

Propagating Herbaceous Perennials: More Than Meets the Eye

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INTRODUCTION

Herbaceous perennials are one of the fastest growing segments of ornamental horticulture. Like woody perennials, they live from year to year. However, in most instances they are grown primarily for their floral display. The plantmen propagating and raising herbaceous perennials are neither traditional floriculturists nor nurserymen, but something in between, and use many of the cultural methods common to both groups.

Herbaceous perennials grow above ground during the growing season, but with the onset of short days and freezing weather, the tops die and the plant retreats to an underground storage organ. These storage organs assume many sizes, shapes and names. They may be fibrous roots, bulbs, tuberous roots, tubers, rhizomes, stolons, crowns, or pips. These storage organs all share the same function, acting as a reservoir of growth regulators, water, and nutrients which propel the plant into growth the following season. They also share many propagation similarities with woody plants; many are propagated by shoot cuttings and many are propagated by seed. In other ways they are different. Due to the presence of an underground storage organ that is easily lifted from the ground and stored, many are commercially propagated by division of that dormant organ. Only one perennial, *Paeonia suffruticosa*, the tree peony (and really a subshrub), is propagated by grafting.

My objective in this presentation is to give an overview of herbaceous perennial propagation methods (Table 1), concentrating on root cuttings and division. Seed and shoot tip propagation will be lightly covered and tissue culture propagation has and will be adequately covered by other speakers.

SEED

Although most herbaceous perennials can be propagated by seed, this method has the same inherent advantages and disadvantages as for woody plants. The seed is a relatively inexpensive propagation unit and easily stored. However, seeds of some herbaceous perennials tend to be shorter lived than their woody counterparts, and there is an industry-wide problem of locating high-quality, true-to-name seed. Another characteristic of herbaceous perennial seeds is that they generally do not have as long or as deep a dormancy as do woody seeds; thus stratification requirements are usually shorter.

Scarification may be required of some, but can be abrogated. For example, if *Baptisia* seed is collected fresh, before the seed hardens, it germinates readily. However, if it dries the seed must be scarified to effect germination.

Propagating some perennials from seed has the same disadvantage as for woody plants—plants with many different phenotypes are produced. For instance, *Heuchera micrantha* var *diversifolia* 'Palace Purple' is prized for its rich, bronze foliage. It is easily propagated by seed and does not require stratification. Even though it has

