



Starting Plants Indoors from Seed

Gardeners can grow most annuals, biennials and many of the popular herbaceous perennials from seed. Sowing seed is less expensive than buying established plants and requires little equipment. Vigorous plants started indoors flower sooner than those started outdoors. Home gardeners can also grow varieties that may not be available at local greenhouses or garden centers.

To successfully grow plants from seed you need to have viable seeds and favorable conditions.

Seeds

To raise quality plants start with good quality seeds from a reliable dealer. Select varieties to provide the size, color and habit of growth you want. Choose the kinds that are adapted to your area.

Many new vegetable and flower varieties are hybrids that cost a little more than open-pollinated types. However, hybrid plants usually have more vigor and uniformity and produce better. Some hybrids offer specific disease resistance or other unique cultural characteristics.

Although some seeds will keep for several years if stored properly, we suggest buying only enough seed for the current year's use. Printing on the seed packet usually indicates essential information about the variety, the date of the germination test and percentage of seed that germinated, as well as any chemical seed treatment.

If you get your seeds well in advance of the actual planting date or are attempting to store surplus seeds, keep them in a cool, dry place. Laminated foil packets help ensure dry storage. Paper packets are best kept in tightly closed jars or containers and maintained around 40°F with low humidity.

Some gardeners save seed from their own garden; however, such seed is the result of random pollination by insects or other natural agents and may not produce plants typical of the parents. This is especially true of hybrid varieties.

Factors Affecting Germination

A seed sprouts only-if when it is viable and ready for germination. Four environmental factors affect germination: water, oxygen, light and heat.

Water: The first step in the germination process is absorption of water. A continuous supply of moisture without fluctuation in the growing medium is important to ensure germination.

Light: Light stimulates or inhibits the germination of some seed. Some crops, including ageratum, begonia, browallia, impatiens, lettuce and petunia require light to help them germinate. Others, such as calendula, centaurea, annual phlox, verbena and vinca germinate best in the dark. Other plants are not specific at all.

Seed catalogs and seed packets generally indicate light requirements. When sowing light-requiring seed, do as nature does and do not bury them. If they are covered at all, cover them lightly with fine peat moss or fine vermiculite. These two materials, if not applied too heavily, will permit some light to reach the seed and will not limit germination. Provide supplemental light by suspending fluorescent lights 6 to 12 inches above the seeds for 18 hours per day.

Oxygen: All viable seeds breathe. Their respiration rate increases dramatically during germination; therefore, the growing medium must be loose and well-aerated. If the oxygen supply during germination is limited or reduced, germination can be severely retarded or inhibited.

Heat: Some seeds will germinate over a wide range of temperatures, whereas others require a narrow range. Many seeds have minimum, maximum and optimum temperatures for germination. For example, tomato seed has a minimum germination temperature of 50°F and a maximum germination temperature of 95°F, but an optimum germination temperature of about 80°F. Where germination temperatures are listed, they are usually the optimum temperatures unless otherwise specified. Generally, a range of 65° to 75° F is best for most plants. This often means the germination flats may have to be placed in special chambers or on radiators, heating cables or heating mats to maintain that optimum temperature.

Media for Starting Seeds

A good germinating medium should be fine and uniform, well aerated and loose. It should be free of insects, disease organisms and weed seeds. It should also be of low fertility and capable of holding and moving moisture by capillary action,

Artificial soil-less mixes offer all these desired qualities. The basic ingredients of such mixes are sphagnum peat moss and vermiculite, both of which are generally free of diseases, weed seeds and insects. The individual ingredients are also readily available, easy to handle, lightweight and produce uniform plant growth. Make your own mix using this recipe: 4 quarts of shredded sphagnum peat moss, 4 quarts of fine-grade vermiculite, 1 tablespoon of superphosphate and 2 tablespoons of ground limestone. These mixes have little fertility so seedlings must be watered with a diluted fertilizer solution soon after they emerge.

Containers

Garden centers sell many different types of wooden or plastic flats and trays and pots for starting seeds. You can also make your own containers for starting seeds by recycling cottage cheese containers, the bottoms of milk cartons or bleach containers, or polystyrene meat or vegetable trays. Make sure to punch or drill a series of holes in the bottom of each planting container to ensure proper drainage.

