefully take off the petals to reveal the pollen-bearing stamen in the middle. Take this to the female flower and carefully remove the tape from the petals (but only when you have the male flower ready for immediate pollination). Bees and flies find squash flowers irresistible and can invade a flower as soon as it is opened, sometimes right in front of your nose!
- 6 Brush the pollen onto the style of the female flower and reseal the petals immediately with tape to prevent further entry by insects. Mark the pollinated flower with a piece of coloured tape or wool loosely around the stem so you know which ones should be saved. One male flower can be used to pollinate several females if there is a shortage of male flowers. However, if you can, pollinate one female flower with several male flowers.
- 7 There are other ways to cover the pollinated female flower. An elastic band provides a substitute for tape. French bread bags tied over the flowers to isolate them work very well. They will need to be removed as the fruit starts to swell.
- 8 **Squash:** Harvest the fruits once they are mature; the fruit stalk will begin to shrivel and the skin of the fruit will be hard. Do not remove the seeds immediately. Leave the fruit in a warm dry place, eg a greenhouse or a cloche, for about three weeks – during that time the seeds continue to increase in size and vigour. Seeds should be removed from the flesh and rinsed in a colander to remove any flesh or strings adhering to them. If they are still sticky or dirty, rub them gently in a sieve under a stream of water. Squash seeds are often large and have a tendency to go mouldy before drying. Try laying out seed on a flat tray with a cool fan gently blowing over them, turning the seed twice a day for a couple of days.
- 9 **Melon:** Seeds are mature when the fruit is ripe to eat. Over-ripe fruits have between 2-10% more ripe seeds, but are not as good to eat, and after all the effort of growing a melon you might as well enjoy eating it. These seeds may need a little more work to clean them. Rub them gently and put them in a large bowl with plenty of water. Hollow seeds and the pulp will float while fertile seeds sink to the bottom. Pour off the debris and repeat a couple of times until you are left with only good seeds.
- 10 **Cucumber:** Keep on the vine until over-ripe. The fruits will be large and starting to go soft. Like squashes, leaving them for a couple of weeks after cutting increases the number of fully mature seeds. The seeds are encased in a gelatinous sac, most easily removed by fermentation. Place the seeds into a large bowl and add about as much water as you have seeds. Put the bowl somewhere warm, out of direct sunlight, to ferment. This can be somewhat smelly! Stir the mixture occasionally. One or two days is usually sufficient, when most of the good seeds have sunk to the bottom. Add as much water as possible and stir the mouldy mass well. Good seeds will sink to the bottom so carefully pour off the debris. Repeat until you are left with clean seeds.



*Squash seed before cleaning.*



*Squash seed cleaned.*



*Squash chaff.*

**11** For all cucurbits, tip the seeds onto a plate or baking tray to dry, avoiding temperatures greater than 32°C (90°F), which will damage the seeds. Turning seeds regularly and providing a cool breeze will help seeds dry evenly. Seeds that break in half rather than bending are dry enough to be stored, but fat, 'empty' seeds will not be viable.

**12** Put them in an seed envelope or packet and label.

**13** Seeds should last in storage for between five to ten years.

## Extended activity

Each species of squash has specific stem, leaf, flower and seed characteristics. Knowing which species your chosen variety belongs to will help you make an isolated planting that could include one variety from each species without having to use hand pollination. The four main squash types are as follows:

- ***Cucurbita maxima*** — these have very long vines, huge, hairy leaves and soft, round, spongy, hairy stems. Seeds are thick, white, tan or brown with cream coloured margins and thin, cellophane-like coats.
- ***Cucurbita mixta*** — these have spreading vines and large, hairy leaves. The stem of the fruit is hard, hairy and slightly angular and flares out only slightly where it is attached to the fruit. The leaves (slightly lighter green than *C. moschata*) have a rounded tip and hardly any indentations along the sides. Seeds are white or tan and have a pale margin and cracks in the skin coat or the fat sides of the seeds. They are covered with thin cellophane-like coats.
- ***Cucurbita moschata*** — these display spreading vines and large, hairy leaves. The stem flares out noticeably where it attaches to the fruit and is hard, hairy and slightly angular. The flower has large leafy green sepals at its base. Leaves are slightly darker than *C. mixta* and have a pointed tip and slight indentations along their sides. The small beige seeds are oblong and have a dark beige margin.
- ***Cucurbita pepo*** — these have prickly leaves and stems, especially when mature. The fruit stem is hard and has five sharply angular sides. Seeds are cream coloured with a white margin. Included in this species are soft-shelled striped and warty decorative gourds and nearly all of the commonly grown summer squashes.