Table 1. Propagation methods for herbaceous perennials

Name	Seed	Stem cuttings	Root cuttings	Division	Shoot tip culture
<i>Acanthus</i> spp	x		x	x	
<i>Achillea</i> spp (yarrow)		x		x	
<i>Aconitum</i> spp (monkshood)	x			x	
<i>Aegopodium podagraria</i> (goutweed)			x	x	
<i>Ajuga</i> spp (bugleweed)		x		x	
<i>Alcea rosea</i> (hollyhock)	x				
<i>Anemone</i> × <i>hybrida</i> (Japanese anemone)	x		x	x	
<i>Anthemis tinctoria</i> (golden marguerite)	x	x		x	
<i>Aquilegia</i> spp (columbine)	x				
<i>Arabis</i> spp (rock-cress)	x	x	x		
<i>Armeria</i> spp (sea pink)	x	x		x	
<i>Artemisia</i> spp (artemisia)		x		x	
<i>Asarum europeum</i> (ginger)	x			x	
<i>Asclepias tuberosa</i> (butterfly weed)	x		x		
<i>Aster</i> spp (hardy aster)	x			x	x
<i>Astilbe</i> spp (false spirea)	x	—	—	x	x
<i>Aubrietia deltoides</i> (rock-cress)	x				
<i>Aurinia</i> spp (alyssum)	x	x			
<i>Baptisia australis</i> (baptisia)	x		x		
<i>Bellis perennis</i> (English daisy)	x				
<i>Bergenia cordifolia</i> (bergenia)	x		x	x	x
<i>Brunnera macrophylla</i> (Siberian bugloss)	x	x	x		
<i>Campanula carpatica</i> (Carpathian harebell)	x	x			
<i>C. medium</i> (Canterbury bells)	x				
<i>Catananche caerulea</i> (cupid's dart)	x			x	
<i>Centaurea</i> spp (cornflower)	x			x	
<i>Cerastium tomentosum</i> (snow-in-summer)	x	x		x	
<i>Ceratostigma plumbaginoides</i> (plumbago)		x		x	
<i>Cheiranthus</i> spp (wallflower)	x				
<i>Convallaria majalis</i> (lily-of-the-valley)				x	
<i>Coreopsis</i> spp (coreopsis)	x	x		x	
<i>Delphinium</i> spp (larkspur)	x	x		x	
<i>Dendranthema hybrids</i> (garden mum)		x		x	
<i>Dianthus barbatus</i> (sweet William)	x				
<i>Dicentra</i> spp (bleeding heart)	x	x	x	x	
<i>Dictamnus albus</i> (gas plant)	x	x			
<i>Digitalis purpurea</i> (foxglove)	x				
<i>Dodecatheon</i> spp (shooting star)	x			x	
<i>Doronicum</i> spp (doronicum)	x			x	
<i>Echinacea purpurea</i> (purple coneflower)	x			x	
<i>Echinops exaltatus</i> (globe-thistle)	x		x	x	
<i>E. ritro</i> (small globe-thistle)	x		x	x	
<i>Erigeron</i> spp (fleabane)	x	x		x	
<i>Eryngium</i> spp (sea holly)	x		x		
<i>Euphorbia</i> spp (spurge)	x	x			
<i>Fallopia japonica</i> [syn <i>Polygonum cuspidatum</i> (Mexican bamboo)			x		
<i>Filipendula</i> spp (filipendula)	x		x	x	
<i>Gaillardia</i> × <i>grandiflora</i> (blanket flower)	x		x		
<i>Galium odoratum</i> (woodruff)		x		x	
<i>Gentiana</i> spp (gentian)	x				
<i>Geranium</i> spp (crane's bill)	x	x	x	x	
<i>Geum</i> spp (geum)	x		x	x	
<i>Gypsophila</i> spp (baby's breath)	x	x	x		x
<i>Helenium</i> spp (helenium)				x	
<i>Helianthemum</i> spp (sun rose)		x			
<i>Heliopsis</i> spp (heliopsis)			x	x	

Table 1. Propagation methods for herbaceous perennials (continued)

