

# Propagating Plants In and Around the Home

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Many ornamental plants in Kentucky can be propagated by home gardeners. Plant propagation can be a source of enjoyment and a way to increase the number of desirable plants you have.

Plants are propagated by asexual or sexual means. Sexual propagation involves starting plants from seed, while asexual propagation is the multiplication of plants from vegetative plant parts like shoots, roots, and leaves or from specialized organs like bulbs and corms. Budding and grafting are also methods of vegetative propagation, and these are discussed in Cooperative Extension publication HO-39, *Reproducing Fruit Trees by Graftage*. Methods for propagating some common Kentucky landscape plants are presented in Table 1 at the end of this publication.

## Asexual Propagation

### Reasons to Use Asexual Propagation

The most important reason for asexual propagation is to reproduce plants with the same characteristics as the parent plant. Asexual propagation is the only practical means of propagation when:

- No seed are produced (French tarragon, peppermint, seedless grapes).
- Seed are difficult to germinate (Viburnum, honeysuckle).
- Seed of plants often produce variations that are not desirable (roses, most fruit trees).
- You want to combine two or more plants to get the specific benefit of a particular rootstock.

For example, you can achieve size control using dwarfing rootstocks as is done for apples. Or you can get pest-resistant rootstock, as in grafting European grapes on American grape rootstocks to avoid damage from Phylloxera, a grape root aphid.

A group of plants originating from a single plant and reproduced by vegetative means is called a clone. For example, the Burkwood viburnum is a hybrid that originally came from seed but is propagated by asexual methods to maintain its unique characteristics. Methods of asexual propagation include cuttings, layering, and division.

## Cuttings

The most common way to propagate plants asexually is from cuttings. You can make cuttings from stems, roots, leaves, or combinations of plant parts like stems with leaves. Take cuttings from healthy plants that grew well during the current or previous growing season. Many factors affect the success of rooting: the plant part's age, season, location of the tissue on the plant, and the plant's nutritional level and general vitality.

### Stem Cuttings

#### Types

Stem cuttings are taken at different stages of growth and may consist of a plant's growing tip (terminal section) or subterminal stem sections and are referred to as tip cuttings or stem cuttings, respectively. Leaf-bud cuttings are a modified type of stem cutting.

Leaf-bud cuttings include the leaf blade, petiole, and a ½-inch to 1-inch segment of stem. Axillary buds located at the union of the petiole and stem produce new shoots under warm, humid conditions. This method is often used for plants with long internodes like pothos. Every node on the stem can be a cutting. With opposite-leaved plants, like hydrangea, the stem is divided in two to produce two cuttings.

Some plants root better from softwood cuttings, while others are propagated from semi-hardwood or hardwood cuttings. Softwood and semi-hardwood cuttings are from current season's growth, and hardwood cuttings are from the previous season's growth.

Softwood cuttings are generally taken from plants in spring or early summer during a growth flush when tissue is relatively soft and succulent. Stems of softwood cuttings will usually "snap" like green beans when broken.

Semi-hardwood cuttings are taken just after a growth flush has matured. Most plants root best as semi-hardwood cuttings. By using semi-hardwood stems that are not quite mature, you can reach a balance between young tissue with abundant meristem activity (dividing cells) and old tissue with abundant carbohydrate food reserves.

Hardwood cuttings are taken during the dormant season when wood is mature and hardened. Some hardwood cuttings are taken from wood older than a year. Junipers, hemlocks, false cypress, hollies, firs, pines, and spruces can be successfully propagated from hardwood cuttings.

## Techniques

- Remove stem cuttings using a clean, sharp knife or pruner. Cuttings 4 to 6 inches long are appropriate for most plants.
- Remove leaves from the bottom 1 to 2 inches of the cuttings. The base of the cutting may be lightly or heavily wounded. Wounding exposes more internal tissue for contact with the rooting compound, thereby increasing rooting.
- Dust cuttings with rooting hormone, and stick them upright in a propagation medium.
- Insert them just deep enough into the propagation medium to hold them upright (usually 1 to 2 inches). Insert at least one node into the medium. Roots develop faster at nodal areas with active meristematic cells. If cuttings are stuck too deeply into a shallow medium, the base may rot.
- Open the medium with a knife slit, or use a pencil as a dibble to help insert the cuttings without rubbing off most of the rooting powder.
- After you insert cuttings, water them to firm the medium around them.
- Stem cuttings have rooted when they cannot be dislodged from the rooting medium without pulling out a mass of the rooting medium at the same time. The rooting period varies from two to 16 weeks, depending on plant species and environment. Once well rooted, cuttings can be potted singly into containers and grown to larger size, or put directly into the landscape after a period of hardening (see “hardening” below).