Garden centers also sell many types of peat pots and strips, plant bands and plastic cell packs for starting seeds. Each cell or mini pot holds a single plant, which reduces the risk of root injury when transplanting. With peat pellets and peat or fiber-based blocks, the growing medium itself forms the container unit.

Seeding

The proper time for sowing seeds depends upon when plants may safely be transplanted outdoors in your area. This period may range from 4 to 12 weeks before transplanting, depending upon the speed of germination, the rate of growth and the cultural conditions provided. A common mistake is to sow the seeds too early and then attempt to hold them back under poor light or temperature ranges. This usually results in tall, weak and spindly plants which do not perform well in the garden.

After selecting your planting container and moistening the growing medium you have chosen, fill the container to within 3/4 inch from the top with the medium. For very small seeds, top off the medium with at least 1/4 inch of a fine, screened mix or a layer of vermiculite.

Firm the medium with your fingers or a block of wood to provide a uniform, flat surface. If you are sowing in trays or flats, for medium to large seeds, make furrows about 1 to 2 inches apart and 1/8 to 1/4 of an inch deep across the surface of the container. Sowing in rows provides better light and air movement to help prevent fungus disease. Seedlings in rows are easier to label and to handle at transplanting time than those that were broadcast. Sow the seeds thinly and uniformly in the rows by gently tapping the packet of seed as you move it along the row. Lightly cover the seeds with dry vermiculite or sifted medium. Plant most seeds twice their diameter deep.

Do not cover extremely fine seed such as petunia, begonia and snapdragon; simply press them into the medium or water them in with a fine mist spray. If these seeds are broadcast, strive for a uniform stand by sowing half the seeds in one direction, then sowing the other way with the remaining seed.

Larger seeds are frequently sown into some sort of a small container or cell pack, 2 or 3 to a unit, eliminating the need for early transplanting. Thin after germination, allowing the strongest seedling to grow.

Watering

After the seed has been sown, wet the planting mix. Use a fine mist spray or place the containers in a pan or tray which has about 1 inch of warm water in the bottom. Avoid splashing or excessive flooding which might displace small seeds. When the water has seeped throughout the container, set it aside to drain.

The best situation would be to have the seed flats remain sufficiently moist during the germination period without having to add more water. One way to achieve this is to use a clear plastic bag into which the whole flat or pot is slipped after the initial watering. The plastic keeps moisture in, allows gas exchange and keeps disease organisms from coming in. Keep the plastic at least 1 1/2 inches from the soil and the container out of direct sunlight or the temperature may rise to the point where the seeds will be harmed. Many home gardeners cover their flats with panes of glass instead of using a plastic sleeve. Be sure to remove the plastic bag or glass cover as soon as the first seedling leaves appear.

Use care when hand-watering newly-planted seed trays to prevent overwatering or drying out. Uniform moisture is the key to good germination and growth.

Germinating and establishing seedlings

Most seeds will germinate best at a specific optimum temperature. Since this is usually higher than most home night temperatures, growers may need to provide supplemental heat, such as thermostatically-controlled heating cables.

Seedlings must receive bright light after germination. If a large, bright, south-facing window is not available, place the seedlings under a fluorescent light. "Shop lights" suspended from chains screwed into the ceiling are an inexpensive solution. After seedlings are well-established, move the flats to a light, airy, cooler location, say at a 55° to 60° F night temperature and a 65° to 70° F day reading. This will prevent soft, leggy growth and cut down the chance of some, disease troubles. Some crops, of course, may germinate or grow best at a different constant temperature and must be handled separately from the bulk of your crop. Use two 40-watt, cool, white fluorescent tubes or special full-spectrum bulbs. Position the plants 6 inches from the tubes and keep the lights on about 16 hours each day. Raise the lights as the seedlings grow.

Transplanting and handling

If the plants have not been seeded in individualized containers they must be transplanted to give them proper growing space. One of the most common mistakes made by plant growers is leaving the seedlings in the seed flat too long so they get stunted or too tall and "leggy." Transplant young seedlings while they are small, about the time the first true leaves appear the cotyledon leaves (the "seed" leaves).