# SS9 Onion and leek seed saving



Onions, *Allium cepa*, and leeks, *Allium ampeloprasum*, are from the *Allium* family and are biennials, which means that they are grown one year to produce seed the next. Onions and leeks share many characteristics. The main difference is that onion leaves are hollow tubes, while leek leaves are fat straps with a keel up the middle. Both are biennial, but the onion leaves die back to leave the dormant bulb while leeks are evergreen and winter hardy.

*Allium* flowers are perfect but cannot usually fertilise themselves. The male anthers open first and shed their pollen before the female stigma of that flower is receptive (protandrous). Individual flowers in ball-like heads open over a period of about four weeks, peaking in the second week.

## Resources

- Selected onions from the previous year's crop; stored carefully over winter or the best leeks that have been left to overwinter in their growing positions
- Space to grow the plants, as the stalks may reach up to 180cm in height, stakes might be needed
- Secateurs
- Paper bag
- Sieve
- For large amounts, a tarpaulin and trays to winnow your seeds
- Tray to collect your seed
- Label for the tray whilst cleaning
- Seed envelopes or packets

### Top tip



### Leeks

Leek seed heads take a lot longer to mature than onions, so keep an eye on them and the plants may have to be moved inside to continue ripening.

## Activity

Be ruthless about roguing any plants whose foliage is not up to scratch, or which flower in the first year. Susceptibility to disease, eg leek rust, can vary within a variety, so select the most resistant plants to save seed from.

- 1 Only choose those onion bulbs that are characteristic of the variety.
- 2 Avoid saving seed from 'bull-necked' (wide and non-rounded) or 'bottle-necked' (tapering up the stem) onions.
- 3 You can slice across an onion, about a third of the way down, to check the evenness of the rings and the colouration, without any harm to the shoot inside. This allows you to check if it is true to type.

- 4 Plant the best of your onions in the spring and they will soon put out fresh leaves and a flower stalk.
- 5 Leave the plants to set seed, they will throw up a flower stalk, flower and then lose their colour and continue to develop seeds throughout the summer and autumn.
- 6 Allium flowers need to be watched carefully as the seeds mature because the ripe seed pods shatter easily (that is, they split and release the seeds). As soon as you can see the black seeds within the drying flowers you should cut the whole head and place it in a paper bag to finish drying.
- 7 Most of the ripe seeds will fall from the dry flower head quite easily, encouraged by gently shaking. The rest can be removed by rubbing the flowers between your palms or across a sieve that allows the seed to pass through. The best way to clean the seed is by sieving and winnowing in a light breeze.
- 8 To winnow the seed away from the chaff, pour the seed from one container into another in a light breeze. The breeze will blow away the lighter chaff and the heavier seed will drop into the container. Do this over a sheet or tarpaulin to capture any stray seed, until the seed is completely clean.
- 9 Seed will store in a cool, dark place for at least two years.

## Extended activity

Handle onion bulbs carefully, to avoid bruising. Cure them in the sun for a couple of weeks before storing. Onions store best at low temperatures and low humidity (0-7°C/32-45°F, <40%R.H.) or high temperatures and high humidity (25-35°C/77-95°F, 60-70%R.H.). Room temperature (16-21°C/60-70°F) is the worst possible for storing onions. Storage gives another chance to reject defective bulbs, such as any that do not last for long.

<b>Health &amp; safety</b>	If there is a lot of dust when breaking the seed pods or winnowing, make sure you wear a face mask.
<b>Further information</b>	<p><b>Winnowing:</b> This is an ancient agricultural method of separating the grain from chaff.</p> <p><b>Note:</b> The easiest way to maintain variety purity is to grow just one variety for seed each year, allowing insects to do the work. They should be isolated from other varieties by at least 1,500 metres. You can grow others to eat, but be vigilant about removing flowers.</p> <p>If you do want to grow two or more varieties for seed you must either isolate by 1,500 metres or use one of the caging techniques. Unless you use alternate caging you will have to hand pollinate daily. Between 9.00am and noon remove the cage from each variety in turn and use a soft brush to transfer pollen between the flowers. Go round the flowers two or three times to ensure a good mix, and either clean the brush in alcohol between varieties or use a different brush for each variety. You may need an assistant to keep insects away while you are busy pollinating.</p>

# SS I 0 Beetroot and chard seed saving



Beetroot and chard, *Beta vulgaris*, are from the Chenopodiaceae family, and are biennials which means that they are grown one year to produce seed the next. Beetroot and chard are the same species selected for different purposes, either the size of the root or the production of the leaves (often for their startling colour and wide midrib).

They will cross-pollinate with each other, but not with true spinach which is a different genus. The 'seeds' of beetroot are actually corky fruits or seed clusters, which normally contain anything between two and four seeds. Flowers are mainly wind-pollinated.