## Leaf Cuttings

Leaf cuttings may consist of only the leaf blade or the leaf blade and petiole. Leaf cuttings are successful for only a few specialized plants. Rex begonias, bryophyllum, and jade plants are commonly propagated by laying the leaf flat on the medium. Rex begonia should be wounded by cutting the main veins on the underside of the leaf before placing the leaf surface flat and in firm contact with the propagation medium. Sometimes it is helpful to pin these leaves to the moist medium with small wire hairpins, bent paper clips, or toothpicks.

African violet is propagated using a single leaf with part of the leaf petiole attached. Shorten the petiole to 1 inch long. Stick the leaf petiole upright in the propagation medium just like the stem of a cutting. Roots and shoots form at the petiole’s base.

The swordlike leaves of Sansevieria can be cut into sections. When subterminal sections of leaves are used, make sure the bottom (basal) end of the cutting is inserted into the propagation medium. Roots and new shoots will start at the base of the leaf or at points where veins were cut.

## Rooting Medium

A mixture of one volume of peat moss and three volumes of coarse perlite is a good rooting medium for most plants, but combinations of other materials like perlite and vermiculite or peat moss and sand are also satisfactory. The medium should drain freely and be free of disease organisms and weed seed.

If you apply root-promoting chemicals to the basal ½ inch of cuttings before sticking them into the medium, you can enhance rooting of some plants. These chemicals are primarily composed of auxins; most commonly IBA (indolebutyric acid)

and/or NAA (naphthaleneacetic acid) are used. Commercially prepared talc formulations in various concentrations, suited for easy-, moderate-, or difficult-to-root plants are available at most garden centers. Some talc formulations of auxins also contain a fungicide to help prevent disease during rooting. Be careful: if you apply the talc powder too heavily, it may burn off the base of some cuttings.

## Where to Propagate Your Plants (Small-Scale Propagation Units)

To propagate effectively, you need to provide a good environment for your cuttings.

### Requirements

Maintaining high humidity around a cutting is a major requirement for success. You need high humidity because when you make a cutting, you sever the plant’s water- and nutrient-conducting tissues. Therefore, cuttings cannot take up enough water from the propagating medium to replace that lost through their leaves. Keep the relative humidity near 100% to minimize water loss from your cuttings. Commercial propagators use an intermittent mist system controlled by time clocks to keep the cuttings moist and reduce transpiration.

Also, keep the temperature cool because at higher temperatures, water loss from the plant is greater. Temperatures of 60° to 80°F stimulate optimum growth and development of most plants.

### Methods

You can provide a warm, humid environment for rooting your cuttings by several methods.

#### Plastic Bags

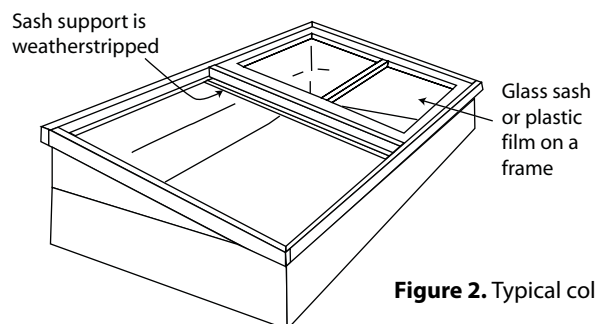
This is one of the simplest propagation units for small numbers of cuttings. All you need is a flowerpot, growing medium, plastic bag, and a rubber band (Figure 1). Two wire hoops, wooden labels, or plastic straws can help support the plastic bag but are not necessary.



**Figure 1.** Flower pot in plastic bag for propagation.

#### Cold Frame

Many people root cuttings under glass jars outside in a cold frame (Figure 2). A cold frame is constructed of a wooden frame and covered with plastic film or old wooden windows; it may be any convenient size. Hinged lids permit access to cuttings and can be gradually propped open after cuttings have rooted. Doing so acclimates them to the outside environment.