Seedling growing mixes and containers can be purchased or prepared similar to those mentioned for germinating seed. The medium should contain more plant nutrients than a germinating mix, however. Some commercial soil-less mixes have fertilizer already added. When fertilizing, use a soluble house plant fertilizer with the dilution recommended by the manufacturer about every 2 weeks after the seedlings are up. Remember that young seedlings are easily damaged by too much fertilizer, especially if they are under any moisture stress.

To transplant, carefully dig up the small plants with a knife or wooden pot ladle. Let the group of seedlings fall apart and pick out individual plants. Gently ease them apart in small groups this will make it easier to separate individual plants. Avoid tearing roots in the process. Handle small seedlings by their leaves, not their delicate stems. Punch a hole in the medium into which the seedling will be put at the same depth it was growing in the seed flat. Small plants or slow growers may be placed 1 inch apart and rapid-growing, large seedlings about 2 inches apart. After planting, firm the soil and water gently. Keep newly transplanted seedlings in the shade for a few days or place them under fluorescent lights. Keep them away from direct heat sources. Continue watering and fertilizing as was done in the seed flats.

Most plants normally grown indoors transplant well but a few of them are difficult to transplant. These are generally directly seeded outdoors or sown directly into individual containers indoors.

Hardening Plants

Hardening is the process of altering the quality of plant growth to withstand the changes in environmental conditions that occur when plants are moved from a greenhouse or home to the cold-frame, the field or the garden. A severe check in growth may occur if plants produced in the home are planted outdoors without some adjustment in the quality of growth.

Hardening is more critical with early crops when adverse climatic conditions can be expected than it is later in the season. Lower temperatures and relative humidity and drastic changes in watering practices and light quality are responsible for the check in growth of unhardened plants. Hardening involves a controlled, selective check of plant growth. It results in an accumulation of carbohydrates and a thickening of cell walls.

Start hardening plants at least 2 weeks before planting in the garden. If possible, plants should be moved to a 45 to 50-degree temperature indoors or outdoors in a shady location. A cold-frame is excellent for this purpose. Then first put outdoors, keep in the shade but gradually move plants into sunlight for short periods each day. Gradually increase the length of exposure. Don't put tender seedlings outdoors on windy days or when temperatures are below 45 degrees F. Reduce the frequency of watering to slow growth but don't allow plants to wilt. Even cold-hardy plants will be hurt if exposed to freezing temperatures before they are hardened. After proper hardening, however, they can be planted outdoors and light frosts will not damage them.

Handling Seeds Difficult to Germinate

Seed from some plants is frequently affected by one or more types of dormancy which must be overcome before they will germinate. One of the following treatments may be required to promote germination, especially for certain woody ornamental plants.

Stratification: To stratify seeds, first soak them overnight in water. Drain the seeds, treat with a fungicide and place in moist sand or peat. Some seeds will require storage for varying periods at warm temperatures (50 to 80 degrees F.). Others require cool temperatures (34 to 50 degrees F.). Some may require warm, moist storage followed by cool, moist storage. These same conditions can often be obtained under natural conditions by the proper timing of outdoor planting. Warm, moist conditions are provided by summer planting while cool, moist conditions are provided by fall planting. Treatment length varies with the type of seed from 1 to 6 or more months.

Scarification: Some seeds will not germinate only because they cannot absorb water or because oxygen and other gases are excluded from the inner parts of the seed. Various techniques will alter the seed coat to allow penetration of water and exchange of gases, including filing or abrasion with sandpaper, etc., or chemical erosion of the seed coat with concentrated sulfuric acid. Use such devices carefully to avoid seed damage or injury to the applicator. Plant seeds immediately after treatment.

After dormancy conditions have been met, the seed can be grown as described for vegetables and herbaceous ornamentals. You can start them indoors for later transplanting outside, or plant directly outdoors at the proper time. Some specialty seed firms offer seed that has already been treated or processed for you. Additional information on germination and a listing of some specific plant requirements can be found in most libraries.

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