<i>Helleborus</i> spp (hellebore)	x			x	
<i>Hemerocallis</i> spp (dayily)	x			x	x
<i>Heuchera</i> spp (coralbelis)	x	x		x	x
<i>Hibiscus moscheutos</i> (hardy hibiscus)	x			x	
<i>Hosta</i> spp (plantain-lily)	x			x	x
<i>Iberis</i> spp (candytuft)	x	x			
<i>Kniphofia uvaria</i> (red-hot-poker)	x			x	
<i>Lamium maculatum</i> (dead nettle)			x	x	
<i>Lavandula angustifolia</i> (lavender)	x	x		x	
<i>Leucanthemum</i> × <i>superbum</i> (shasta daisy)	x			x	x
<i>Liatris</i> spp (gay feather)	x			x	
<i>Limonium</i> spp (hardy statice)	x		x		
<i>Linum perenne</i> (perennial flax)	x	x			
<i>Lobelia</i> spp (cardinal flower)	x			x	
<i>Lunaria annua</i> (moneyplant)	x				
<i>Lupinus</i> spp (lupine)	x	x			
<i>Lychnis chalcidonica</i> (Maltese cross)	x			x	
<i>Lysimachia clethroides</i> (goose neck loosestrife)		x		x	
<i>Lythrum salicaria</i> (purple loosestrife)		x			x
<i>Matricaria</i> spp (feverfew)	x	x		x	
<i>Mentha</i> spp (mint)		x		x	
<i>Mertensia virginica</i> (Virginia bluebells)	x		x	x	
<i>Monarda didyma</i> (bee balm)	x	x		x	
<i>Myosotis</i> spp (forget-me-not)		x		x	
<i>Nepeta cataria</i> (catmint)		x		x	
<i>N</i> × <i>faassenu</i> (catnip)		x			
<i>Oenothera</i> spp (evening primrose)	x				
<i>Pachysandra terminalis</i> (pachysandra)		x			
<i>Paeonia lactiflora</i> (herbaceous peony)			x	x	
<i>Papaver orientale</i> (oriental poppy)	x		x	x	
<i>Penstemon</i> spp (beardstongue)	x	x		x	
<i>Phlox paniculata</i> (summer phlox)		x	x	x	
<i>P</i> <i>subulata</i> (creeping phlox)		x		x	x
<i>Physostegia virginiana</i> (false dragonhead)	x	x		x	
<i>Platycodon grandiflorum</i> (balloon flower)	x	x			
<i>Polemonium caeruleum</i> (jacob's ladder)	x			x	
<i>Potentilla</i> spp (cinquefoil)	x			x	
<i>Pulmonaria</i> spp (lungwort)	x		x	x	x
<i>Pulsatilla vulgaris</i> (windflower)	x		x	x	
<i>Rudbeckia</i> spp (coneflower)	x		x	x	
<i>Salvia</i> spp (sage)	x			x	
<i>Santolina</i> spp (santolina)		x			
<i>Saponaria ocymoides</i> (soapwort)	x	x	x	x	
<i>Saxifraga</i> spp (saxifrage)				x	
<i>Scabiosa caucasica</i> (pincushion flower)	x	x		x	
<i>Sedum</i> spp (stonecrop)	x	x		x	
<i>Sempervivum</i> spp (hens and chicks)				x	
<i>Solidago</i> spp (goldenrod)		x			
<i>Stachys byzantina</i> (lamb's ear)				x	
<i>Stokesia laevis</i> (Stokes aster)	x		x	x	
<i>Tanacetum coccineum</i> (painted daisy)	x	x			
<i>Teucrium chamaedrys</i> (germander)		x		x	
<i>Thalictrum aquilegifolium</i> (meadowrue)	x	x		x	
<i>Thymus</i> spp (thyme)		x		x	
<i>Tradescantia</i> × <i>andersoniana</i> (spiderwort)				x	
<i>Trollius</i> spp (globe flower)	x		x		
<i>Verbascum</i> spp (mullein)	x		x		
<i>Veronica</i> spp (speedwell)	x	x		x	
<i>Viola</i> spp (violet)	x			x	
<i>Waldsteinia ternata</i> (barren strawberry)		x		x	
<i>Yucca filamentosa</i> (Spanish bayonet)	x		x	x	

a cultivar name which implies uniformity, green or off-color variants are produced and must be rouged out. If this is not done rigorously, many off-types enter the market. For the most desirable plants, selections should be made of the best types and they should be asexually propagated. In contrast, *Campanula carptica* 'Weisse Clip' [syn 'White Clips'] and 'Blaue Clip' [syn 'Blue Clips'] are also propagated by seed, but the populations are very uniform, so there is no practical reason to propagate it asexually.

Knowing which plants should and can be propagated by seed is especially important to the perennial nurseryman, since their catalogs list many more selections—some nurseries grow as many as 4,000 taxa—than the average “woody” plant producer’s catalog. While the perennial industry has experienced rapid growth in the last few years, the growth has also resulted in customers who no longer want the common seed-propagated plants like Shasta daisy, rather they are looking for named cultivars. The result is that, while seed propagation will always be important, greater emphasis will be placed on asexual propagation methods to propagate the new cultivars.