**Figure 2.** Typical cold frame.

### Cold Frame with Heating Cables (Hotbed)

For a more consistent propagating structure outside, heating cables may be added to the cold frame (Figure 3). Heating cables provide heat to the base of the cutting. Plants usually grow faster at warmer temperatures. Bottom heat encourages growth of roots but allows water loss from leaves to remain low.

### Location

Location of the propagation unit is critical; it should be in diffused light, never in direct sun. Temperature in these closed units will become too high if placed in full sun, causing the cuttings to die. Indoors, put the units near a north window or to the side of other windows where they will receive light but not direct sunlight. Maintain temperatures of 60° to 80°F. Outdoors the units may be placed on the north side of the house or under a tree. Although these units will restrict water loss, you still must routinely examine the moisture level. Add moisture only if the propagation medium begins to dry out.

### Hardening

Rooted cuttings must be adapted to withstand environmental stress after rooting has occurred. This process is called hardening. Cuttings that have been rooted in a humid environment with moderate temperatures often die if they are put directly in a dry, hot environment in full sun. They need a transitional period to let new leaves and shoots adjust gradually to environmental change.

- Decrease humidity by increasing ventilation in an enclosed rooting structure.
- After a gradual decrease in humidity, increase the light intensity gradually by moving plants into areas receiving increasing amounts of direct sunlight.

### Layering

Layering is a method of propagation in which new plants are completely formed while attached to the parent plant. The new plant receives nutrients and water from the parent plant until roots develop. This method is an excellent way to produce a small number of plants for the home landscape or to propagate plants that are difficult to increase by other methods.

Layering outdoors is best done during spring and summer months, although it can be done during any season. Spring and summer layers are usually rooted and ready for transplanting in fall or early next spring. If you plant them in fall, mulch heavily in early winter to keep the plant from heaving out of the soil.

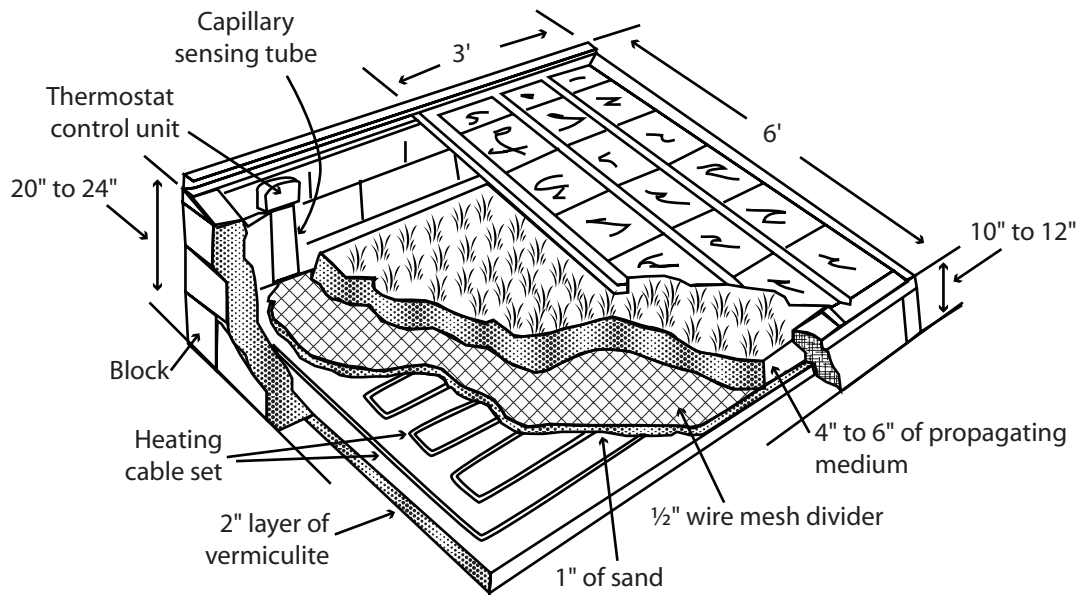


Figure 3. Hotbed construction with electric heating cable and thermometer.

