

Woody Propagation Basics

By Brie Arthur

Introduction

Asexual propagation, or rooting cuttings, is the one the easiest and most effective ways to maintain an individual trait that best represents a variety. In fact, asexual propagation, or cloning, is how all cultivars are produced, because you cannot guarantee that plants grown from seed will have identical traits. The 'Bartlett' pear (1770) and the 'Delicious' apple (1870) are two classic examples of plants that have been asexually propagated for many years due to the desirable traits they each posses.

There are several methods of producing plants asexually: cuttings, layering, division, tissue culture and grafting. My preferred method of plant propagation is rooting cuttings, which involves taking healthy pieces from the parent plant and propagating them in a mist house. A cutting is a vegetative plant part, often a tip, which is severed from the parent plant in order to regenerate itself, thereby forming a new plant on its own roots.

Many types of plants, both woody and herbaceous, are propagated by cuttings. It is an efficient method for producing many plants off a single specimen and is the most common way plants are propagated in the professional nursery trade.

As a home gardener it is fun to experiment with producing plants, particularly those with special meaning shared by family friends. Do not get discouraged if you aren't always successful... Some plants are just hard to propagate! Many woody specimens require special facilities and care and are best purchased from a local supplier. However, there are hundreds of herbaceous species that "root like weeds", enabling you to have a garden full of treasures you grew for yourself!



General Information

Rooting herbaceous material is a gratifying way to fill your garden with color without spending a lot of money. Plants such Coleus, Sweet Potato Vine and New Guinea Impatiens root in water in 8-12 days. They can also be stuck in media as a 3-5 node piece, like a traditional cutting. Vigorous softwood herbaceous cuttings root quickly and do not require a mist house. Simply stick in a shady location and keep the cuttings moist. You can create a mini greenhouse by doming a tray or adding a clear plastic bag, but make sure it is vented as to not allow heat to build up.

Propagating woody cuttings is all about balancing the rate of respiration and transpiration. Transpiration is the process through which plants lose water, and respiration is the way they acquire energy; both are vital functions in plants. In simple terms, you are trying to create an environment that allows the plant to "sweat" at a rate that does not drain its stored energy. This is why nurseries have developed propagation or mist houses. In these chambers un-rooted cuttings are placed in an environment with periodic mist of water to help reduce temperatures and compensate for water lost through transpiration. The rate of the mist changes seasonally, depending on several factors: temperature, day length, airflow, shade to sun ratio and the plant material being produced. Ideally a mist house will have a 40% shade cloth, allowing for bright but filtered, indirect exposure.

Over the years i have adjusted my propagation space from the convenience of the table top to below the bench on gravel. It seems the temperature is lower and the airflow less chaotic. I tent my space with clear plastic that is not secured to the ground, allowing it to blow in the breeze but still capture humidity.

Different types of plants will root at varied times of the year. I consider spring (April-June) to be the optimal time for rooting softwood cuttings of deciduous trees and shrubs, such as *Prunus mume* (flowering apricot), *Viburnum* and *Cornus*. It is necessary to propagate deciduous plants earlier in the season to allow them plenty of time to root and store the needed energy through photosynthesis before going dormant and dropping their leaves with cool weather and short days. If a deciduous plant roots but does not store enough energy it will not leaf out the following spring.

Mid summer (July-September) is ideal for the propagation of broad leaf evergreens, such as *Camellia*, *Rhododendron* and *Holly*. These plants root best on semi-hardwood, meaning the spring flush slightly hardened. Since broad leaf evergreens do not drop their foliage they capture energy year round. Generally broad leaf evergreens will root in 8-12 weeks. Once they are rooted, remove from mist, and sight in a shady area to acclimate the new plants to the outside environment.

Fall into winter is conifer propagation season. Many conifers are slow to root, or require grafting to grow with vigor. Conifers root best on hardwood, and can take 6-24 months in a propagation facility, often developing a large callus before roots. Conifers such as *Sequoia sempervirens* (Giant California Redwood) may require multiple wounds during the time in the mist house, often taking 15-24 months before rooted well enough to be potted. Most nurseries will incorporate bottom heat for hardwood cuttings to "trick" the plant into thinking it is still warm, allowing the naturally occurring rooting hormones to develop roots more quickly. In my experience, conifers can be the most difficult to propagate, and may be best left to the experts with the time and facilities to produce them efficiently.

