



Growing From Seed: A Toronto Master Gardeners Guide

Although it is somewhat time consuming, growing plants from seed can be a very rewarding experience. This gardening guide provides introductory information about starting plants from seed.

Why Grow From Seed

There are many reasons why gardeners grow plants from seed. Starting plants using this method can be very economical and enables the gardener to grow a wide range of plants that perhaps cannot be easily transported when mature or are not readily available from local growers. Growing indoors enables the gardener to carefully control the growing conditions and minimizes the risk of disease and pests during the early stages of growth. In addition this process enables the gardener to get a head start on the growing season or just enjoy 'spring' flowers during the winter months.



Whether you start them indoors, or sow them directly into your garden, growing plants from seed can be fun and satisfying.

What is a seed?

A seed is a ripened ovule containing an embryonic plant and its food supply. Seeds contain enough food to last through their dormancy until the seedlings produce true leaves. The first leaves are cotyledons and the second set of leaves are the true leaves.

Seed viability

Some seeds have a very short viability and will only successfully germinate if planted immediately. Examples include most gentians, pulsatillas, cyclamen, oleander and some primulas.

Generally speaking, however, seeds remain viable for some length of time. As a rule, seeds should be able to be successfully germinated as follows:

- annuals for 2-3 years
- vegetables for up to 10 years
- perennials for 2-20 years – sometimes more (Scientists have germinated lotus seeds over 1000 years old found in pyramids)

Seeds may be nonviable and, therefore, not able to be germinated because they have been kept too long and the food stored inside the seed has been used up. They may also have been stored incorrectly in a warm, damp environment or have had immature or even absent embryos.

Seed Sources

Seeds are available from many sources including plant societies, seed companies, private collectors, friends' gardens, seed

exchanges, and your own garden. If you are collecting seeds from your own or a friend's garden, clean the seeds and label them straight away. Store the seeds in the fridge in airtight plastic bags or containers.

Germination

Seeds must be germinated in the appropriate light conditions and have oxygen, water, and warmth. Information on the germination requirements of a particular seed may be found on seed packets, in catalogues, or in books. If no information is available on germinating a specific seed, attempt to copy the climatic conditions in its country of origin.

Although most seeds are relatively easy to germinate if they are given the appropriate conditions, there are some seeds that are difficult to germinate. The main groups of seeds that are more difficult include:

- Seeds that require a dormant period before germination;
- Seeds that have an impermeable seed coat;
- Seeds that contain a chemical inhibitor to germination;
- Seeds that require very specific conditions such as a fire, period of warmth followed by cold (e.g. *Cornus canadensis*), or total darkness (e.g. pansies and delphiniums) for germination to occur.

Stratification

Stratification can be used to simulate the dormant period required by some seeds. They must be subjected to moisture and cold for a specific time period, anything from two weeks to five months. The seeds should be placed in a moist peat moss or soilless potting mix in a container covered with clear plastic (or in a plastic bag) and placed in the fridge or freezer or, if it is winter, outside.

Germination may not be rapid after a warm period as some seeds (e.g. those of the rose family), need an after-ripening period which may take three to four months.

Doubly dormant seeds (e.g. trilliums, sanguinaria or peony) require more complicated stratification since they require two periods of cold and warmth that would normally take two years. This process can be accelerated slightly by placing the sown seeds in a location with a temperature of 18 – 29 degrees Fahrenheit for four to six months followed by three months in the fridge. The seeds should then be placed outside.

Scarification

Seeds with hard, impermeable coats (e.g. hibiscus) require a process called scarification for germination to occur. Scarification

modifies the seed coat so that moisture can enter and initiate germination. The seed coats can be pierced, scratched, nicked or partially destroyed with acid. Knives or sandpaper are most commonly used. Care should be taken not to penetrate too deeply. Seeds with hard coats and containing a chemical inhibitor (e.g. lupines) should be soaked for 24 – 48 hours in hand-hot water. This softens the seed coat and leaches out the chemical inhibitors.

Supplies for Seed Starting

Any container as long as it is sterilized (1 part bleach to 9 parts water), has drainage holes and is large enough to prevent overcrowding can be used for starting seeds. Other supplies that will be useful include:

- Flats with covers, or use clingfilm/plastic wrap.
- Waterproof markers are essential to record plant names and dates.
- A seed distributor and dibble (a tool for transplanting).
- A thermometer

Write down any special instructions for each type of seed and the approximate amount of each that was sown. This information is helpful because many seeds do not have 100% germination. They may also germinate over several weeks.

Growing Media

Seeds should be grown in a soilless mix that contains peat moss, vermiculite and perlite. Soilless mixes contain no nutrients but fertilizer is not required until true leaves are produced. A slow release fertilizer – 14:14:14 – may be added to the growing media.

You can make your own seed starting mix using sterilized soil, compost, coarse sand, peat moss, vermiculite/perlite. Leaf mould should not be used as it can be toxic to seeds and inhibit germination. The mix should be well aerated, well drained and weed and disease free.

To sterilize soil, fill an oven proof container about 3” (7.5cm) deep with soil and moisten (do not add so much water that the soil becomes runny or soupy), cover with aluminum foil. Bake in a 200°F (90°C) oven for thirty minutes once the internal temperature has reached 180°F (85°C). This can be checked by using a meat thermometer. Keep the internal temperature around 180°F (85°C), do not go over 200°F (90°C). Do not over bake. Be aware that sterilizing soil has a very bad smell.