For layering, choose healthy, mature branches that are growing vigorously and have been exposed to light since these usually have more food reserves and therefore root faster. Branches from pencil size to about an inch in diameter are best.

### Types

Various types of layering are air, simple, tip, trench, mound, and serpentine. Air, tip, and simple layering are the most popular methods and the only ones discussed here.

Air layering is used on plants with stiff or large stems that cannot be bent to the soil or plants that do not readily produce shoots at their base. Air layering works for propagating rubber trees, figs, crotons, Chinese hibiscus, holly, sweet bay, lilac, and magnolias.

### Method

To air layer:

- Remove leaves and twigs on the selected limb for 3 to 4 inches above and below the point where the air layer is to be made (usually 8 to 15 inches below the tip of the branch).
- Wound the branch just beneath a node to induce rooting.
- One method: remove a 1/2-inch to 1-inch ring of bark and, with a knife, scrape clean the wood underneath. Doing so ensures complete removal of the cambium layer—a layer of cells between the bark and wood. If this layer is not removed completely, new bark may develop instead of roots.
- A better method: make a long slanting cut upward about one-quarter to halfway through the twig. Keep the incision open by inserting a bit of sphagnum moss or a toothpick to prevent the cut from healing over. A thin bamboo stake or stick tied to the stem above and below the wound will keep the stem from breaking at the wound.
- You can apply a rooting hormone around the wound on hard-to-root plants to hasten rooting, but hormones are unnecessary for most air layering.

- Bind the wounded area with a handful of moist sphagnum moss. Squeeze excess moisture from the moss before placing it completely around the stem at the wound. Tie the moss firmly in place with twine.
- Cover the moss with plastic film or heavy-duty aluminum foil, crimped tightly to the stem above and below the ball to reduce water loss.
- Check every 7 to 10 days for moisture.

When roots have developed in the sphagnum ball (one month to a year later), remove and pot the layered branch. Pot layers in containers and harden them much like rooted cuttings discussed previously.

**Simple layering** is a proven means of propagating climbing roses, forsythia, grapes, wisteria, and pyracantha. Most plants with a trailing or viny growth habit can be propagated this way. Choose a low branch and injure the bark (as described for air layering) about ½ to 1 inch along the stem and 8 to 15 inches back from the tip. Anchor the injured area 2 to 3 inches beneath the soil. (See Figure 4 for the steps in simple layering.) Do not let the soil dry out.

Spring is the best time to simple layer since the injured portion develops roots during summer. Spring layers can be cut from the parent and planted in early fall or left until the following spring.

**Tip layering** is used on most brambles (blackberries, black and purple raspberries, dewberries). In mid- to late summer, the cane tips arch over, and leaves at the end become small and curled. This is the proper time to tip layer them. Cut a slit in the soil 2 to 4 inches deep using a trowel or tile spade. Insert the tip of the cane about 2 inches into the soil, and close the soil around the tip by stepping on the soil. The tip will root and form a new plant by fall. New plants can be cut from the parent, dug, and replanted in fall or early the next spring.