Media

Use a well-drained, sterile, soilless media. The goal is not have saturated soil: remember roots grow in the air space between soil particles. I prefer to use 3 parts ground pine bark to 1 part perlite. In general, the rooting medium should be low in fertility, drain well enough to provide oxygen, but retain enough moisture to prevent water stress. Always moisten the media before inserting cuttings, and keep it evenly moist while cuttings are rooting and forming new shoots.



Containers

Additionally, use a pot that is deep and has good drainage holes. You do not need a lot of media volume, so select a pot no larger than 2" across and equally deep. Stick one cutting per pot to make transplanting easy. Communal pots will work, but you end up bare rooting the cuttings in the transplant stage. This adds stress to the plants and will likely reduce vigor.

Method

Take cuttings with a sharp blade to reduce injury to the parent plant. Spray the blade with rubbing alcohol and burn with a lighter to prevent the spread of disease. You can also dip the cutting tool in a mixture of one part bleach to nine parts water to prevent transmitting diseases from infected plant parts to healthy ones. Remove flowers and flower buds from

cuttings to allow the energy and stored carbohydrates for root and shoot formation rather than fruit and seed production.

Tip cuttings are the easiest material to select when sticking cuttings. You can work from the tip down, counting back 5-6 leaves, or approximately 2 to 5 inch piece of stem, including the terminal bud. Make the cut just below a node, where a leaf comes off the stem. Remove the bottom 2-3 leaves exposing the nodes. Lightly wound semi-hardwood and hardwood cuttings, exposing the cambium layer. This will absorb more rooting hormone, and is particularly important for woodies. Dip the stem in rooting hormone and gently tap the end of the cutting to remove any excess. Insert the cutting deeply enough into the media to support itself, and give a slight press to ensure the media is settled around the stem. If it is too loose in the media you run the risk of the fresh cuts and wound drying out. At least one node must be below the surface, ideally 2-3 nodes will be stuck in the media to ensure vigorous root development.

Rooting Hormones

Auxin (indole-3-acetic acid "IAA") is a naturally occurring growth regulator found in all plants. The function of auxin is to stimulate cell length and return the cells of stems and leaves to "square one", so to speak, so that they can become roots for means of plant production. Two synthetic auxins, indole-3-butyric acid ("IBA") and naphthaleneacetic acid ("NAA") have proven to be most effective in stimulating root growth and are the standard active ingredients in commercial rooting hormones.

Though it is not always necessary to use them, rooting hormones promote rooting, increase the number of roots and create uniform rooting much more quickly than without, particularly with woody material. There is a wide selection of hormones available in garden centers and on line. I prefer to use powder hormone, such Rhizopon #1 for my spring softwood cuttings. Summer semi-hardwood cuttings root fastest with a diluted liquid formulation of roughly 1 part IBA/ NAA to 8 parts water, such as Dip N Gro. And a gel formula, called Root-Gel has worked very well for me on my hardwood conifer cuttings.

Store the rooting hormone in the refrigerator, as it can last up to a year (or longer). To avoid contamination of the entire supply, add a small amount to a separate container for dipping cuttings.

After Care

Be patient! Do not tug on the cuttings or pull them from the soil to check their progress. Once roots develop, they are easily broken and can dry out quickly. I like to wait until I see roots coming out the bottom of the pot before I remove them from the mist. This ensures that the plants are well established and capable of normal water absorption.

Shift the newly rooted plants into a shady location and keep evenly moist. Fertilize lightly to encourage strong growth. When the plants are rooted thoroughly pot them into a larger container, one to two times the size of the plug. Use a well-drained media and grow sun-shade depending on the plant material. This final potting step will ensure a healthy garden specimen for the future.

Tips of the Trade

As a professional plant propagator I have learned these methods through trial and error. Some key tips I have picked up include:

- Take notes on everything! Keep a log including the gathered and stick dates, the source, rooting



hormone and any other information that caught your attention about the plant.

- Every propagation facility is different. Some of the most successful growers are using unsophisticated systems with great results.
- Invest in a good timer that is easy to program and alter as the seasons change. Buy a good one to start and you won't have to replace it.
- Never get discouraged. Even the professionals have crop failures and often there is no clear explanation why. Enjoy this fascinating science experiment and learn from both your successes and failures (and take notes so you will not forget!)

Best of luck! Propagation is the ultimate skill for every gardener to understand.