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**Perennial Propagation in the New Millennium****John Valleau**

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**INTRODUCTION**

I chose this topic with a sense of excitement, panic, and frustration because in many ways the propagation and production of certain herbaceous perennials on a commercial scale has changed radically in the last 30 years, yet at the same time the methods used for the vast majority of taxa has not really changed much at all. As we approach this upcoming turn of the century mark, knowing the rate of technological change in the world today, one wonders just what we might be growing, say, 20 years from now. Gazing into the future is not an option for the vast majority of us here today, yet it is worth looking at where we have come from and pondering what may lie ahead in the propagation of such a diverse and exciting group of garden plants.

Without a doubt, one of the most revolutionary developments in commercial plant production in past decades was the invention of the plug flat. Hardly a nursery exists that does not make use of these handy things for the production of seedlings or for rooting cuttings of nearly any plant imaginable. Plug flats allow growers to minimize transplant shock by eliminating "pricking out", mechanization of potting is possible, as well as the ability to hold seedlings or cuttings for longer periods of time before they are moved up.

These are all advantages, particularly for easier-to-germinate perennial species. Production on an enormous scale is possible, such as at Raker's Acres in Michigan, so much so that it may be more economical for a nursery to purchase ready-to-transplant plugs of more common seed-grown types, thus utilizing one's limited space for cutting propagation or growing seedlings not available elsewhere.

The plug revolution has been an enormous boon to growers, without a doubt. In recent years, however, as the end consumer — the gardening public — has become more sophisticated, the items many growers used to consider to be "bread-and-butter" plants have taken some radical downshifts in popularity. In other words, gardeners are now wanting something more exciting than seed-grown carnations or shasta daisies, and they have been whipped into a frenzy by our friends, the garden

media, into demanding an endless supply of more unusual plants such as *Corydalis* 'Blue Panda', or *Heuchera* 'Chocolate Veil'. This in itself is not such a bad thing, so long as growers are able to somehow anticipate and meet this now constant demand for new plants.

This brings us then to ponder, once we have a hunch what the hottest new taxa are going to be, how are they to be propagated in large numbers and eventually made available to gardeners? What, aside from plug flats, are the tools and methods that we as growers have available to help us in this struggle to survive? I would like to review some of the current methods that many wholesale perennial growers are utilizing for perennial production, the advantages and disadvantages that these methods may offer.

### SEED PROPAGATION

In many cases this is still the most economical way to produce a wide range of perennial species and cultivars. Despite a certain amount of snobbery that seems to be inherent in the perennial industry towards anything that is not vegetatively propagated, there are some perfectly fine garden plants produced by seed, whether they be species, cultivars, or less stable "strains" or mixtures of colors. Some of the more popular ones that are easy to produce include *Campanula carpatica* 'Weisse Clips', *Rudbeckia fulgida* var. *sullivantii* 'Goldsturm', or *Echinacea purpurea*. For growers, these easy-to-germinate plants usually adapt well to mass production, giving reasonably uniform and predictable results from the germination bench right on into potting, growing, and shipping.

Moving on to the more tricky seed-grown perennials is a difficult leap for a grower to make. Dealing suddenly with a species that has uneven germination, requires stratification or scarification or who-knows-what-else, can make for a difficult mix of seed germination requirements in a facility designed for factory-level output. The sad truth is that most wholesale perennial growers struggle once or twice trying to produce a crop of *Helleborus* or *Meconopsis* from seed, before giving up and leaving it to the specialist grower. Often part of the decision to not even bother with tricky seeds is directly related to the cost of the seed. In other words, some of most coveted and wonderful seed-raised perennials are an unfortunate burden on the grower's time, energy, and pocketbook, with little to show in return. As competition increases, and seed sources become more reliable, this is an area that holds much promise for the grower who is willing to learn a few simple tricks and also learn to be patient.

### VEGETATIVE PROPAGATION BY CUTTINGS

Growers who start out raising primarily seed-grown types soon discover a strong demand exists for cultivars that they simply can't raise from seed. Any number of characteristics can only be maintained in certain plants through vegetative means, for example, variegated foliage, unique flower colour or size, or a compact habit. Taxa with very expensive or hard-to-germinate seeds can sometimes be more economically produced by cuttings also, as is the case with *Amsonia tabernaemontana*. Fortunately, a good number of herbaceous perennials are easily produced by means of softwood cuttings, but in all cases there is one common requirement that a grower will have to address immediately: acquiring and maintaining a supply of stock plants.

There are several approaches to stock management: some growers maintain in-ground stock beds, which produce cuttings through the spring, summer, and fall.

Another method is to grow stock plants in containers; this can help greatly to make cuttings available for harvesting year-round. A third approach is to harvest cuttings off of existing production, in other words to sneak cuttings from crops that will be ultimately sold.

Cuttings can be a little temperamental about exactly when they will or won't root, and what sort of percentage of successful take might be expected varies widely between taxa. Few good sources of information about cutting propagation of perennials are in existence, so any grower that embarks down this path is well advised to pay careful attention to successes or failures and learn as much as possible through trial and error. *Galium odoratum* is a good example of this; perfectly nice cuttings taken in the heat of summer usually result in very poor rooting, perhaps as low as 5%, yet when taken from stock plants during the cooler winter months, the take may be closer to 95%.

