# Posse+Plus, Wood County Texas

# Plant Propagation

*Information provided by Texas A&M Agrilife Extension Service*

## How to Take Cuttings

This effective and inexpensive way of propagating plants is swiftly becoming more popular than buying seeds. One plant is all that is needed to get you started with growing your own plants.

In less than six months you could end up with an adult plant that is exactly like its parent in every way. This method of 'cloning' plants has helped to save some of the world's endangered species. Taking cuttings can also be turned into an enjoyable hobby. Only taking about 4-6 weeks to be rooted and potted up, cuttings are the fast way to produce new plants. Once you've mastered the art of propagating your own plants, the experience can be shared amongst friends and families. Why not set up a plant exchange? It is completely free and you might just obtain that special plant that would look great in your house or garden!

Softwood Cuttings - **Stem Cuttings with Lavender**

Choose a healthy young shoot, 2 to 4 inches long.

Trim leaves from the lower half of the stem.

Dip into rooting hormone if you have any.

Choose a fine potting compost mixed with sharp sand or perlite.

Up to five shoots can be used in one pot.

Water from below.

Pierce a bag and cover pot to hold in moisture.

Shoots can be transplanted when roots appear.

There are a variety of ways in which you can take cuttings from your plants and it is important to know what type to take in order to maximize success, (this is explained later on). There are also a few different ways in which you can root your cuttings so by finding the method that is best suited to your plant you are giving it the very best start. Most popular methods include water, specific composts that are formulated especially for cuttings and a variety of mixtures containing peat, perlite, sand or grit. Not all of these methods will be suitable for every plant so a bit of trial and error may be required.

Other things you may need to consider before you take your cuttings are your technique, the time of year and the healthiness of your plant. The same rules apply with cuttings as they do when you buy seeds. Not every cutting will root just as every seed you buy may not. The success rate of cuttings is between 60-70% to the average gardener but with a little care and attention there is no reason why the majority of your cuttings shouldn't root. As with everything preparation and a little bit of research is vital.

The only objects that you need to begin taking cuttings are a sharp knife or secateurs, a rooting medium and a windowsill. Ensure that your cutting tools are clean and sharp, this will stop any cross infection that could lead to disease and also tearing and bruising of the plant and cutting. The rooting medium should be specifically bought or made for your cuttings and never recycled from other pots or the garden. To encourage healthy growth of your cuttings it may be an idea to use a rooting hormone containing fungicide to combat any fungus diseases.

Temperature is very important to stimulate good growth. The ideal temperature for most cuttings is between 18-21C. Most cuttings will do well with a temperature drop of down to about 10C, any less than that and they will suffer. There are a wide range of methods available to help you keep a regular temperature around your plants. Simply choose the method that is most suited to your own situation. Greenhouses and propagators are probably the most widely used ways of regulating the temperature. They provide moisture control that is invaluable to your plants well being. More often than not all you need is the warmth of a windowsill. You must ensure not to draw any curtains between the plant and the window as this will discourage the cuttings from rooting. Another way to regulate the temperature is to supply a gentle warmth, by electrical cables under soil or tanks filled with hot water, directly to the base of the containers. More sophisticated equipment is available for cuttings taken on a larger scale.

Cuttings are very sensitive to moisture loss so direct sunlight is damaging to them. In order to control the moisture loss place a clear, plastic bag over the cuttings and their container, ensuring that the bag is secure but not touching the plants. If using water as a method to root your cuttings this treatment is not needed as the water will replace any moisture lost. Alternatively you can spray your cuttings regularly with water to increase humidity.

Different plants have different methods in which rooting cuttings should be done. Houseplants usually need water and a jam jar like container. Outdoor plants and perennials such as fuchsias and geraniums usually need compost or mixtures of peat, sand or grit. Whilst these are the

most widely used methods you can interchange them to see how they work for you. It is important to remember to experiment. You may find that one method works particularly well for one plant and not another even though they are similar.

Taking cuttings can be done in a lot of different ways but it is important to establish exactly which category your plant falls into. Cuttings are divided into two main categories depending on the kind of plant and what time of year is best suited to them. The two categories are ***softwood*** and ***hardwood*** cuttings. Each has requirements for rooting i.e. correct size, proper temperature and moisture and suitable rooting medium. Choose carefully from where on the plant you wish to take a cutting so that your new plant reflects the desired characteristics of its parent plant.

Many houseplants, perennials and some shrubs fall into the **softwood cuttings** category. These should usually be taken in spring and summer. Cuttings taken between March and October for houseplants and perennials, and between June and July for shrubs produce the best results. These cuttings should root between one to eight weeks. Any plants that are susceptible to frost should be rooted indoors or in greenhouses. When selecting softwood cuttings you should look for: young sections from the current growth, firm but flexible shoots and no flowers, fruit or seedheads. Always remove any diseased or damaged parts and make sure your cuttings are at least two to four inches long with at least two leaf joints attached.

**Stem cuttings**, the most common type, can be made from shoot tips or side shoots and taken from most plants. Choose a healthy, young shoot, two to four inches long. Trim any leaves from the lower half of the stem, cut the stem below a leaf joint and insert at least half of the cutting into your rooting medium. Minimum of three nodes, at least two go under the soil.

**Leaf stem cuttings**, from plants consisting mainly of leaves, with short or no distinct stems. Using a healthy adult leaf, trim and insert into rooting medium. A new plant will grow from the base of the leaf and a root system will grow from the stem.

**Bud cuttings** are taken from plants with long trailing stems. Removing a section of the stem from above and below a leaf joint insert the section below the bud into the rooting medium.

**Leaf cuttings**, from plants consisting mainly of leaves , with little or no stems. Selecting a healthy adult leaf, cut sections of one inch right across the leaf. Insert into rooting medium upright about halfway down.

Many shrubs, trees and conifers fall into the **hardwood cuttings** category. These should usually be taken in autumn and winter. Cuttings taken between July and October for semi-hardwood cuttings, and between September and March for hardwood cuttings produce the best results. These cuttings should root between two to twelve months. Hardy plants should be rooted in containers outdoors or in cold greenhouses. When selecting semi-

hardwood cuttings you should look for: mature sections from the current growth, (usually from the base of the stem), firm, woody shoots and no flowers, fruit or seed heads. Always remove any diseased or damaged parts and make sure your cuttings are at least three to ten inches long with at least two leaf joints attached.

When selecting hardwood cuttings you should look for: mature sections from the current growth, (usually from the base of the stem), firm, woody shoots and no flowers, fruit or seed heads. Always remove any diseased or damaged parts and make sure your cuttings are at least six to eighteen inches long with at least two leaf joints attached.

**Stem cuttings**, taken from most semi-hardwood and hardwood cuttings i.e. conifers, shrubs and trees. Choose a firm, woody stem at least six inches long, depending on plant size and remove the leaves from the lower part. Trim to below a leaf joint and insert two thirds into the rooting medium.

**Bud or leaf cuttings**, from most climbers and some evergreen shrubs and trees. Removing a section of the stem three to six inches long by cutting above and below a leaf joint, insert the stem up to the bud into the rooting medium.

**Root cuttings**, taken from some herbaceous perennials, shrubs and trees. Exposing the roots, remove sections which are at least a quarter of an inch in diameter (approx the same width as a pencil). Cut the roots into sections of one and a half to three inches long. A flat cut at the top end of the cutting and a diagonal cut at the bottom is the preferred method. This is so the cuttings are inserted into the rooting medium the correct way up. Insert the cuttings completely into the rooting medium. This type of cutting is limited to a few plants.

Choosing the correct time of year to take your cuttings is vital for success. Using the calendar below as a rough guide will enable you to choose the correct month for your desired plants.

**January**: root cuttings of some herbaceous perennials, shrubs and trees protected under glass.

**February**: root cuttings of some herbaceous perennials, shrubs and trees protected under glass. Softwood stem cuttings from half-hardy and hardy perennials.