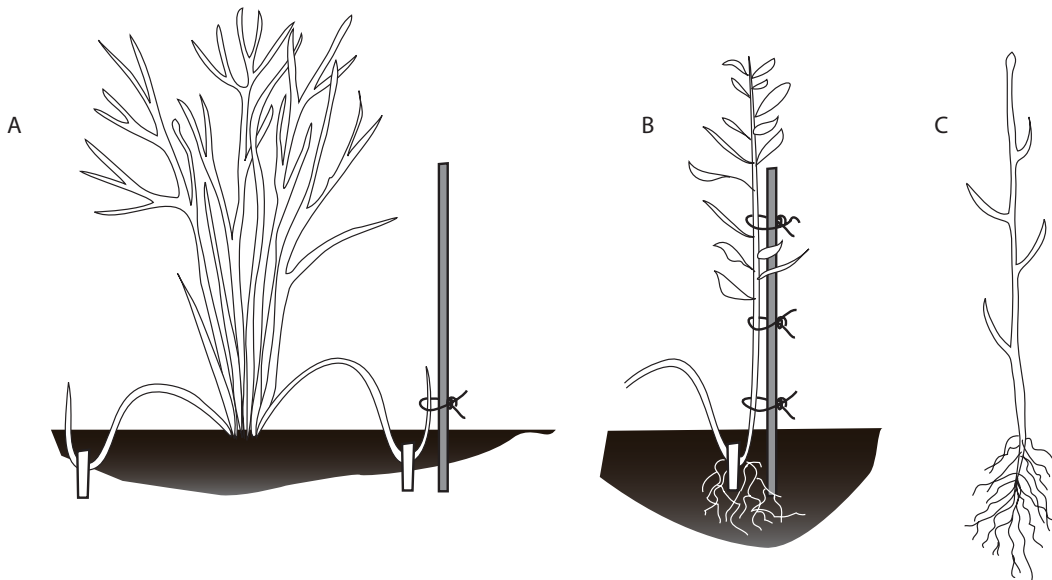
## Division

Plants with a multi-stemmed or clumping growth habit, offshoots, or fleshy underground storage structures like bulbs, rhizomes, tubers, corms, and tuberous roots and stems can be propagated by division. Such plants include daylilies, bulbous plants, bearded iris, peonies, and liriope. Division involves cutting large clumps into smaller sections, making sure that each clump has enough stems, leaves, roots, and buds to survive transplanting. Every two or three years plants can be dug, divided, and replanted into a larger area. Some plants can be pulled apart, but most must be cut. Transplant separated clumps at the same depth they were growing originally. Division of iris and daylilies is usually done in mid- to late August, while most other plants are divided during the plant's dormant period (late fall, early spring).

## Sexual Propagation

Seed propagation is often the least expensive and easiest way to produce large numbers of plants. Many plants produce variations when seed-propagated, and seed of many plants in the temperate zone have special conditions that must be met before germination will occur. In most cases, the seed require a period of moist-chilling. Since most home gardeners need only a few new woody plants, the easiest way to satisfy the chilling requirement is to sow seed in a protected area in the garden as soon as they are ripe. Usually they germinate the following spring.

Some woody plant seed have a hard seed coat that either mechanically restricts germination or inhibits water uptake that prevents germination. Easy ways to overcome this problem are to: (1) file or grind a small notch in the seed coat, (2) rub seeds on fine sandpaper, or (3) put seeds on a concrete floor and rub them against the floor using a brick or a board. This process is



**Figure 4.** Steps in propagation by simple layering: (a) Shoots are bent over to the ground in early spring or fall. A second bend is made in the branch a short distance from the tip, which is covered with soil and held in place with wire or wood-stakes. The stem is sometimes injured at the underground section, which stimulates rooting. (b) Roots form on the buried part of the shoot. (c) The rooted layer is removed from the parent plant.

called “scarification.” When a certain seed needs such treatment for germination, Table 1 so indicates.

A few woody plants combine a hard seed coat and the need for moist-chilling.

Seeds of annual bedding plants, vegetables, and some woody plants need only the proper environmental conditions of temperature, moisture, oxygen, and sometimes light for germination. Germination of flower and vegetable seeds is discussed in University of Kentucky Cooperative Extension publication, HO-56, *Starting Plants from Seed at Home*.

### **Seed Cleaning and Storage**

Remove the fleshy coat of seed from plants like dogwood, southern magnolia, Cotoneaster, and Euonymus before planting. For small numbers of such seed, rub them against a wire screen and wash to remove the pulp, or put the seed in a container of water and let them ferment a few days to soften the fleshy coat before rubbing them against a wire screen. You can separate the pulp and seed by putting them in a container of water; the pulp and unfilled seed float while the good seed sink to the bottom. After seeds are cleaned, they can be dried and stored or planted immediately, depending on the seed. Table 1 gives directions for specific seed.

Optimum storage temperature and seed moisture content vary with species, but generally seed should be stored at 40°F and in an environment with 30 to 35% relative humidity. Household refrigerators usually maintain temperatures suitable for seed storage. Seed can be stored in the refrigerator dry in tightly closed plastic bags or glass jars.

Purchased seed packets of most garden annuals, perennials, and vegetable seeds often contain more seed than needed for one year’s planting. You can usually store these seed with good results for one or sometimes two years. To save such seed from one year to the next, put them in a tightly closed glass jar, and store in the refrigerator. Germination is reduced as the seed age, and the amount of reduction varies with the kind of seed. Experience will tell you which seed to save and for how long.