SHOOT CUTTINGS

Many perennials, like *Artemisia*, *Dianthus*, *Chrysanthemum* [= *Dendranthema*, *Leucanthemum*, etc], *Coreopsis*, *Lavandula*, and *Tricyrtis*, can be propagated by shoot tip cuttings. The principles and methods are similar to those for woody plants although most are easier to root. However the change from the juvenile to adult phase occurs within the growing season, so the propagator must time cutting collection to avoid flowering shoots which are either blind (no vegetative buds) or difficult to root. One significant difference from woody cuttings is that little or no rooting hormone is necessary. If it is used, it is usually the equivalent of Hormodin #1. Another is that cuttings, since they are soft, non-woody tissue, are more susceptible to rotting in the propagation bench. This is easily overcome either by reducing the misting frequency, or by covering the plants with row cover material. This is a thin, white, light-weight fabric routinely used by European growers who prefer it to mist beds for herbaceous cuttings.

ROOT CUTTINGS

Root cuttings are made from sections of root and should not be confused with rooted cuttings, which are shoot cuttings that are obtained from plants like *Armeria* or *Achillea* and already have roots attached when they are removed from the stock plant.

Root cuttings are a very useful method of asexual propagation, particularly for plants that produce little seed, have a growth habit that produces relatively few divisions or shoot tip cuttings. Many plants in the borage family, like *Pulmonaria*, *Brunnera*, *Anchusa*, and *Mertensia*, have these characteristics, so are routinely propagated by root cuttings. This method can be efficient too. By using a combination of root cuttings and division, I have propagated nearly 100 salable-sized *Pulmonaria* plants from three root pieces that were approximately 10 inches long. Imagine what a root-bound, 2-gallon *Pulmonaria* would yield!

Root cuttings are usually thought to be only for plants with thick roots like *Acanthus mollis*, but thin-rooted perennials like *Phlox paniculata*, the summer phlox, willingly forms shoots on root cuttings also.

Root cuttings are usually gathered while the plants are dormant from November to February. The exceptions are *Papaver orientale*, the oriental poppy, which goes dormant in August, so cuttings can be taken anytime thereafter. Another plant, *Anemone sylvestris*, forms shoots on roots still attached to the plant, so can be excised anytime from late September on and transplanted. Root cuttings can be gathered from plants that are grown in the field, but are most easily gathered from container-grown stock plants. Container grown plants have the advantage of being readily available, and no roots are lost to digging. Further, the upper or crown part of the plant usually can be further divided or replanted. The roots are shaken free of medium and washed, if necessary. They are removed from the stock plant with a knife or clippers, being careful to keep the roots oriented in the same direction. Next, the roots are sectioned into about 1-in. pieces. Many propagation books suggest making an angle cut on one end to denote the proximal or distal end, but most nurserymen just lay all the roots out in the same direction and section them in bundles. The bundles are packed into holding flats in the same position prior to insertion into the propagating medium.

Cuttings can be propagated in two distinctly different ways. The easiest method is to bundle them into groups of about 15 sections and place them in an upright position in 72-cell pack flats. The flats are then placed in a high-humidity chamber (the cuttings should be misted occasionally) in a shaded portion of a 60°F greenhouse where they can be observed for rooting. Light does not seem to inhibit shooting or rooting. As each cutting or group of cuttings shoots and begins to root, they are removed and transplanted. In the second method, the cuttings are packed in rows into a 3- to 4-in. deep flat. The flat is placed on the bench at a 45-degree angle, and alternate layers of cuttings and medium are placed each on top of the other until the flat is filled. Flats filled in this manner can hold 300 to 400 cuttings, depending of the root diameter and spacing.

While the polarity of a shoot cutting is very important, it is less so with root cuttings. Even though fastest shooting and rooting is obtained if cuttings are oriented in the upright, proximal (the end that was closest to the soil line) position, cuttings placed in a horizontal position appear to root equally well, but require more space.

Not all plants can be propagated by root cuttings nor is it desirable to propagate some plants by this method. For instance, variegated plants like *Brunnera microphylla* 'Hadsphen Cream' can only be propagated by division. When propagated by root cuttings, plants with green leaves result. This is because the origin of the shoot within the root tissue is different from the tissue that resulted in the variegation.