**March**: softwood stem cuttings from half-hardy perennials. Base stem cuttings from border perennials. Cuttings from houseplants. Hardwood cuttings from shrubs.

**April**: base stem cuttings from border and half-hardy perennials. Houseplants. Softwood cuttings from shrubs.

**May**: base stem cuttings from border perennials. Alpines. Houseplants. Softwood cuttings from shrubs and climbers. Herbs.

**June**: Alpines. Houseplants. Softwood cuttings from shrubs and climbers. Herbs.

**July**: stem cuttings from herbaceous perennials and semi-hardwood cuttings from shrubs and trees. Softwood cuttings from shrubs and climbers. Alpines. Houseplants. Herbs.

**August**: stem cuttings from herbaceous and half-hardy perennials. Softwood and semi-hardwood cuttings from shrubs and climbers. Alpines. Houseplants. Herbs. Strawberry runners.

**September**: stem cuttings from herbaceous and half-hardy perennials. Alpines. Houseplants. Herbs. Semi-hardwood cuttings from shrubs, trees and climbers.

**October**: houseplants. Semi-hardwood and hardwood cuttings from shrubs, trees and climbers.

**November**: root cuttings of some herbaceous perennials, shrubs and trees protected under glass. Hardwood cuttings from shrubs, trees and climbers.

**December**: root cuttings of some herbaceous perennials, shrubs and trees protected under glass. Stem cuttings from perennials protected under glass.

It pays to remember that some of our best loved plants are poisonous. Although not normally an issue it becomes one when taking cuttings. It is possible for some of the sap to come into contact with skin or household items once the stem or leaf is cut. Try to wear gloves whilst handling plants and always wash hands and work surfaces thoroughly afterwards. Below is a list of plants to watch out for.

Azalea, Codiaeum, Datura, Dieffenbachia, Euphorbia, Fatshedera, Gloxinia, Hedera helix, Hoya, Nerium, Philodendron.

Sometimes your cuttings will simply not root. This may be because the part of the plant that you have tried to use is not capable of forming roots. Try to avoid any plants that are growing from bulbs or any flowers from a florist's arrangement.

Once your cuttings are well rooted they should be potted up into a good compost. For any plant, pot up cuttings in a small pot to establish a good root system before transferring them into a larger pot or garden.

## More Plant Propagation- Cuttings

Material from How to Grow Native Plants of Texas and the Southwest by Jill Nokes

**The Rooting Process**

1. The stem or root is cut or otherwise wounded
2. This triggers the beginning of root development
3. A callus or swollen mass of cells develops around the wounded plant tissue on the basal part of the stem
4. Within the stem exist groups of meristematic cells that are able to differentiate into adventitious roots; these cells are stimulated by wounding. (Meristematic cell= an undifferentiated embryonic tissue, which is actively growing and dividing cells)
5. Adventitious roots emerge from the base of the stem cutting. (Adventitious =a root that is neither primary nor secondary nor arising there from. A new growing point on a vegetative structure such as a root, stem or leaf.)

Production of adventitious roots on the stem depends on:

1. The inherent ability of the plant to develop new roots (age and type)
    - The Juvenility Factor – one year old seedlings and other young plants often root in larger percentages than older plants
    - As the plant grows older, it may produce growth inhibitors

    - The juvenile stage of a plant is described as the vigorous stage of growth preceding flowering and fruiting
2. The location on the stem where the wound/cutting was taken
    - Auxins appear in greatest concentrations directly **below** a bud or leaf, so roots as most likely to form there
3. The time of year the cutting was made
    - This depends on the wood type; some can be cut year round
4. The type of wood used
    - Hardwood, semihardwood, softwood
5. Proper environmental conditions
    - Temperature, humidity, light, etc

**Wood Types**

Hardwood cuttings

- Taken during the dormant (late fall and winter) season from wood of the previous season's growth
- May take from several months to a year to root

Semi-hardwood cuttings

- Taken during the growing season from new wood that has finished its first flush of growth.
- Wood is reasonably hard, not flexible, especially toward the base and the leaves are mature.

Softwood cuttings

- Taken from the emerging tender shoots and growing tips of the current season's growth.
- Wood is easily bent or bruised and the new leaves are small and undeveloped from the bud.

**Hardwood Cuttings**

- Use wood of moderate size and good condition
- Carbohydrate reserves stored from the growing season to support it
- Hormone 2,000-5,000 ppm
- Keep root area warm, but tops cool to inhibit bud break on the stems that could cause the cutting to dry out early
- Take cuttings before buds start to swell
- Avoid spindly growth
- Best cuttings are from central and basal portions of the stem; they have highest concentration of stored carbohydrates
- Cuttings typically 6-20"
- Each cutting should have at least 2 nodes or bud
- Cut diagonally just below a node and cut top ½-1" above a node
- Diameter can be between ¼" to 2", depending on type
- Heel or mallet cuttings may help

**Semi-hardwood (Greenwood) Cuttings**

- Taken from late spring through summer and early fall
- From new shoots that have partially matured and woody at the base
- Texas- taken from April through early June, then late summer, early fall
- Use of a bottom heater may help
- Usually 3-6" long with leaves removed from the bottom half
- Larger top leaves should be trimmed to reduce transpiration

- Best cutting wood comes from the growing tips of the stems, but basal ends are also used
- Rooting hormone extremely beneficial
- Leaves of cuttings and rooting bed should be kept shaded and damp throughout rooting process

**Softwood Cuttings**

- Prepared from the soft, succulent new spring growth of deciduous or evergreen species
- May root easier than hardwood cuttings in the winter
- Taken from shoot tops of side branches after a flush of growth has been completed, wood is partially mature but before it is thoroughly woody
- Wood should be flexible, but mature enough that it will snap if bent
- Difference between semi-hardwood and softwood cuttings is slight
- Generally taken only during a few weeks early in the growing season
- Temperatures for cuttings 75-80 degrees at the base and 70 degrees at the leaves
- Intermittent misting system may minimize water loss
- An IBA hormone helps
- Cuttings 2-5" long with 2 or more nodes
- Remove lower leaves, trim back top leaves, remove flower buds
- Softwood cuttings tend to wilt faster and must be processed quickly

## Rooting Hormones

**Powders:**

Hormodin 3 – Indole-3 butyric Acid .8%. For difficult to root varieties. 15.75 for ½ lb
Hormodin 2 – Indole-3 butyric Acid .3%. For moderate to root varieties 17.20 for 1 lb.
Hormodin 1 – Indole-3 butyric Acid .1%. For smaller plant varieties 15.75 for 1 lb.
RooTing – Indole-3-butyric acid .1% (Green Light product) 4.50 for 2 oz
Take root – Indole-3-butyric acid .1%
Rootone – Naphaleneactamide .20%, Thiram 4.04%; has fungicide. 5.99 for 2 oz

**Gels:**

Root Tech – Indole-3 butyric acid .55% 12.95 for 2 oz

Clonex - 3g/L Indole butyric acid, Thiamine (Vitamin B1). Plus antimicrobial agent 24.95 for 100 ml
Dutch Master Replicator (Australia) Nitrate Nitrogen, Phosphoric Acid, Potash, Magnesium, Sulphur 10 .00 for 2 oz

**Liquids**:

Dip'n Grow - Indole-3 butyric Acid 1.0%, 1 Naphthalenacetic acid .5% $7.95 for 2 oz
You mix this to the concentration needed. Alcohol based for self sanitizing.

**Willow water**

Collect 3-4 small willow branches to make 1 gallon.
Remove leaves and cut the branches into 1" pieces.