### **Seed Germination of Woody Plants**

#### **Conditions**

The simplest way for homeowners to satisfy dormancy requirements of seed of many woody plants is to sow them in a protected area as soon as they are ripe. Germination is often better if seed are planted immediately after harvesting (and cleaning, if needed) without being allowed to dry.

If you want to sow woody plant seed in the fall for germination the following spring, a section of the vegetable garden is a good site. The soil should be fertile and well drained. Prepare the area ahead of time by tilling. Add organic matter such as compost or peat moss if the soil has a high clay content.

### **Planting**

A rule of thumb is to cover the seed with soil one to two times the seed’s narrowest diameter.

Moisture is a critical requirement for germination. Once seed are planted outdoors, keep them moist. Adding 1 inch of mulch over the planting area helps keep soil moisture uniform and available. A deeper mulch can be applied in fall, but most or all should be removed in early spring before seed germination begins (usually mid-March to mid-April). A deep mulch helps control weeds.

Don’t plant seed so close together that seedlings are crowded, resulting in poor growth with weak, spindly stems.

You can plant seed in rows or broadcast it over a bed area. Since the homeowner usually requires only a few plants of a kind, rows are preferred. Row planting makes weeding easier and, with proper labeling, helps you identify and keep different seedlings separated.

To help provide good drainage, you may raise the area selected 3 to 4 inches above the normal soil level. For a single seed row, soil should be 4 to 6 inches wide at the top. If a large number of different kinds of seed are to be sown, prepare a bed system 3 feet wide and any desired length.

You can then sow individual varieties of seed in rows across the bed. Whenever seed are sown, identify them with a label. Write labels only with pencil or weatherproof marking pens. If you are going to leave labels outdoors through the winter, stick them at least 3 inches into the soil.

For small numbers of seed or where no garden area is available, seed may be sown in a clay pot. The pot is then plunged into soil up to its rim and watered both to supply moisture to the seed and to establish intimate contact between the outside of the pot and the surrounding soil. Finally a mulch 4 to 6 inches deep is placed over the area. In late winter (March-April), the pot is dug up and moved to a location where moisture can be maintained and a temperature of 45° to 75°F provided.

### **Transplanting Seedlings**

If seedlings are crowded after germination in the spring, they may be transplanted with wider spacings or thinned to allow more space per plant. Most seedlings should remain in their original location for at least one full growing season. In some instances, plants should be left in place for two or more growing seasons before being moved.

Transplanting young plants is best done in early spring after the ground has thawed but before plants begin growth. Transplanting can be done in the fall after plants have gone dormant, but the plant may be pushed out of the soil by freezing and thawing action. If plants must be moved in the fall, heavy mulching (4 to 6 inches deep) prevents frost heaving.



