

Addressing the Challenges of Native Woodland Wildflower Propagation[©]

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INTRODUCTION

There are considerable challenges to propagating certain Eastern North American wildflowers, that fact is undeniable. Mt. Cuba Center has been seeking appropriate methods for over 20 years and has met with success in a number of instances, several of which I will eventually highlight. However, what I would like to do initially, during this brief opportunity, is to identify problems and propose strategies that propagators interested in working with these plants might employ. This information has been acquired through substantial trial and error and also the unique opportunity to observe life cycles, growth patterns, and idiosyncrasies of the many plants in the gardens at Mt. Cuba Center.

While it may be easier to pass over these plants because they are so costly to produce in terms of time and resources, I think it is important that we analyze why this is so. Perhaps better strategies can be developed in the future to overcome present obstacles. From a conservation standpoint, understanding and knowledge are important because these are precisely the plants that disappear when forests are damaged or fragmented. Sadly, once gone, they more than likely won't return on their own.

THE PLANTS

Which Plants Am I Talking About?

Not those such as creeping phlox (*Phlox stolonifera*), green-and-gold (*Chrysogonum virginianum*), wild geranium (*Geranium maculatum*), or wild columbine (*Aquilegia canadensis*). They can be easily propagated using seeds, stem cuttings, or division and quickly grow to marketable plants. The ones I'm addressing are those such as Canada lily (*Lilium canadense*), showy wake robin (*Trillium grandiflorum*), bloodroot (*Sanguinaria canadensis*), and showy skullcap (*Scutellaria serrata*).

What Makes Them Different?

First of all, they are an ancient group of plants, largely "undomesticated" through hybridization and selection that are in sync with the seasonal rhythms of the eastern deciduous forest. Many are spring ephemerals that appear above ground in early spring before the trees leaf out to take advantage of the available sunlight, moisture, and nutrients. They flower, fruit, and die back to their underground structures (roots, rhizomes, bulbs, etc.) in a short period of time, around 6-8 weeks. Many do not fit into the typical nursery production schedule. Root growth of some species begins in the fall and continues until summer heat arrives. Root diseases can become problematic during periods of dormancy; good drainage is essential under cultivation. Many are long-lived but also slow to mature, raising labor and production costs.

CHALLENGES

The challenges I've identified can be found in the following four categories: propagation, production, sales, and marketing. I'll address the first two and briefly mention the last two.

Propagation

Propagation challenges include finding reliable sources for information on propagation, sourcing seed, assuring seed viability, determining seed stratification requirements, finding alternatives to stem cuttings, and using tissue culture effectively.

To most effectively propagate these plants, the first step is to look for a source of information on their requirements, a propagation manual. Finding one on woody plants is fairly easy. But in the case of native herbaceous perennials, there is the need to do some hunting. There is no one comprehensive propagation manual for eastern North American wildflowers. William (Bill) Cullina, formerly with the New England Wild Flower Society, has written an excellent manual, *Growing and Propagating Wild Flowers*, covering many Northeastern species but a number of important southern plants that are not hardy in New England have been left out. Jan Midgely, a very experienced native plant propagator from Alabama, has self-published a book, *Native Plant Propagation* that takes off where Bill's ends, highlighting in a very thorough way many southern species. Also recommended is Harry Phillip's well-written book, *Growing and Propagating Wildflowers* that includes a section of propagating native ferns from spores. Additionally, Henry Art's book, *The Wildflower Gardener's Guide*, is good for a nicely detailed description of a number of woodland plants. *Propagation of Wetland Plants* by McIninch and Garbisch is informative on that specialized topic.

Growing and Marketing Ginseng, Goldenseal, and Other Woodland Medicinals, by Persons and Davis is another valuable source of information because many of the medicinals covered in their discussions are in fact also horticulturally important. Propagation information is included on bloodroot (*Sanguinaria canadensis*), wild ginger (*Asarum canadense*), fairy wand (*Chamaelirium luteum*), and black cohosh (*Actaea podocarpa*) in addition to ginseng (*Panax quinquefolius*), and goldenseal (*Hydrastis canadensis*).