Bring 1 gallon water, (distilled if possible) to a rolling boil. Drop in the willow pieces and remove from the stove. Let it set overnight and cool down. It can be bottled and kept refrigerated for up to 1 week. To use, put cuttings in and soak several hours. Contains indole butyric acid (IBA)

**Perlite** is an amorphous volcanic glass that has a relatively high water content. It occurs naturally and has the unusual property of greatly expanding when heated sufficiently.

## What is Perlite?

Perlite is not a trade name but a generic term for naturally occurring siliceous volcanic rock. The distinguishing feature which sets perlite apart from other volcanic glasses is that when heated to a suitable point in its softening range, it expands from four to twenty times its original volume.

This expansion process is due to the presence of two to six percent combined water in the crude perlite rock. When quickly heated to above 1600 F (870 C) the crude rock pops in a manner similar to popcorn as the combined water vaporizes and creates countless tiny bubbles in the softened glassy particles. It is these tiny glass-sealed bubbles which account for the amazing lightweight and other exceptional physical properties of expanded perlite.

The expansion process also creates one of perlite's most distinguishing characteristics: its white color. While the crude perlite rock may range from transparent to light gray to glossy black, the color of expanded perlite ranges from snowy white to grayish white.

Expanded perlite can be manufactured to weigh from 2 lbs/ft$^3$ (32 kg/m$^3$) to 15 lb/ft$^3$ (240 kg/m$^3$) making it adaptable for numerous uses, including filtration, horticultural applications, insulation, inert carriers and a multitude of filler applications.

### Properties and uses

When it reaches temperatures of 850–900 °C, perlite softens (since it is a glass). Water trapped in the structure of the material vapourises and escapes and this causes the expansion of the material to 7–16 times its original volume. The expanded material is a brilliant white, due to the reflectivity of the trapped bubbles.
Unexpanded ("raw") perlite bulk density: around 1100 kg/m$^3$ (1.1 g/cm$^3$).
Typical expanded perlite bulk density: 30–150 kg/m$^3$

Due to its low density and relatively low price, many commercial applications for perlite have developed. In the construction and manufacturing fields, it is used in lightweight plasters and mortars, insulation, ceiling tiles and filter aids. In horticulture it makes composts more open to air, while still having good water-retention properties; it makes a good medium for hydroponics. Perlite is also used in foundries, cryogenic insulations, as a lightweight aggregate in mortar (firestop) and in ceramics as a clay additive.

### Typical analysis of perlite

- 70-75% silicon dioxide: $SiO_2$
- 12-15% aluminium oxide: $Al_2O_3$

- 3-4% sodium oxide: $Na_2O$
- 3-5% potassium oxide: $K_2O$
- 0.5-2% iron oxide: $Fe_2O_3$
- 0.2-0.7% magnesium oxide: MgO
- 0.5-1.5% calcium oxide: CaO
- 3-5% loss on ignition (chemical / combined water)

## What is Vermiculite?

**Vermiculite** is a natural mineral that expands with the application of heat. The expansion process is called exfoliation and it is routinely accomplished in purpose-designed commercial furnaces. Vermiculite is formed by hydration of certain basaltic minerals. The former W.R. Grace mine in Libby, Montana was the largest and oldest vermiculite mine in the United States, but other deposits exist in South Carolina and Virginia, and large commercial vermiculite mines currently exist in South Africa, China, Brazil, and a several other countries.

Vermiculite is the mineralogical name given to hydrated laminar magnesium-aluminum-iron silicate which resembles mica in appearance.

Vermiculite mines are surface operations where ore is separated from other minerals, and then screened or classified into several basic particle sizes.

When subjected to heat vermiculite has the unusual property of exfoliating or expanding into worm-like pieces (the name vermiculite is derived from the Latin 'vermiculare' - to breed worms).

This characteristic of exfoliation, the basis for commercial use of the mineral, is the result of the mechanical separation of the layers by the rapid conversion of contained water to steam.

**Structure**

Horticultural Vermiculite has the excellent property of improving soil aeration while retaining the moisture and
nutrients necessary to feed roots, cuttings, and seeds for faster growth. Like perlite, horticultural vermiculite is permanent, clean, odorless, nontoxic and sterile. It will not deteriorate, turn moldy or rot.

The pH of vermiculite is essentially neutral (7.0-9.5) but owing to the presence of associated carbonate compounds, the reaction is normally alkaline. It also will vary (become more alkaline) with changes in processing techniques and time, and with the presence of moisture. The pH, color and chemical composition of vermiculite also will vary from mine to mine. Vermiculite possesses cation exchange properties, thus it can hold and make available to the growing plant ammonium, potassium, calcium and magnesium. When mixed with peat, composted bark, organic compost, or natural soils, vermiculite like perlite helps promote faster root growth, and gives quick anchorage to young roots. These mixes

help retain air, plant food, and moisture, and releases them as needed by the plant. Because vermiculite is very light and easy to handle, it easily mixes with soil, peat, composted pine bark and other composted organic materials, fertilizers, pesticides and herbicides. And when used as a carrier or bulking agent, it ensures more even distribution.

## Some Notes from <u>The Plant Propagator's Bible</u> by Amanda Smith

- ALWAYS take cuttings from the current season's growth
- Take cuttings early in the morning, while the stem is full of water
- Place cuttings immediately in water or wrap them in wet paper towel
- Wipe your knife with a cloth soaked in bleach solution before each cut
- In the stem, the meristem located at the tip of each shoot is called the apical meristem. Meristematic tissue found in the axil of each leaf is known as the axillary meristem.
- The stem tip produces plant auxins, compounds that are similar to hormones and suppress the growth of secondary stems. If you pinch off the tip of the stem, you remove these auxins, and the topmost leaf nodes begin to develop. They will then produce their own auxins to suppress the growth of nodes below them on the stem
- Woody plants have an additional site for meristematic tissue, the cambium, located just underneath the bark.

**Stem cuttings**

- Greenwood cuttings (slightly older than softwood cuttings, younger than semi-ripe
- *Softwood cuttings (in early to midsummer, grasp the end and bend it back on itself, about 6" from the tip at a 90 degree angle. If it snaps it's the right stage
- *Semi-ripe (between greenwood and hardwood) having soft growth at the stem tip and much harder growth 6-8" down
- Hardwood –taken on wood typically in the dormant stage, using a straight cutting, heel cutting, mallet cutting

* She suggests wounding the stem by removing an inch-long slender strip of bark from the base of the cutting

**Conifer Cuttings**

- Take conifer cuttings from side shoots growing in the middle to the lower sections of the shrub or tree; these root better than the top parts
- These may be 2 yr old wood
- Use a mallet cutting – one that includes about 1/2 to 1" of the branch from which the stem grows. Best on juniper
- Use a heel cutting – a sliver of the bark and some of the interior of the wood from which the cutting emerges. Also works on conifers
- Use stems 4 to 5" long
- Strip the bottom leaves from the cutting
- Use a hardwood type rooting compound

**Cane Cuttings**

- Works on Chinese Evergreens, Ti Plant, Dracaena, Dumb Canes
- Cut off the top growth or the entire cane
- Cut the cane into pieces, each piece having at least one joint, preferable more (2-4" lengths)
- Place the canes horizontally on a flat of media, burying them no more than half their width

- Cover to keep humidity levels high
- Monitor – remove the cover as soon as shoots are forming
- Pot the plant once it has roots and a strong shoot

## Plant Propagation by Leaf, Cane, and Root Cuttings: Instructions for the Home Gardener

### Leaf Cuttings

Some, but not all, plants can be propagated from just a leaf or a section of a leaf. Leaf cuttings of most plants will not generate a new plant; they usually produce only a few roots or just decay. Because leaf cuttings do not include an axillary bud, they can be used only for plants that are capable of forming adventitious buds. Leaf cuttings are used almost exclusively for propagating some indoor plants. There are several types of leaf cuttings.