## Resources

- At least 16 plants from last year's stock (either beetroot or chard, not both)
- Space to grow the above plants, at 30cm spacings
- Stakes
- Horticultural fleece
- Tray to collect your seeds
- Label for the tray whilst collecting
- Seed envelopes or packets

## Activity

- 1 Grow the roots as normal for the first year, sowing in spring and storing the best roots in autumn for replanting the following year. Lifting and storing them allows you to select those with the shape, colour and size most typical of the variety. Store roots in damp sand, or black plastic bags with holes cut in them, in a cool, frost-free place. Any roots that are not storing well or are misshapen can be eaten. Do not save seed from plants that flower the first year.
- 2 Plant out the best plants in spring as soon as danger of severe frost has passed. Plant them firmly in blocks or rows at least 30cm apart and with their crown at soil level. Water well to encourage re-rooting.
- 3 The tall twisting flower spikes are surprisingly attractive and smell delightfully like honey. The spikes are branched and can grow to a metre or more, needing good staking.
- 4 Isolate if necessary (see extended activity).

Top tip



### Volumes

There will be lots of seed when saving from beet or chard; so expect a shoe box full from 16 plants and make some big packets up for saving and swapping.

- 5 The seeds are mature when they start to turn brown, which they do successively from the base of the flower spike upwards, and when the stems are brown and crispy. They fall off readily so inspect regularly to see when the seed clusters start to form and get ready to harvest them as and when they look like they are about to drop.
- 6 The mature seed clusters can easily be stripped from the stalks by hand. Pinch off the tips of the stalks where the seed clusters are small and immature, and sieve to remove any debris or dust. There is no need to separate the seed clusters, they are normally supplied this way and separation can injure the seeds.
- 7 Collect the dry seeds and store in a labelled envelope.
- 8 Seed can store for up to six years, however expect fifty percent germination.

## Extended activities

- 1 The pollen can be wind-borne over long distances so isolation is important. Commercial seed growers recommend an isolation distance of 500m minimum for similar varieties (eg between two globe-shaped beetroots) and 1-3km for different types of crops (eg between beetroot and sugar beet). If you are confident that no other beet, chard or sugar beet is flowering around you, and you save only one variety each year, you may not need to worry about cross-pollination. Crops grown for eating are not a threat, provided any 'bolters' are removed before flowering. Isolation can also be achieved by 'bagging' or using horticultural fleece. Isolate as soon as the first flowers start to form. Insect proof mesh is not suitable as the pollen is fine enough to pass through even a very fine mesh. Horticultural fleece is a better barrier, but can cause problems with humidity. Push a stake into the middle of each circle of plants and gently bend all the flower stalks towards it. Cover the flowers with a large potato sack and tie round the base. Some sort of cushioning (cotton wool or soft paper towel) will be needed to reduce abrasion round the stems and to prevent stray insects and pollen getting in. On still days shake the bag to keep the pollen moving and ensure seed set.
- 2 It is possible to bag using a potato sack over six or seven plants at a time. This should not be used every year, as it is necessary to use a minimum of 16 plants, covered together to allow cross-pollination, to maintain the health and diversity of the variety.

### Health & safety

If there is a lot of dust when breaking the seed pods or winnowing, make sure you wear a face mask.





Garden Organic is the UK's leading organic growing charity, and is dedicated to researching and promoting organic gardening, farming and food. We are driven by an enduring passion and belief, founded on over 50 years of research and practice, that organic methods provide a healthy, sustainable life for us all.

Garden Organic Ryton, Coventry, Warwickshire CV8 3LG

Tel: 024 7630 3517 Fax: 024 7663 9229 Email: [enquiry@gardenorganic.org.uk](mailto:enquiry@gardenorganic.org.uk)

[www.gardenorganic.org.uk](http://www.gardenorganic.org.uk)

Registered charity no 298104 Garden Organic is the working name of the Henry Doubleday Research Association.

The Food for Life Partnership is a network of schools and communities across England committed to transforming food culture. The Partnership is led by the Soil Association with the Focus on Food Campaign, Garden Organic and the Health Education Trust. Together we work to revolutionise school meals, reconnect young people with where their food comes from and inspire families to cook and grow food.



**food for life PARTNERSHIP**

LOTTERY FUNDED | **BIG LOTTERY FUND** | **Soil Association** | **The Focus on Food Campaign** | **HEALTH EDUCATION TRUST** | **garden organic**

**food for life PARTNERSHIP**  
South Plaza, Marlborough Street, Bristol BS1 3NX  
**T** 0117 314 5180    **F** 0117 314 5001    **E** [fflp@foodforlife.org.uk](mailto:fflp@foodforlife.org.uk)    [www.foodforlife.org.uk](http://www.foodforlife.org.uk)