Alternatively you can microwave 9lbs (4kg) of moist soil in open plastic bags for 2-5 minutes on high. Check to make sure the

internal temperature reaches 180°F (85°C). Once this temperature has been reached carefully close the bags and place in a cooler to retain the heat. Allow to cool.

One last method for sterilizing soil is to select an area in your yard that gets 6 plus hours of sunlight per day. Lay out a plastic sheet, cover with 4" (10cm) of soil, moisten and cover and secure the soil with another sheet of plastic. Bake the soil this way for 4 weeks in sunny weather. Here in Toronto bake for 6-8 weeks. Rake and redistribute the soil weekly to allow for good penetration of the heat.

Planting the Seeds

The following steps outline the procedures for starting seeds indoors:

- Before sowing the seed, the soil mix should be moistened by hand so that it is evenly damp and not wet.
- Fill pots to the rim without packing down the soil.
- Evenly scatter the seeds over the soil and sprinkle a fine layer of soil on top if needed.
- Firmly press down so the seed comes in full contact with the soil. A general rule to follow is to plant the seed no deeper than the thickness of the seed. Avoid hand contact if possible — a board is useful.
- Label the pots to identify the species and date of planting.
- Water the pots using a mister just enough to evenly moisten the soil. Watering should be done with a mister to prevent dislodging the seeds. Never allow the planting medium to dry out.
- Cover the flats with a plastic top or plastic wrap to increase humidity. If using a wrap slit the plastic to provide ventilation. Use a clear or dark plastic depending on whether light or dark is required.
- Check the containers daily if they are under lights. Take the cover off for an hour. The moisture under the cover can be tapped back in.
- When 75% germination occurs, remove the cover.
- Use a fan if the area is poorly ventilated.

Temperature and Light Requirements

A temperature of 72°F (20-22°C) degrees is often adequate. Many seeds (e.g. delphiniums), will not germinate well in very warm temperatures. Some seeds need a drop in temperature, of at least 5 degrees at night, to germinate.

Fluorescent lights are best because the light can be adjusted to the height of the seedling, to prevent legginess. Lights may be left on for 12 – 16 hours. Seeds can also be placed in fairly strong light in an east window. Total dark can be achieved by placing the flat in a black, plastic bag.

Transplanting and Watering

Transplant the seedlings into other pots or containers if they become overcrowded or when the cotyledons have developed or when the first pair of true leaves have grown. When transplanting, always hold the seedlings by the cotyledons to prevent stem damage. After transplanting, water the seedlings well and then restrict the watering until the plants are established and producing new growth.

Once true leaves have appeared, apply a weak solution (1/4 strength) of 10:52:10 fertilizer followed by 33% strength 20:20:20 weekly or 50% strength every other week. When the plant has its second set of true leaves you can apply a 15:30:15 fertilizer at full strength.

Special Problems

“Damping off” is the term used to describe the total collapse of seedlings after the stem has withered at soil level. Several related parasitic fungi cause it. There is no cure for damping off once it has become established; therefore good preventative control is required. This includes using sterile soil mix, providing good air circulation, controlling soil moisture and avoiding overcrowding of the seedlings.

Other problems that may occur include:

- Over-fertilization symptoms include leaf curl, marginal leaf burn and white residue on the soil.
- Yellowing of lower leaves indicates a lack of nutrients, oxygen, light or space. Remedy by transplanting the seedlings.
- Pale leaves are due to nitrogen deficiencies.
- Reddish cast to leaves means the tops of the seedlings are too cool.
- Red-purple cast on underside of leaves indicates a phosphorus deficiency.
- Brown edges on leaves is indicative of a potassium deficiency.

Mould on soil may be remedied by using charcoal powder, sand or grit. To guard against aphids or whitefly, keep cuttings and houseplants away from seedlings. You may have to use an insecticidal soap if these insects become a problem.

If seedlings are too leggy, reduce the temperature, especially at night; increase the light intensity; reduce overcrowding and/or pinch out the growing tips.

Planting Outdoors

Seeds that require stratification or a long time to germinate may be

placed outside in early winter or in the freezer for 30-90 days. They can be sown at leisure inside and then transferred to the north or east side of a building or a fence.

The containers should be placed a little distance away from the structure to avoid the warming influence of the house and to allow free access to rain and snow. Place the pots in a cold frame without a lid or plunge them in a sand bed up to their rims to conserve moisture and to stop the pots from being blown over.

Plastic netting or wire placed on top will deter rodents. Cover the wire with a layer of straw or leaves to retain moisture and maintain a constant soil temperature.

The soil should always be kept moist and should be checked daily once the mulch is removed in mid spring. A trail of diatomaceous earth can be laid around the pots to prevent slug and snail damage.

References

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Produced by the Toronto Master Gardeners, these Gardening Guides provide introductory information on a variety of gardening topics.

Toronto Master Gardeners are part of a large, international volunteer community, all committed to providing the public with horticultural information, education and inspiration. Our goal is to help Toronto residents use safe, effective, proven and sustainable horticultural practices to create gardens, landscapes and communities that are both vibrant and healthy.

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