**Leaf-petiole** - Remove a leaf and include up to $1\frac{1}{2}$ inches of the petiole. Insert the lower end of the petiole into the medium (Figure 1). One or more new plants will form at the base of the petiole. The new plants are then severed from the original leaf-petiole cutting and the cutting may be used once again to produce more plants. Examples of plants that can be propagated by leaf-petiole cuttings include African violet, peperomia, episcia, hoya, and sedum.

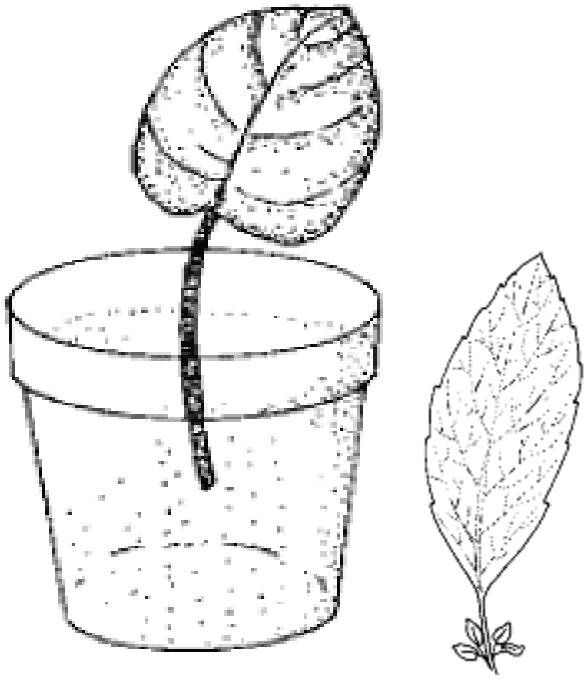

**Figure 1.**

**Leaf without a petiole** – This method is used for plants with thick, fleshy leaves. The snake plant (Sansevieria), a monocot, can be propagated by cutting the long leaves into 3- to 4-inch pieces. Insert the cuttings vertically into the medium. African violet, a dicot, can also be propagated from the leaf blade itself. Cut a leaf from a plant and remove the petiole. Insert

the leaf vertically into the medium making sure that the midvein is buried in the rooting medium (Figure 2). New plant(s) will form from the midvein.

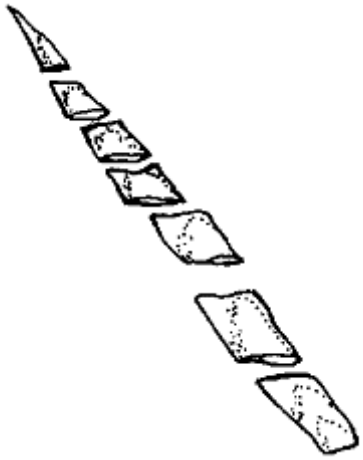

**Figure 2.**

**Split-vein** – Detach a leaf from a rex begonia and remove the petiole. Make cuts on several prominent veins on the underside of the leaf (Figure 3). Lay the cutting, lower side down, on the medium. If the leaf curls up, hold it in place by covering the margins with rooting medium. New plants will form at each cut. A variation of this method is to cut the leaf into wedges, so that each piece has a main vein. The leaf wedge should be inserted into the media with the main vein partially covered.

**Figure 3.**

**Leaf-bud Cuttings**

Leaf-bud cuttings are used for many trailing vines and when space or cutting material is limited. Each node on a stem can be treated as a cutting. This type of cutting consists of a leaf blade, petiole, and a short piece of stem with an attached axillary bud. Place cuttings in the medium with the bud covered ($^1/_2$ to 1 inch) and the leaf exposed (Figure 4). Examples of plants that can be propagated in this manner include clematis, rhododendron, camellia, jade plant, rubber plant, devil's ivy, grape ivy, dracaena, blackberry, mahonia, and heart-leaf philodendron.

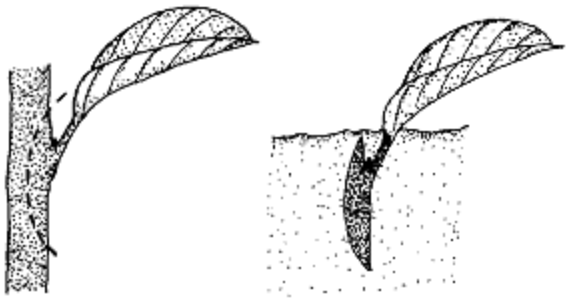

**Figure 4.**

**Cane Cuttings**

Cane cuttings provide an easy way to propagate some overgrown, leggy house plants such as dumbcane, corn plant, Chinese evergreen, and other plants with thick stems. Leafless stem sections (2 to 3 inches long) are cut from older stems. Each cane should have one or two nodes (Figure 5). Lay the cutting horizontally on the medium, or insert it vertically with about half of the cutting below the surface of the medium, and leave a bud facing upward. Cane cuttings are usually potted when roots and new shoots appear.

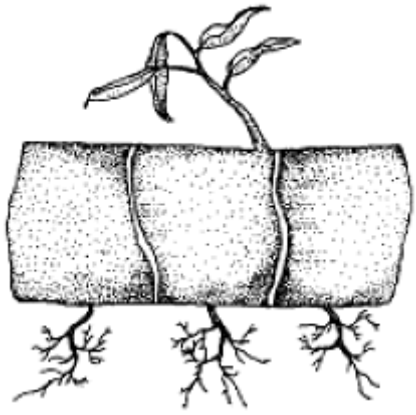

**Figure 5.**

**Root Cutting**

Some plants can be propagated from a section of a root. Root cuttings of woody plants are usually taken from plants during the dormant season, when carbohydrate levels are high. Root cuttings of some species produce new shoots, which then form their own root system, whereas root cuttings of other plants develop root systems before producing new shoots. Examples of plants that can be propagated from root cuttings include raspberry, blackberry, rose, trumpet vine, phlox, crabapple, fig, lilac, and sumac.

Plants with large roots are normally propagated outdoors. The root cuttings should be 2 to 6 inches long. Make a straight cut on the proximal end (nearest the crown of the parent plant) and a slanted cut on the distal end (furthest from the crown) of each root cutting. Tie the cuttings in bundles with all the same type ends together.

It is important to maintain the correct polarity of the cuttings. Store for 3 weeks in moist sawdust, peat moss, or sand at 40 °F. Remove from storage. Space the cuttings about 2 to 3 inches apart in well-prepared garden soil. The tops of the cuttings (proximal ends) should be 2 to 3 inches below the soil surface.

For plants with small roots, cut the roots into 1 to 2 inch sections. Lay the cuttings horizontally on the medium surface in a flat and cover with about $^1/_2$ inch of soil or sand. Place the flat inside a plastic bag or cover with a pane of glass. Place the flat in the shade and remove the protective cover after new shoots appear.

**For Further Reading**


- Bryant, G. 1995. *Propagation Handbook*. Stackpole Books: Mechanicsburg, Pennsylvania.
- Dirr, M. A. and C. W. Heuser, Jr. 1987. *The Reference Manual of Woody Plant Propagation: From Seed to Tissue Culture*. Varsity Press: Athens, Georgia.
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## Plant Propagation by Layering: Instructions for the Home Gardener

Stems that are still attached to their parent plant may form roots where they come in contact with a rooting medium. This method of vegetative propagation is generally successful, because water stress is minimized and carbohydrate and mineral nutrient levels are high. The development of roots on a stem while the stem is still attached to the parent plant is called *layering*. A layer is the rooted stem following detachment (removal) from the parent plant.

Some plants propagate naturally by layering, but sometimes plant propagators assist the process. Layering is enhanced by wounding the stem where the roots are to form. The rooting medium should always provide aeration and a constant supply of moisture.