Typically, a grower will harvest tip cuttings in small batches to be stuck into plug flats as quickly as possible. The majority of perennials respond well to a powder-type #1 rooting hormone, although with certain easy-rooters, like *Sedum* taxa, this step is more or less a waste of time. A mist or fog system is very beneficial to successful rooting of perennials, particularly during the warmer summer months. However, as a rule of thumb, plants with silver or grey foliage, like many *Artemisia*, or fuzzy-leaved species will rot easily with too much moisture, so a dryer area in the greenhouse may also be useful. Bottom heat may help to speed up rooting time significantly during the fall or winter months.

Stem cuttings, taken beyond the softer tips, are used with certain plants, like *Lamium* taxa, and in this case a stem with a single set of nodes will initiate both roots and new top growth, a handy means of making efficient use of available stock plants. A few perennials will produce above-ground runners, like *Fragaria*, and these can be removed as soon as new plantlets form at the ends, then treated like tip cuttings.

A method that is probably under-utilized here in North America is the root cutting. European nurseries propagate oriental poppies, *Phlox paniculata*, and Japanese anemone regularly by this means, and with good success. Typically, roots about the thickness of a pencil are taken in late fall or early spring, and often these are trimmings from field-grown plants being dug for cold storage. The root pieces are cut into sections and inserted into plug flats before being placed in a greenhouse with bottom heat.

## DIVISIONS

Simple division of perennial roots is a method still used very widely in the industry. This is an excellent way to preserve the special characteristics of a cultivar, and is the method most widely used by home gardeners. In North America we have relatively few commercial growers of bareroot perennial divisions, with the exception of a few genera such as *Hosta* or *Hemerocallis*. By far the vast majority of bareroot divisions used by growers here are field-grown in Holland, dug and cold-stored in the fall, and exported here for growers to pot in early spring. As a North American perennial grower, it is very difficult to compete with the European field growers on price, when it comes to run-of-the-mill selections of *Dicentra* or *Phlox*. There are, however, a good number of hard-to-find plants, for example *Astrantia major* 'Sunningdale Variegated', that are worthwhile producing here at home in order to be assured of a personal supply. Some perennials simply do not take well to the root-washing, heat, and cold-storage treatments incurred with exporting, so

a plant like *Trollius* has good potential as a domestic crop.

Both cutting-propagated and division-propagated perennials share a common problem that we are beginning to learn more about with increasing frequency; there is a high likelihood that any pathogens that are present within the system of the plant will be passed on through vegetatively propagated material. These include harmful nematodes (e.g., *Aconitum*, *Cimicifuga*), or nasty viruses, especially tomato spotted wilt, and possibly a host of others. An example I will give you is *Lamium maculatum* 'Beacon Silver'. During the 1980s this quickly became a top-selling groundcover at nurseries from coast to coast. Cuttings rooted readily in about 3 or 4 weeks with near 100% success, and grew on to be vigorous and healthy plants. Over the last 5 to 6 years, nearly every grower I have talked to reports a tremendous decline in rooting percentage and noticeable lack of vigor both in the nursery and in the garden. Speculation ranges from "downy mildew" to "some kinda virus" to another theory that there have simply been too many hundreds of generations of cuttings taken and the plants have acquired some sort of genetic instability. Whatever the true problem is with 'Beacon Silver', several perennial growers, ourselves included, have simply dropped the plant in favor of newer *Lamium* cultivars.

### MICROPROPAGATION

If we could look into the gazing ball, this technology may be the answer to "entering the new millennium" of perennial propagation, but this is hardly groundbreaking news! For 20 years or more, labs have been working with a limited range of herbaceous genera, most especially *Hosta* and *Hemerocallis*. However, increasing demand for new and unusual perennials is going to be the focus of many growers in the near future and tissue culture techniques have already become critical to the rapid increase of *Heuchera*, *Geranium*, *Brunnera*, *Pulmonaria*, *Hakonechloa*, and all kinds of other wonderful plants. All it takes is that special someone at the lab to "crack the code", finding just the right mix of hormones that will unlock the secret, before millions are listening to Martha convince them of the merits of something exciting and new that they must have! Imagine what could happen to a grower's product mix if there were unlimited numbers of *Paeonia tenuifolia* 'Plena', double *Trillium*, or *Cypripedium reginae* available from the labs? Perhaps some of these are pipe dreams that will never come true, but we must have faith in the unknown.

On another level, there is good evidence that micropropagation can offer a way of "cleaning up" any number of genera, helping nurseries to maintain healthy, virus-free stock that grows well in production and performs as it should in the garden. This has been the fortunate circumstance with double *Gypsophila*, and any number of Victorian double *Primula* cultivars, and rumor has it that a major plug producer in the U.S. is in the process of cleaning up *Phlox subulata*. Regardless of the wonders this miracle technology may hold in terms of making the unusual rarities of the plant world more commonplace, as a producer of perennials, I will be happy to see many a good-old plants cleaned up and once again made vigorous and healthy for generations of gardeners to come.