DIVISION

Division is one of the simplest and easiest methods to propagate perennials like *Astilbe*, *Hosta*, *Hemerocallis*, *Iris*, and *Paeonia*. With this method the storage organ is divided into sections containing at least one eye (bud), usually, but not always, while the plants are dormant. Late spring, just before bud break, seems to be the best time for most, although *Iris* and *Hemerocallis*, are best propagated during August, and peony during September. Division seems to be well adapted to plants that have a growth habit where multiple buds or eyes are produced on the storage organ.

The only astilbe that, when propagated by seed, yields reasonably homozygous populations is the *A. chinensis* group hybrid 'Pumila'. Even here, in order to maintain cultivar integrity, it should be propagated by division. Otherwise, propagating *Astilbe* from seed is not recommended. Some tissue culture laboratories have recently begun selling astilbe from shoot tip cultures. While this may be reasonably safe for cultivars with pink and white flowers, it is not recommended for those with red flowers because of their propensity to sport naturally. Finally, all astilbes have a crown type growth habit where the shoots are compressed, so no shoots are available for tip cuttings. Thus, for the majority of astilbe, division remains the only reliable method to perpetuate cultivars.

Astilbes can be propagated at almost anytime during the growing season. However, the best time is in early spring, before buds break and shoot growth begins. The second best time, and a time that many nurserymen prefer because there is still time for a plant to establish that can then be sold the following year, is in August.

Astilbe is especially well adapted to container culture, so container-grown plants serve as the stock plants. Best results can be obtained if the stock plants are not more than 1-year old. The crowns on larger and older plants are too woody, contain few eyes (buds), and are generally more difficult to separate. Larger and more vigorous growing crowns of the *arendsii* and *japonica* types are best divided with a knife. *Astilbe simplicifolia* group hybrids tend to have more numerous, but smaller, buds and can often be separated by pulling them apart by hand.

Replanting the eye at the correct depth is critical to the success of *Astilbe* propagation. The eye should be planted at or just below soil (medium) level.

With most cultivars, planting a single eye in the spring should yield salable sized plant with as many as 10 eyes by the end of the growing season if the plant has been properly watered and fertilized. A vigorous 3-eye division is considered to be a standard sized division ready to be transplanted into a 1-gal container.

Paeonia lactiflora, the herbaceous peony, is, like astilbe, propagated by division. However, there are several major differences. First, even though many peonies are sold in containers through garden centers, it is not a container crop, it is best adapted to field culture and requires at least two years in the field to establish a vigorous plant that can be further divided. Second, peonies should be divided only in the late summer and early fall. It is at this time of the year when, with the onset of short days, buds are formed on the top of the tuberous root.

To divide peonies, the plants are dug from the field with a shovel, fork, or, for larger numbers, lifted with a potato digger, being careful to retain as much of the root system as possible. In the digging process, the root system is shaken free of dirt. Using a stout handled knife or a pair of shears, cuts are made vertically through the tuberous root so that each division contains three or more eyes. Some divisions will contain more than three eyes, but there will not be a sufficiently large tuberous root to support it. There must be as much root as possible, although roots that are excessively long are trimmed back, so that the division can be either planted to the garden or placed into a container. Replanting is especially critical in peonies. Too many woody-plant nurseryman or garden center operators that buy peonies try to stuff a vigorous division in a small container. Choose a large enough container so that the buds will be at about 1 in. below the surface of the medium AFTER it is watered in. If the eyes are far above or below the medium (or

soil) level, peonies will flower poorly if at all

In summary, propagating herbaceous perennials is similar, but in many respects, easier than woody plants. However; knowledge of timing, treatment, and method is still critical. The major difference between woody and herbaceous perennial propagation is that the average perennial nursery grows many more taxa than its woody counterpart, thus knowledge of plants and their requirements assumes greater importance

RALPH SHUGERT: You mentioned scarification on small perennial seeds. Forget the acid and use hot water scarification with these small seeds.

CHRIS CASH: Would you comment on the need for mist with the Remay covered cuttings in the bench?

DAVE BEATTIE: In Europe where I have seen it done they use no additional mist. They water the crop in before covering and that is all. They are just shading it to reduce moisture loss.