**Types of Layering**

**Simple layering** can be accomplished by bending a low growing, flexible stem to the ground. Cover part of it with soil, leaving the remaining 6 to 12 inches above the soil. Bend the tip into a vertical position and stake in place (Figure 1). The sharp bend will often induce rooting, but wounding the lower side of the bent branch may help also. Simple layering can be done on most plants with low-growing branches. Examples of plants

propagated by simple layering include climbing roses, forsythia, rhododendron, honeysuckle, boxwood, azalea, and wax myrtle.

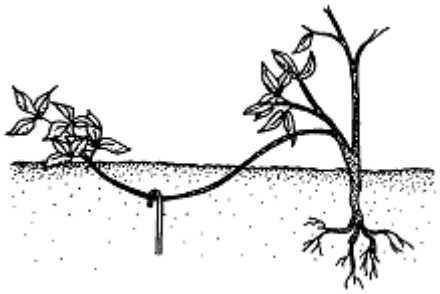

**Figure 1. Simple layering**

Simple layering can be done in early spring using a dormant branch, or in late summer using a mature branch. Periodically check for adequate moisture and for the formation of roots. It may take one or more seasons before the layer is ready to be removed for transplanting.

**Tip layering** is quite similar to simple layering. Dig a hole 3 to 4 inches deep. Insert the tip of a current season's shoot and cover it with soil. The tip grows downward first, then bends sharply and grows upward. Roots form at the bend. The re-curved tip becomes a new plant (Figure 2). Remove the tip layer and plant it in late fall or early spring. Examples of plants propagated by tip layering include purple and black raspberries, and trailing blackberries.

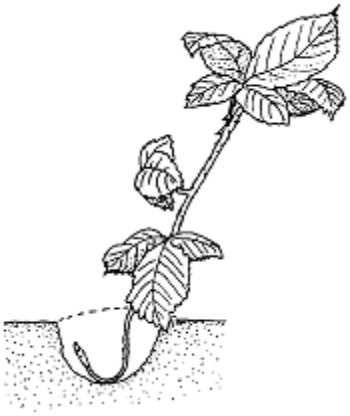

**Figure 2. Tip layering**

**Compound (serpentine) layering** is similar to simple layering, but several layers can result from a single stem. Bend the stem to the rooting medium as for simple layering, but alternately cover and expose sections of the stem. Each section should have at least one bud exposed and one bud covered with soil. Wound the lower side of each stem section to be covered (Figure 3). This method works well for plants producing vine-like growth such as heart-leaf philodendron, pothos, wisteria, clematis, and grapes.

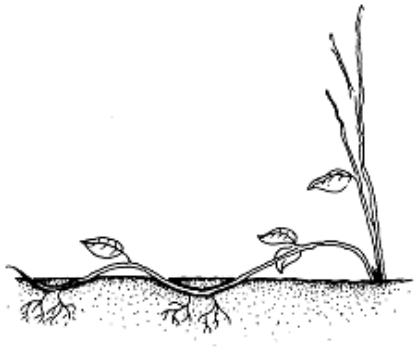

**Figure 3. Compound layering**

**Mound (stool) layering** is useful with heavy-stemmed, closely branched shrubs and rootstocks of tree fruits. Cut the plant back to 1 inch above the soil surface in the dormant season. Dormant buds will produce new shoots in the spring. Mound soil over the new shoots as they grow (Figure 4). Roots will develop at the bases of the young shoots. Remove the layers in the dormant season. Mound layering works well on apple rootstocks, spirea, quince, daphne, magnolia, and cotoneaster.

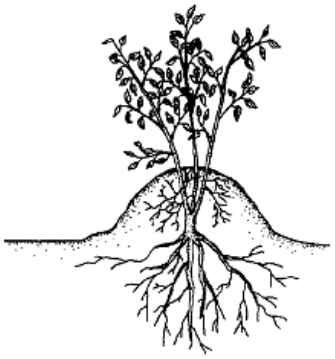

**Figure 4. Stooling**

**Air layering** can be used to propagate large, overgrown house plants such as rubber plant, croton, or dieffenbachia that have lost most of their lower leaves. Woody ornamentals such as azalea, camellia, magnolia, oleander, and holly can also be propagated by air layering. For optimum rooting, make air layers in the spring on shoots produced during the previous season or in mid to late summer on shoots from the current season's growth. For woody plants, stems of pencil size diameter or larger are best. Choose an area just below a node and remove leaves and twigs on the stem 3 to 4 inches above and below this point. This is normally done on a stem about 1 foot from the tip.

Air layering differs, depending on whether the plant is a monocot or a dicot. For monocots, make an upward 1- to 1 1/2-inch cut about one-third through the stem. The cut is held open with a toothpick or wooden match stick. Surround the wound with moist, unmilled sphagnum moss (about a handful) that has been soaked in water and squeezed to remove excess moisture. Wrap the moss with plastic and hold in place with twist ties or electrician's tape. No moss should extend beyond the ends of the plastic. Fasten each end of the plastic securely, to retain moisture and to prevent water from entering. If exposed to

the sun, the plastic should be covered. Aluminum foil can also be used, as it does not require twist ties or tape to hold it in place.

The process for dicots is similar, except a 1-inch ring of bark is removed from the stem. With a sharp knife, make two parallel cuts about an inch apart around the stem and through the bark and cambium layer (Figure 5). Connect the two parallel cuts with one long cut. Remove the ring of bark, leaving the inner woody tissue exposed. Scrape the newly bared ring to remove the cambial tissue to prevent a bridge of callus tissue from forming. Application of a root-promoting substance to the exposed wound is sometimes beneficial. Wrap and cover using the same procedure as that described for monocots.

**Figure 5. Air layering**

After the rooting medium is filled with roots, sever the stem below the medium and pot the layer. The new plant will usually require some pampering until the root system becomes more developed. Provide shade and adequate moisture until the plant is well established.

**Natural Forms of Layering**

Sometimes layering occurs naturally, without the assistance of a propagator. Runners and offsets are specialized plant structures that facilitate propagation by layering.

A runner produces new shoots where it touches the growing medium (Figure 6). Plants that produce stolons or runners are propagated by severing the new plants from their parent stems. Plantlets at the tips of runners may be rooted while still attached to the parent or detached and placed in a rooting medium. Examples include strawberry and spider plant.

**Figure 6. Offsets**

Plants with rosetted stems often reproduce by forming new shoots, called offshoots, at their base or in the leaf axles. Sever the new shoots from the parent plant after they have developed their own root systems. Unrooted offsets of some species may be removed and

placed in a rooting medium. Some of these must be cut off, whereas others may simply be lifted from the parent stem. Examples include date palm, bromeliads, and many cacti.

**For Further Reading**


- Bryant, G. 1995. *Propagation Handbook*. Stackpole Books: Mechanicsburg, Pennsylvania.
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## Rooting Roses using Softwood Cuttings

Take a cutting that at least has color showing in the bud - this is an indication of the maturity of the wood in the stem. More mature is OK - I do it a lot after the flower has died, but it should be from this year's growth. It is preferable have at least a five leaflet set at the bottom of the cutting, but this isn't necessary. I'm not going to say how thick or long the cutting should be since it depends greatly on the rose variety. Cuttings from micro miniatures such as Tom Thumb or Cinderella can be pencil lead thin and only an inch and a half long, or the cuttings can be half an inch thick and a foot long from a tall growing rose with budeyes spaced far apart. What's most important is that the cutting has healthy bud eyes.

Don't use stem on stem. For the once blooming old garden roses, use the stem produced this year, not last year's growth, even if it is only a couple of inches long. Some people like a "heal" (part of the old cane) on the bottom of the cutting, but I find it makes no difference. Actually, I prefer not taking a heal because it damages the old cane. Make sure the bud eyes are healthy, since they are where the new growth will come from. Use cuttings where the bud eyes haven't started growing yet. It may not be possible to get a cutting where all the bud eyes aren't growing, so pinch out any soft new growth from those that are growing. This soft new growth will just die anyway and might contribute to rot. If some of these terms, such as stem on stem don't make any sense, click on this rose image for a labeled drawing.