**Table 1.** Methods of propagating common landscape plants.

<b>Botanical (Common Name)</b>	<b>Propagation Method</b>
<i>Abelia grandiflora</i> (Glossy Abelia)	Semi-hardwood tip cuttings, June-Sept.
<i>Acer</i> (Maples)	Collect seed when mature, sow immediately in protected area or flats.
<i>Actinidia</i>	Softwood cuttings, June-July. Semi-hardwood cuttings, July-Sept.
<i>Aesculus</i> (Buckeyes)	Collect seed when mature and sow in protected area.
<i>Bamboo</i>	Division: late winter, early spring.
<i>Berberis</i> (Barberry)	Semi-hardwood tip cuttings, June-Sept. or seed sown outdoors in fall.
<i>Betula</i> (Birch)	Seed: some ripen in spring, most in fall. Sow as soon as mature.
<i>Buddleia</i> (Butterfly Bush)	Cuttings, June-Sept.
<i>Buxus</i> (Boxwood)	Tip cuttings, June-Sept.
<i>Callicarpa</i> (Beautyberry)	Tip cuttings, June-Sept. or seed sown as soon as the berries are ripe.
<i>Cephalanthus</i> (Buttonbush)	Tip cuttings, June-Aug.
<i>Cercis</i> (Redbud)	Scarify seed coat and sow seed in fall outdoors. Spring germination.
<i>Chaenomoles</i> (Flowering Quince)	Semi-hardwood cuttings, June-July.
<i>Cornus</i> (Dogwood)	Softwood cuttings, June-Aug. difficult. Seed: clean, sow outdoors in fall. Spring germination.
<i>Cotoneaster</i>	Cuttings, June-Aug.
<i>Crataegus</i> (Hawthorn)	Seed: collect in summer, clean, sow immediately.
<i>Daphne</i>	Cuttings, June-Aug.
<i>Deutzia</i>	Softwood cuttings, June-July.
<i>Euonymus</i>	Cuttings, June-July.
<i>Fagus</i> (Beech)	Seed: collect when mature, sow immediately.
<i>Forsythia</i>	Cuttings, June-Sept.
<i>Fraxinus</i> (Ash)	Collect seed as soon as mature, sow outdoors. Spring germination.
<i>Gleditsia</i> (Honeylocust)	Collect seed, hold till mid-April, scarify and sow immediately.
<i>Hamamelis</i> (Witch Hazel)	Seed: collect capsules before opening, place in closed paper bag. Sow soon after capsules burst.
<i>Hedera helix</i> (English Ivy)	Cuttings, June-Oct.
<i>Hibiscus syriacus</i> (Rose of Sharon)	Seed sown outdoors in fall.
<i>Hydrangea</i>	Tip cuttings, June-July.
<i>Hypericum</i> (St. Johnswort)	Tip cuttings, June-Oct.
<i>Ilex</i> (Holly)	Terminal firm semi-hardwood cuttings, July-Nov., wound.
<i>Juniper</i>	Most prostrate types root readily from tip cuttings, Nov.-April. Upright types almost impossible.
<i>Kerria japonica</i>	Cuttings, June-October.
<i>Koelreuteria</i> (Goldenrain Tree)	Seed: scarify, then sow in fall.
<i>Ligustrum</i> (Privet)	Semi-hardwood cuttings, June-Sept.
<i>Liquidambar</i> (Sweetgum)	Seed: collect fruit when yellow to brown, place in closed paper bag. Sow seed soon after fruit opens.
<i>Liriodendron</i> (Tulip Tree)	Seed: sow immediately in fall.
<i>Lonicera</i> (Honeysuckle)	Softwood cuttings, June-August.
<i>Magnolia</i>	Time and success variable with species. Softwood cuttings, June-July. Seed: clean, sow outdoors in fall. Keep seed moist until planted.
<i>Mahonia</i> (Grape Holly)	Seed: collect, clean, sow immediately.
<i>Malus</i> (Crabapple)	Results vary with variety. Softwood cuttings in May-June.
<i>Nyssa sylvatica</i> (Black Tupelo)	Clean seed, sow outdoors in fall. Spring germination.
<i>Pachysandra</i>	Tip cuttings, July-Sept.
<i>Philadelphus</i> (Mock Orange)	Softwood cuttings, June-July.
<i>Pyracantha</i> (Firethorn)	Cuttings, June-Aug.
<i>Pyrus calleryana</i> (Callery Pear)	Seed: clean, sow immediately.
<i>Quercus</i> (Oaks)	Sow acorns outdoors as soon as they drop.
<i>Rhamnus</i> (Buckthorn)	Cuttings, June-July.
<i>Rhododendron</i>	Tip cuttings, June-July.
<i>Robinia</i> (Black Locust)	Seed: collect, clean, store until April, scarify, sow.

**Table 1.** Methods of propagating common landscape plants.

Botanical (Common Name)	Propagation Method
<i>Rosa</i> (Roses)	Soft to semi-hardwood leafy cuttings. June-Aug.
<i>Sophora japonica</i> (Japanese Pagoda Tree)	Seed: collect, clean, store until April, scarify, sow.
<i>Spiraea</i>	Softwood cuttings, May-July.
<i>Syringa</i> (Lilac)	Cuttings, May-August.
<i>Taxus</i> (Yew)	Cuttings taken in Sept.-Dec. Stick in cold frame. Rooting will occur following spring.
<i>Tilia</i> (Linden)	Seed: pick before seed coat turns brown, sow immediately.
<i>Ulmus</i> (Elm)	Seed: some ripen in spring, others in fall. Collect and sow immediately.
<i>Viburnum</i>	Tip cuttings, May-July.