Several periodicals offer a wealth of information especially the *Native Plants Journal* with peer reviewed articles published three times a year by the University of Wisconsin Press and the North American Rock Garden Society bulletin, the *Rock Garden Quarterly*, with articles by very knowledgeable gardeners and an annual seed list.

Production

The next challenge is finding a source for seeds of these species. The Internet makes searching easier than in the past, but all in all there are very few retail or wholesale sources for these seeds. To the best of my knowledge, there is no commercial seed house on the East Coast carrying woodland wildflower seeds in quantity. Richter's Herbs in Canada, Horizon Herbs in Oregon and Prairie Moon Nursery in Minnesota carry the largest selection of species. The reasons for this are because the seeds are both expensive to collect and difficult to process and store. Many species produce hydrophyllic or "wet" seed that should not be allowed to dry out before sowing. Some seeds have a moist, fleshy appendage called an aril or elaiosome that is attractive to ants and aids in their dispersal. They should be sown as-soon-as-possible after collection. Timing is critical for successful seed collection; some plants retain foliage only 6–8 weeks and produce seeds that ripen and are released within a few days. Seeds of some species do not ripen simultaneously making collection difficult. Some have projectile seeds that when ripe literally explode out of the seedpods, limiting collection.

Occasionally you'll find private collectors who offer seed for sale on a seasonal basis. This can be a valuable source for fresh seed.

As an alternative, it's necessary to collect or produce seed yourself. You can purchase plants and establish stock blocks. Another option, if available, is to request permission to collect local seed from private land.

Mature garden plants can be an invaluable source for seed. Mt. Cuba Center's gardens, over 40 years old, produce abundant quantities of seed each year. A list of seed collection dates (Table 1) is included based on our conditions in the mid-Atlantic. Seed collection starts in early May and runs through November.

It's important to stress that although there are exceptions, sowing fresh seeds and adhering to the stratification requirements is important for success. Use nature as the model—seed falls to the ground in a moist environment on soil that is rich in organic matter, winter conditions provide temperatures that break dormancy, and germination

occurs in early spring, often as soon as the frost is out of the ground. An artificial cold/moist 60-90 day period in a cooler will often satisfy some species but experience has shown that other species require fluctuating temperatures in an outdoor environment. Several others have double dormancy.

Table 1. Seed and spore collection dates¹.

May 10-18	<i>Mertensia virginica</i>
May 10-20	<i>Hepatica nobilis</i> var. <i>acuta</i>
May 14-15	<i>Erythronium americanum</i>
May 18	<i>Osmunda claytoniana</i>
May 25	<i>Osmunda regalis</i> , <i>Osmunda cinnamomea</i> , <i>Shortia galacifolia</i> , <i>Thalictrum dioicum</i>
May 26	<i>Mitella diphylla</i> , <i>Tiarella cordifolia</i>
June 1	<i>Isopyrum biternatum</i> , <i>Trollius laxus</i>
June 1-9	<i>Caltha palustris</i> , <i>Collinsia verna</i> , <i>Aquilegia canadensis</i> ‘Corbett’, <i>Viola labradorica</i> , <i>Thalictrum thalictroides</i> , <i>Polygala pauciflora</i> , <i>Helonias bullata</i> , <i>Delphinium tricorne</i> , <i>Jeffersonia diphylla</i> , <i>Polemonium reptans</i>
June 4	<i>Epigaea repens</i>
June 6	<i>Sanguinaria canadensis</i>
June 8	<i>Asarum canadense</i>
June 9	<i>Stylophorum diphyllum</i> , <i>Dicentra eximia</i> , <i>Geranium maculatum</i> , <i>Houstonia caerulea</i>
June 16	<i>Camassia scilloides</i>
June 19	<i>Zephyranthes atamasco</i> , <i>Actaea rubra</i> woodspath selection, <i>Scutellaria serrata</i>
June 29	<i>Dodecatheon meadia</i> , <i>Hexastylis speciosa</i> , <i>Phacelia bipinnatifida</i> , <i>Trillium grandiflorum</i>
July 1	<i>Delphinium alabamicum</i>
July 9	<i>Actaea rubra</i> , <i>Hydrastis canadensis</i> , <i>Trillium stamineum</i>
July 12	<i>Uvularia grandiflora</i>
July 14-28	<i>Trillium erectum</i>
July 20	<i>Iris cristata</i>
Aug. 15	<i>Trillium sulcatum</i> , <i>T. cuneatum</i> , <i>T. simile</i> , <i>T. vaseyi</i> , <i>Caulophyllum thalictroides</i>
Aug. 28	<i>Trillium catesbaei</i>
Sept. 1	<i>Adlumia fungosa</i>
Sept. 18	<i>Clematis viorna</i>
Sept. 29	<i>Actea</i> (syn. <i>Cimicifuga</i>) <i>racemosa</i> , <i>Xanthorhiza simplicissima</i> , <i>Actaea pachypoda</i> , <i>Prosartes lanuginosa</i> (syn. <i>Disporum lanuginosum</i>)
Oct. 4	<i>Smilacena stellata</i> , <i>S. racemosa</i> , <i>Porteranthus trifoliatus</i> , <i>Aruncus dioicus</i> , <i>Lilium superbum</i>
Oct. 20	<i>Campanula divaricata</i> , <i>Allium tricoccum</i> , <i>Aconitum uncinatum</i>
Nov. 15	<i>Actea</i> (syn. <i>Cimicifuga</i>) <i>americana</i> , <i>Galax urceolata</i> , <i>Chamaelirium luteum</i> , <i>Astilbe biternata</i>