If you can't root the cutting right away, keep it moist by placing it in water just as you would a cut flower or by wrapping the end in wet paper towel and placing it in an air tight container such as a ziplock baggie or a tupperware container. Actually, you can root roses from those in a bouquet - that's how I came by my Felicite Parmentier, Cecile Brunner and a few of my unknown roses. Keep the cuttings out of the sun and wind.

Remove the flowering part, strip off the bottom two sets of leaves and score the bottom part of the stem along its length an inch or so. Roots will form along this score. To score the cutting, you can use a knife, pin (or even a sharp fingernail) and scratch just through the surface to the pith underneath.

Don't remove all of the leaves, just those that will be underneath the soil. The cutting needs the leaves to produce roots, but those under the soil will just rot. The leaves can be trimmed back if there is a problem fitting them into the baggie. For more information on how to prepare the cutting, refer the image obtained by clicking on the cutting image.

Fill a gallon zip lock baggie 1/4 to 1/3 full with moist (not wet) STERILE loose potting mix. I use 1/2 Peter's potting soil and 1/2 perlite or vermiculite. The bag will should have about 2 1/2" of potting soil and the soil should be able to clump together when squeezed, but not drip water. With your hands, firm the soil down well, within the baggie.

You may want to use a rooting compound, especially on hard to root varieties. Poke a hole into the soil in the baggie where the cutting will go. Carefully insert the cutting a couple of inches into the hole. Continue to inserting cuttings until you are done. I've managed to root over 20 cuttings of miniatures in a one gallon baggie, but don't recommend it because of the difficulty getting the roots detangled later. Four or five are usually enough to fit in one baggie. Once all the cuttings are inserted, gently squeeze the soil in the baggie by placing your hands on each side and pushing in until the holes are closed up and the soil is making good contact with the cuttings. Now, take something with a spout such as a measuring cup and fill it with one quarter to one half a cup of water. Gently pour a tiny amount of this water right at the point where the cutting sticks into the soil. This helps the soil stick to the cutting and removes air pockets. Don't use too much water or the soil will get too wet and the cutting will rot.

Inflate the baggie by blowing into it and zip it shut.

Put in bright, indirect light - if it gets direct sun it will cook. I've used both indirect sunlight, and more recently fluorescent light. If using fluorescent light, use at least a double bulb light (a shoplight works great) and have the bulbs just 2 to 4 inches from the tops of the baggies. If you use a window, you may have to experiment a bit to find the best exposure. What ever light source you use, just place the baggie there and ignore it for awhile. You don't need to add any water, nor do you need to reinflate the baggie if it starts to deflate some. The cuttings don't seem to mind.

If any leaves drop from the stem, you can remove them and reinflate the baggie. If you pick up the baggie, such as for checking for roots, and the soil cracks away from the cuttings, just put the baggie back down and gently press the sides until the crack in the soil is closed.

In about a month, you should see roots forming in the soil. The roots on rooted cuttings tend to head down to the bottom of the baggie where they then spread out like the arms of an octopus. When you have plenty of roots, you can start to harden the cutting off. Don't rush it. I usually like to wait until there is also plenty of top growth. Some roses are good at producing top growth before they produce roots. This can cause some people to think that the rose has rooted when it actually hasn't yet and they make the mistake of trying to harden the cutting off too early. In this case just wait. I've never had success hardening off a cutting that didn't show roots. Other roses are good at producing lots of roots but are slow to produce top growth. You can successfully harden off the cutting at this point. But it doesn't hurt at all to wait. I've left cuttings so long in the baggie that they bloomed.

Miniatures and polyanthas such as Mari Pavie are good at setting buds and blooming while still in the baggie.

Once you are convinced that the cutting has enough roots, unzip the baggie about an inch. Unzip a little more every day for about a week. If any any time the cuttings start to look shriveled, zip the baggie back up and leave it for a few days before starting to harden it off again. Once the baggie is fully open, transplant to a pot and protect from too much direct sun for a while. In order to get the cutting out of the bag, you can cut the baggie down the sides and lay it out flat with the cuttings and dirt sitting in the middle. Then you can separate the cuttings. Try to keep the dirt on the roots as much as you can, but don't worry if this is impossible when detangling a mess of roots. (Don't do like I often do and wait until the roots are a tangled mess before potting the cuttings up)

Some notes:

- There is a BIG difference between cultivars in how long it takes them to breakout. Some will show roots by the end of ten days, others will take more than 6 weeks. If the cutting is still green there is hope.
- Don't use diseased cuttings. Blackspot and Mildew just LOVE the closed, humid environment of a baggie.
- If the leaves drop, don't panic. The cutting may still root.
- Reasons the leaves drop: diseases such as blackspot will definitely cause them to drop. Inadequate light will cause them to drop.
- If the soil is too dry, the cuttings will shrivel, if it is too moist they will rot and turn black.
- If there are any black or rotting leaves or cuttings in the baggie, just open it up and remove them.

Zip lock baggies can be used to root plants other than roses. Some of the plants I've had an easy time rooting in baggies are:

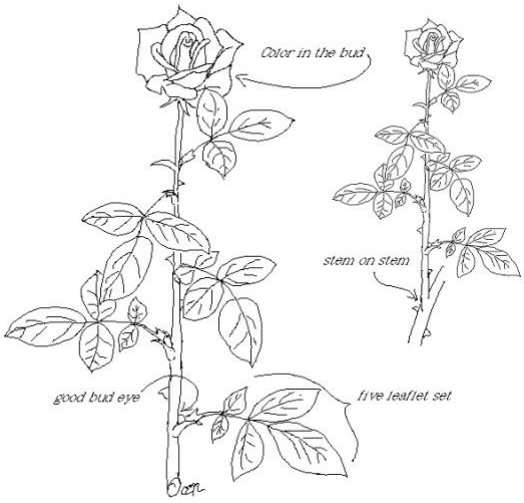
Tomatoes - tomatoes are incredibly easy to root from cuttings. Just cut off several pieces that will fit in the baggie and stick them in the soil the same way you would rose cuttings. Roots are usually visible in under a week. You can get good sized tomato plants faster than by seed this way.

Stevia - this herb is currently in vogue and can be quite expensive. I find it roots fairly easily in about three weeks. Cuttings from non-blooming plants root the easiest.

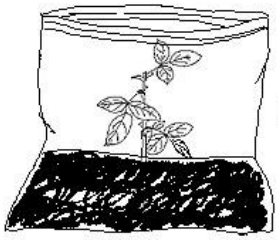
Salvias - I've rooted the following salvias in two to three weeks: Pineapple Sage - Salvia elegans, Lady in Red, Indigo Spires, and Gentian Sage - Salvia patens.

Various thymes such as English Thyme and Lemon Thyme root easily.

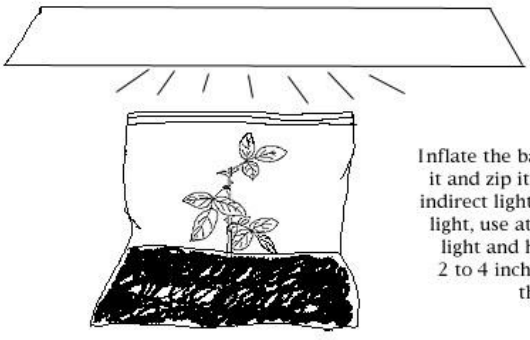
Lemon Verbena roots easily.




Fill a gallon zip lock baggie 1/4 to 1/3 full with moist (not wet) STERILE loose potting mix.



Dip end of cutting into rooting compound and stick it a couple of inches into the soil.