## Appendix: Cold Frame Construction

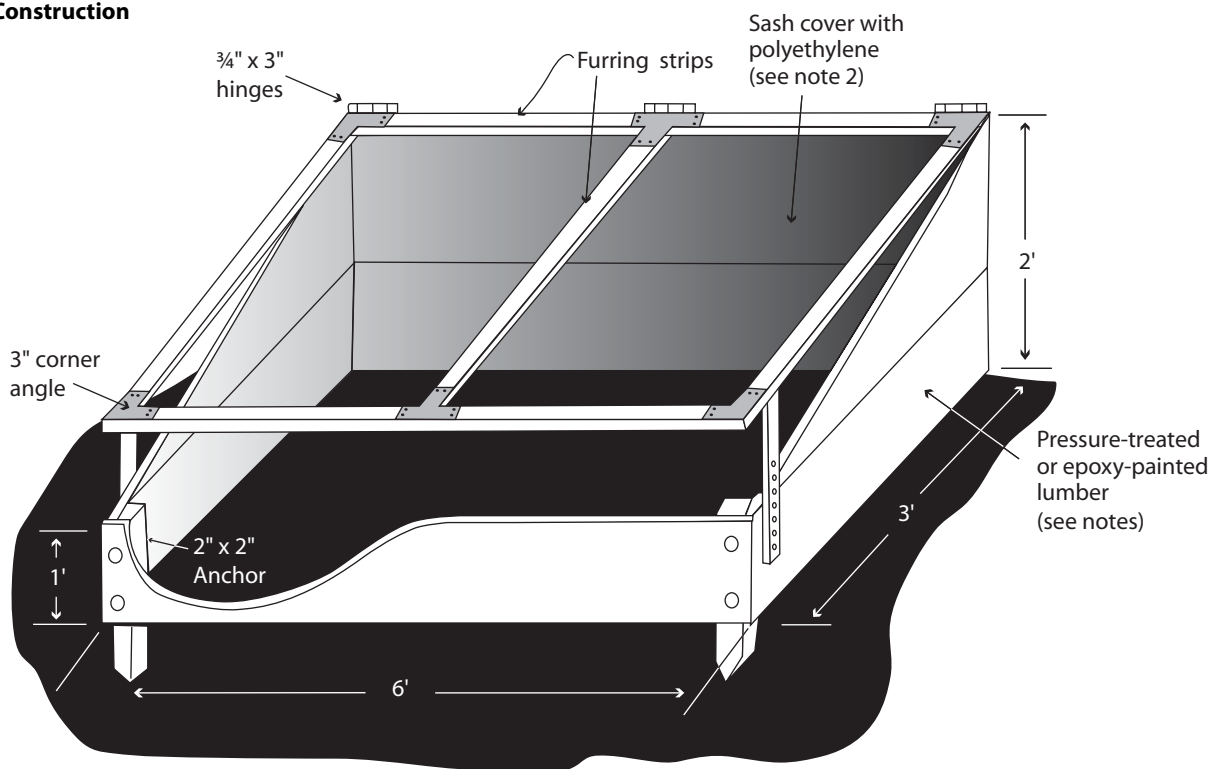
### Bill of Materials

Quantity	Item Needed
27 board feet	1" thick pressure-treated lumber (see Note 1)
8 linear feet	2" x 2" pressure-treated lumber for anchors
24 linear feet	1" x 2" or 1" x 3" furring strips for sash frame
21 linear feet	wood strips 1/4" thick (see Note 2)
4	3" x 3" corner angles
2	3" x 3" tee angles
3	3/4" x 3" hinges
4' x 6' sheet	6 mil. polyethylene plastic
30	1 1/2" x No. 10 flat-head wood screws
3 oz.	3/4" wire nails
1 qt.	white epoxy paint

### Construction Notes

1. Use pressure-treated lumber for all wood that will be in contact with the soil, or use untreated lumber and apply two coats of epoxy paint to all surfaces before assembly.
2. The poly cover is stapled to the sash frame, and 1/4"-thick wood strips are nailed over the staples to prevent wind from blowing the poly cover off. The wood strips can be cut from 1"- or 2"-thick lumber.
3. For use during freezing weather, the inside of the unit may be lined with 1" Styrofoam insulation board and a blanket or other insulation placed over the top on cold nights.

### Cold Frame Construction



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