¹Compiled by Jeanne Frett, Research Horticulturist, Jan 1995, updated October 2012.

One example of the effectiveness of fresh seed and natural cold treatment is illustrated with the successful propagation of *Hepatica* or *Anemone americana* and *A. acutiloba* (new names). The literature states that liverleaf seed is difficult to germinate. Sown fresh and cold stratified outdoors, this does not seem to be the case.

Organization is the key to scheduling these activities. Setting up a calendar such as the one found in Microsoft Outlook as a reminder to move seeds from cold to warm conditions is helpful.

Stem cutting propagation is often not an option. Technically what you see above ground is a flowering branch not a stem. There are no buds on this branch. Rhizome division is possible but a large number of stock plants is required. Many of these plants can be categorized as rhizomes, bulbs or corms. Rhizomes include trilliums, bloodroot, wild ginger, Dutchman's breeches, twinleaf, and lady slippers. Bulbs or corms include Jack-in-the-pulpit, spring beauty and dogtooth violet.

In recent years, tissue culture has led to the successful propagation of a few woodland species. Two success story involving Mt. Cuba Center's plant introductions are pink profusion Bowman's root (*Gillenia trifoliata* 'Pink Profusion') and misty blue white baneberry (*Actaea pachypoda* 'Misty Blue'). Advances at various institutions have included the successful in-vitro propagation of several endangered trillium species. Commercial in-vitro propagation of native orchid species, especially lady slippers, is also occurring.

Establishing in-vitro plants in media can be challenging and there is the added expense of purchasing plants. However, tissue culture does provide possibilities for the successful propagation of species that otherwise cannot be commercially produced by traditional means and/or in large numbers.

The next topic is production challenges that include slow maturing plants, the need to provide shade, to control pests, to use low maintenance strategies, and to identify those plants that respond well to pot culture.

Unfortunately, many of the most ornamentally attractive woodland wildflowers are notoriously slow to mature. A few samples of the time from seed sowing to flowering include: trillium species (*Trillium* spp.) 6-7 years; twinleaf (*Jeffersonia diphylla*) 5-6 years; trout lily (*Erythronium americanum*) 5-6 years; lily species (*Lilium* sp.) 5 years; Solomon's seal (*Polygonatum biflorum*) 3-4 years.