Inflate the baggie by blowing into it and zip it shut. Put in bright, indirect light. If using fluorescent light, use at least a double bulb light and have the bulbs just 2 to 4 inches from the tops of the baggies.

http://members.fortunecity.com/cnetter/rose_tour/rose_cut.html

# Rhizomes and Tubers

## What is the difference between a stolon, rhizome, tuber, corm or bulb?

*From Aggie Horticulture*

**Stolons** are stems that creep horizontally above ground.

- These stems or runners contain nodes or joints. Nodes are where the new roots and plants develop.
- Plants such as strawberry and spider plant have stolons.
- Division can be made by separating sections containing a node and then planting the section.

**Rhizomes, tubers, bulbs and corms** are actually underground stems, not roots. These underground stems are storage containers for the plant.

**Tubers** are thickened terminal portions of the stem.

- They are usually fat, round and knobby and do not grow horizontally.
- They have eyes or buds that create new shoots which will become new plants.
- Tubers can be cut into sections containing at least one eye per section.
- Caladiums, cyclamen and tuberous begonia are all tuber plants.

**Rhizomes** are stems that grow horizontally, but rhizomes grow underground and generally have a thickened stem that is used for storage.

- Rhizomes have eyes or buds that appear along the top and sides, which grow upward to produce new stems and foliage.
- Some rhizomes are fleshy like the iris and some are slender and elongated with internodes as in Bermudagrass.
- To propagate, cut into sections containing at least one eye and plant.

A **bulb** actually contains the embryo of a new plant.

- If a lengthwise cross section cut were made you would see a tiny stem and flower as well as fleshy modified leaves called scales encircling the embryo.
- These scales serve as food reserves for the tiny plant.
- There are two types of bulbs.
- One is like an onion with an onion-like skin called a tunic, as in tulip.
- The other has overlapping scales like garlic and no outer skin, such as lilies.
- Propagate by dividing bulbils (lateral buds on the base plate) off bulb and replanting or storing until the next planting season.
-

**Corms** are similar to bulbs but do not have fleshy scales.

- Corms are either rounded or slightly flattened at the top and have dry scale-like scales held together at the basal plate where the roots grow.
- The parent corm dies back but produces cormels or cormlets from buds on the top or side of the original corm.
- Large new corms may flower the following year, but the smaller cormels may take several years to bloom.
- Cormels can be divided from the shriveled parent corm and planted separately.

- Gladiolus and crocus are examples of corm plants. **Dividing Rhizomes**

**LIFT** Dig up the entire rhizome of the plant you want to divide, trying not to damage the root system

**EXAMINE** Divisions will reestablish best if they have at least 2 growth buds with leaves growing from them as well as many roots

**CUT** Use a very sharp knife to cut the divisions. A dull knife can bruise tissues because you have to press so hard on it

**TRIM** Cut back the leaves so that the plant isn't stressed by having to provide water for a large leaf area

**PLANT** Replant the rhizome at the same depth it was growing, and water it well to exclude air pockets from around the roots.

*From The Propagator's Bible by Miranda Smith*

- Spring blooming rhizomes should be divided in the fall and fall blooming rhizomes should be divided in the spring

- Divide every 3-5 years for healthy plants

**Dividing Tubers**

**DIG** Let the tubers rest for a week after the top growth has been killed by frost or you have cut it. This allows for the skin to harden. Dig at least a foot away from the stems on all sides to avoid injuring the tubers

**DRY** Let the soil around the tubers dry out before you handle them

**CUT BACK** Cut back the stems to several inches above the tubers. Next year's eyes will grow from the same area, so it's important to check for disease
or broken necks, if you find any, discard the tuber.

**WASH** Gently wash the tubers again to get all of the soil off. Let their surfaces dry completely.

**CUT** Cut the tubers apart so that you can grow them without crowding the next year. Make sure each tuber has at least one eye. If not, leave it attached to a tuber that does.

**PACK** Dry the tubers overnight and then pack them, upside down, on top of a layer of sand or peat moss in a sturdy box.

*From The Propagator's Bible by Miranda Smith*

**Dividing Iris**

As everyone who raises iris knows, sooner or later you have to divide your iris.
Here are a few pictures of that process

 This is a clump, ready to dig

 Here is that same clump, lifted from the ground and washed so you can see how the rhizomes connect together.

 This is that same clump, split apart. There are 7 rhizomes to replant and 2 spent bloomstalks to throw away.

This is a picture of one of the rhizomes, still wet from being washed. See the "babies" along the side? This one is ready to have it roots and foliage trimmed so it can be replanted.

# Cold Stratification

- Some seeds will not germinate unless they have experienced a winter outside
- To overcome this, we need to provide moist chilling to simulate winter.
- Inside cold stratification can provide even chilling temperatures and requires less space than sowing outside until seed viability is guaranteed
- During stratification seeds are undergoing chemical changes that will allow eventual germination.
    - The seeds must have imbibed water (hard seed coat must be treated)
    - The seeds needs adequate oxygen, proper temperature and proper length of time exposed to certain temperatures
- Optimum temperatures for cold stratification are 32-41 degrees F.

Pulsing – this may condense the length of cold storage into a shorter period
After 2 weeks in the refrigerator, remove and let the bags warm up for 6-24 hours, then return to the refrigerator. Repeat at 2 week intervals

Double Dormancy - Some seeds need warm moist temperatures before cold stratification, such as Black-haw viburnum and American holly. This is because the seeds embryos are immature at the time of harvest and must be allowed time to completely develop before they will germinate.

Some seeds, like conifers, need alternate freezing and thawing

**Method 1** – put seeds in a jar, layered with moist sand, seal, and bury the jar

**Method 2** – put seeds in a poly bag with moist sand, sphagnum moss, or a peat/perlite mixture, seal it, place it in the salad compartment of the refrigerator for 6-8 weeks, then sow outside. If the bag is not sealed, it must be misted periodically to prevent drying.

**Method 3** (from Antique Rose Emporium)
Use a tray or 6 cell pack
Moisten fine potting medium and fill the trays
Bury the rose seed about ¼-½" in the media
Put the tray in a FREEZER bag and seal
Put in the refrigerator for 6-8 weeks.
Check periodically after 6 weeks for sprouts
After sprouting or 8 weeks, remove tray and set in a warm sunny location

Some chilling times for seeds, from <u>The Plant Propagator's Bible</u> by Amanda Smith

| | | | |
|---|---|---|---|
| Columbines | chill 2-8 weeks, | Clematis | 3 months |
| Larkspurs | 6 weeks | Coneflower | 3-6 weeks |
| Gayfeather | 6 weeks | Lavender | 4 weeks |
| Salvias | 1 week | | |

Black-eyed Susan freeze 1 week, then chill 1 week
Sweet pea chill 2-3 weeks, soak 48 hours

## Seeding Plants

**Temperature Needs**

- For germination – Constant 75 to 80°F
- For growth - Constant, 65 to 70°F during day, 55 to 60°F during night

**Humidity**

- Seeds in a moist soil mix not affected
- Seedlings 50-60% humidity, generally

**Starting Seeds - general**

- Start with soil moistened to proper amount
- Poke a hole with a dibble stick to the proper depth for the seed type; marking the depth on the dibble stick helps
- Place the seeds into the hole or furrow
- Mist with a hand mister
- Cover the seed with soil or vermiculite and mist again
- Cover the flat or pot with film, soda bottle, TV dinner top, etc. to retain humidity.
- Put a newspaper on top if surface seed and dark requirement
- Water gently or mist to keep soil only moist until seedling comes up

**Fine Seeds**

- Fill pot with regular potting mix to about 1" below the regular level
- Fill with fine granulated potting mix to regular level or you can deduct the seed depth, such that you can put the seed on the soil top and then add the proper amount of soil on top of it.
- Mist the mix thoroughly with a hand mister
- Sow the seed carefully, trying not to over seed
- Mist again, cover with soil if needed, and mist one more time. Continue as above
- A seeding device, like a dial seed sower can be useful for small seeds

## Scarification – Mountain Laurel

Scarification is a process of breaking, scratching, mechanically altering, or softening the seed coat making it more permeable to air and water. Used to overcome a hard seed coat.

- Basic Methods
  - Nick the seed coat with a very sharp knife
  - Rub them with a piece of fine sandpaper
  - Soak the seed in hot water, usually 24 hours; it helps to keep replacing the water. Seeds should swell.

For class:

- Each intern should try 2 seeds:
- Identify the small indent on the seed where the growth will take place. DON'T DAMAGE THIS SPOT!
- Seed #1: With a sharp knife, nick the seed on the opposite side or near the bottom. You want to go deep enough to see very light pink, or the whitish/yellowish cotyledon-- but barely.

- Seed #2 With 100-120 grit sand paper or a metal file, rub the seed until you have a very light pink spot or barely see the whitish/yellowish color. You will notice as you sand that the area will become flatter, and you may see some black coloring.
- It helps to soak the seed in warm water overnight or until the seed starts to swell.
- If it doesn't swell, you can repeat the sanding process and go deeper.
- Plant the seed immediately after soaking it or it will die.
- Plant it in regular moistened potting soil about ½" deep.

## Cold Stratification – Rose Hips

Cold Stratification – Moist chilling - seed is placed between layers of moist paper towel or sphagnum moss or potting media and exposed to chilling temperatures (about 40°F).

- The rose hip should be broken open to get the seeds out. You can use a knife – it's hard to hurt it. The seeds will be roughly 3/16" and kind of rough irregular shape. A good seed will be tan in color. Green seeds are not ripe enough. You can try the floater test with them (good seeds sink), but it is far from absolute, so plant them all anyway
- Clean the seeds of all material from the hip; they may be soaked to help this.
- Fill a small flat at least 2" deep (one that can fit in a freezer bag) with potting media, fine peat moss, or a combination with pearlite and/or vermiculite. Moisten the media first so that it can be uniformly moist. It should NOT be wet, but moist.
- Dig a ½" deep hole with a dibble stick and put the seed in and cover it. You can put the seeds about 1" apart.
- Place the flat in a food freezer bag – a gallon size is good – and seal it.
- Put the bag in the refrigerator, NOT freezer, for 6-8 weeks, checking weekly for growth after about a month.
- As soon as a seedling appears, remove the bag from the refrigerator and place in bright light until first true leaves appear. Seedlings can be carefully transplanted to their own container at this time – or wait a little.
- NOTE: Germination is very low, even for professionals. Expect between 10 and 25% of the seeds will germinate.
- A good reference is How to Grow Roses from Seed - http://scvrs.homestead.com
- Also Rose Hybridizers Association http://www.rosehybridizers.org/

A ripe rose hip


Rose seeds

## Other Scarification Methods

**Acid Scarification**
Acid "thins" the seed coat
Sulfuric acid is used – twice the volume of seeds in a beaker
Dangerous to do, and dangerous for disposal of the acid

**Sodium Hypochlorite (household bleach)**
Mix a 1:10 ratio with water and soak
Must be rinsed for 2 hours to avoid damaging seed

**Hot water**
Boil water
Put seeds in a mesh bag
Seeds are immersed in the hot water for prescribed time and then immediately immersed in cold water until cooled

**Active Yeast**
Cleaned seeds are aerated for 2 weeks in a solution of warm water to which active yeast and a teaspoon of sugar has been added

## Seed Nomenclature

Genera or genus – a category of classification between a family and a species – the equivalent of your last name
Species – the basic unit of classification; a population capable of interbreeding freely with one another but do not in nature interbreed with members of other species – the equivalent of your first name
Form or variety – a naturally occurring variation from the straight species; ex. may have a different flower color. Signified by *f.* or *var*.
Cultivar – when plants of the same species are bred to produce a distinct variation that has specific desirable characteristics (engineered by humans. Name appears in single quotes.
Hybrid – a man-made cross between different species or different genera; denoted with an x before or in the middle of the plant name
Nomenclature:Genera – Species – Variety or form

**Damping Off** – (a fungus disease)

***How to Avoid It:***

- Sterilize all containers and tools
- Use only sterile growing media
- Sow seeds thinly to allow air circulation between seedlings; thin promptly
- Thoroughly moisten growing medium with chestnut compound (copper sulfate & ammonium carbonate) (from From Seed to Bloom)
- Water seed trays from below
- Allow seedlings to develop 3 true leaves before fertilizing

***What to do if you see it:***

- Remove the seedling and its neighbors from the container
- If soil is too moist, move container away from other containers to increase air circulation; place absorbent material on the soil surface, such as crushed charcoal

**Companion Plants – interesting facts**

- Plants can change the chemistry of the soil
- Plants can influence the type of microorganisms in the soil
- Some will poison their neighbor's offspring to maintain a competitive advantage
- 2000 years ago Varro, a Roman agriculturalist declared nearby walnut trees made the border of the farm sterile
- Insecticides derived from plants include rotenone, sabadilla and ryania
- Alfalfa and clover enrich the soil with nitrogen they capture from the air
- Certain trees move groundwater to the surface helping shallow rooted plants
- Native American "Three Sisters" – corn, beans, and squash are an example
    - Corn stalks provide structure for climbing beans
    - Beans don't compete for nutrients as they supply their own nitrogen
    - Squash provides a dense ground cover that shades out weeds
- **Groups of plants that grow well together are called "companions"**
- **Cover crops** – deeply rooted plants move nutrients from the subsoil to the aboveground parts, and when plants decompose, the nutrients become available for subsequent crops
- **Enhanced environmental conditions** –
    - shade trees for plants that grow better there
    - maple trees move groundwater upward
- **Reducing pest damage**
    - Defensive chemicals that may be insect poisons
        - Marigolds can help eliminate certain nematodes
    - Strong scents – confuse insect pests looking for a host to feed on (herbs)
- **Trap crops** – using a host plant to draw insects to feed on it rather than nearby plants of a different type
- **Beneficial insects** – plants that lure beneficial insects that will feed on insects attacking nearby plants

**Companion Plants - guidelines**

- Avoid monoculture – a one hundred foot row provides a large target for an insect pest – scattered plants, interplanted with others is less obvious

- Know thy friends and avoid killing them inadvertently. Less than 1% of insects are garden pests
- Plant dill, marigolds, chives, onions, parsley, basil and other flowers throughout the garden
- Allow parsley, carrot and celery to remain in the ground over winter – their flowers attract beneficial insects
- Plant strong smelling herbs among vegetable crops

## Collecting Seed

When to collect

- For Texas, most seeds are ready to collect mid-summer and continuing through fall
- Some seeds are ready other times of the year
- Early spring or dry summer may cause very early seed ripening
- High winds or rainstorm may cause loss of an entire crop of seeds
- Some seeds do not produce good seed crops every year
- Seeds may mature at different rates on the same plant
- Some plants only produce seed crops every 3-5 years

How to identify a good candidate for collection

- Choose healthy, thriving plants with average or superior growth rates
- Collect seeds from plants with good qualities of flowering, fruiting, form
- Isolated plants may not have had adequate cross-pollination
- Seeds are ripe when there is no more increase in fresh or dry weight
- Mature seeds are usually somewhat dark in color, filled out and firm
- Some seeds turn reddish and then blue-purple when ripe
- Seeds should be free of insect damage or mold
- Immature seeds produce weak, deformed seedlings
- Seeds in a pod should be collected just before the fruit turns brown and dries.
- Some seeds with high moisture content (walnuts, acorns, buckeyes) must be kept moist; if allowed to dry out, they will either germinate prematurely or not at all
- Seeds that are forcibly ejected from capsules can be collected when the capsules are beginning to ripen and have turned yellow-brown; store in paper bags to catch the seeds