Added to this is the fact that shade must be provided either artificially using shade cloth over supports or naturally beneath trees in a woodland setting. Pests in the form of deer, rabbits, mice, even domesticated cats can be problematic. Hardware cloth to cover seed flats and 8-10-in. exclusion fencing becomes necessary, especially to prevent even one unfortunate incident that can ruin several years of work.

While plants may take years to mature, eventually with careful scheduling, harvests can be made on a yearly basis. Maintenance needs are minimal during periods of dormancy if weeds are controlled with mulch. Soaker hoses or automatic watering is useful for those few instances where it's necessary, usually in mid-summer. Shade conditions make for less aggressive and vigorous weeds and also less water loss.

From our experience, some species adapt well to pot culture in or outside a greenhouse and some do not. Whether in a raised bed or in containers, a general rule is that most species, as small plants, have larger and more substantial root systems below ground than visible foliage above ground. Accommodations must be made for this either in the form of deep flats or small, cylindrical pots such as cone-tainers. Cone-tainers work extremely well for sowing small seeds, several per cone that can be left without transplanting for several years and take up minimal space. This arrangement often reduces mortality especially with seedlings that resent disturbance. Granite grit can be used to discourage moss from growing on the surface of containers that are retained for multiple years.

Selling

The next topic is the challenge of selling these plants. Generally, there is one season of bloom which is a short window for sales. Appearance can be less than flattering after flowering and ephemeral plants are without foliage except in spring. Some are best shipped bare root and dormant: very early spring and fall because they establish best at that time. Several, such as purple phacelia, (*Phacelia bipinnatifida*) are highly ornamental and grow like weeds but are biennial. They would be easy to sell in flower because of their appearance but die soon after flowering.

The good news is that these plants, if successfully propagated, are NEW to customers because they haven't been widely available in the past. Undoubtedly, they have high

visual appeal. This is definitely a niche market where there is lower competition from other nurseries and, from my experience, what is produced is often sold out early in the season. Many are reliably perennial and long lived. There is also the strong appeal of their association with the beauty of naturalistic landscapes and nostalgia for memorable experiences in those landscapes.

Last but very significant is the importance of “conservation through propagation.” Wild collection is very tempting with this group of plants because it is easy and inexpensive. However, this is unsustainable and should not be supported by the nursery industry.

Several success stories from Mt. Cuba Center include violet wood sorrel, *Oxalis violacea*, which is a 6-in. tall shade loving bulbous perennial with umbels of bell-shaped lavender to pale magenta flowers that grows naturally in moist to dry loamy or rocky soil. These have been propagated by simply lifting, separating, and replanting bulblets that multiply from plants grown in pots.

Nodding onion, *Allium cernuum*, is a perennial bulb with umbels of nodding white to pink flowers found in dry woodlands and rock outcroppings. The tiny seeds are sown in multiples in cone-tainers to grow on for the first few years before transplanting into quart pots.

Lilium species are bulbous species found generally in moist rich soil in woodlands. They range from 5-10 ft in height with spotted, reflexed petals on flowers ranging in color from yellow to red. Numerous species have been grown from seed including *Lilium canadense*, *L. superbum*, *L. michauxii*, *L. grayi*, *L. catesbaei*, and *L. michiganense*. Faster still would be to propagate from the new bulblets that arise from stolons or start with bulb scales.

Marketing

Numerous requests over the years from people seeking the following plants without success recommend a possible market for these plants.

Quaker ladies, *Houstonia caerulea*, is a 4-6-in. tall rhizomatous perennial found in meadows, pastures and open woods. It grows in moist but well drained soil and is perfect for the rock garden. Fresh seed can be harvested in June if stock plants are available.

Large flowered bellwort, *Uvularia grandiflora*, is a 12-24-in. tall perennial with pendulous bell-shaped clusters of yellow tepals found in moist but well drained slightly alkaline woodland soil. Plants self-sow in the garden and seed can be easily collected when ripe.

This is a very brief overview of our propagation and production experiences. Please contact me with additional questions and comments. We use the BG-BASE Propagation Module to collect and store data from all our activities. If you have questions about particular species, please give us a call. We would also be happy to share seeds if they are available.

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