

## PROPAGATION OF WILDFLOWERS

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The recent resurgence in popularity of herbaceous perennials in this country has prompted many growers to consider propagating native wildflowers for sale. Although many growers probably do not realize it, American natives have been a staple in perennial gardens for years. To name just a few, *Asclepias tuberosa* (butterfly weed), *Baptisia australis* (blue false indigo), the many *Liatris* species (blazing star), *Echinacea purpurea* (purple coneflower), *Lobelia cardinalis* (red cardinal flower) and *Phlox stolonifera* (creeping phlox) are all North American natives that have become so ubiquitous in perennial gardens that they are now thought of as perennials rather than wildflowers.

However, there are many other natives that deserve wider recognition and use by growers. There are two main reasons why more natives are not in greater use:

1) Image — Wildflowers have been looked upon as being only for specialty gardens that contain unusual habitats. With the increasing sophistication of the American gardener this idea is gradually being dispelled.

2) Economics — Although more nurseries are beginning to propagate native plants, the vast majority of wildflowers sold in this country are still collected from the wild. The reason is purely economic. It is almost always cheaper to buy a collected plant for resale than it is to propagate the same plant. Many species need several years to produce a saleable plant, and since there has always been a ready supply from the wild, nurseries have bought from collectors instead of propagating plants themselves. It is somewhat ironic, however, that a nursery that would not balk at propagating a Japanese species for two years before sale, will not consider propagating a native that needs a similar period of time.

Wild collection has often been criticized, and due to destruction of local populations, some states have even enacted laws preventing the export of certain species from their boundaries. Yet wild collection is not a simple issue. I feel that there are a number of common species that could be ethically collected from the wild on a sustained-yield basis without destruction of local populations if only collectors would do so. Other species, many of our native orchids for instance, need many years of growth before they reach blooming size, and

therefore collection of these plants in any number is likely to result in decimation of the population in a short period of time. The decision to collect should therefore be based on three factors: the rarity of the species in its overall range, the local abundance of the species at the collection site, and the length of time the species needs to regenerate the population to its former level after collection.

Faced with uncertainty as to whether the plants they are buying-in to sell have resulted in the decimation of a local population, and in response to the ever-growing public demand for propagated material, a number of nurseries are now beginning to propagate the wildflowers they sell. Propagation assures that no local populations have been destroyed, and selling plants that are propagated rather than collected is becoming a public-relations tool for the nurseries.

There is a wide range of practical (and often conflicting) information available on wildflower propagation. Our program at the New England Wild Flower Society has been geared towards producing economically-feasible propagation methods for the commercial nursery. What follows is a very basic outline of techniques used at our botanical garden, the Garden in the Woods. The methods used are similar to those for other herbaceous perennials, and thus allow wildflowers to be fit in to existing propagation schedules.

## METHODS OF PROPAGATION

The first step in commercial propagation of wild flowers is to build up sufficient stock. At this time there is little alternative to buying-in collected material and lining the plants out in growing beds according to their cultural requirements. Once established, these beds will provide material for division, cuttings, and, most importantly, will allow for collection of fresh seed. Seed of many native species is not readily available. Furthermore, fresh seed of many species that is collected and sown while still moist is the best and sometimes the only method of germination.

## SEEDS

Seeds of wildflowers tend to fall into two categories. These categories are based on successful germination rather than any published physiological categories. In the first category, seeds of these species must be sown immediately outdoors upon collection. Often included in this group are seeds that ripen within moist berries, seeds of wetland plants, and seeds bearing a small, white aril on their surface. However, there are seeds of other species that, although they appear to ripen in a dry state, should be sown immediately outside in

flats or seed beds or their germination will be delayed for a year or retarded altogether. Seeds of many of the Ranunculaceae, including *Hepatica*, *Coptis*, and *Caltha*, should be collected when ripe and sown immediately outside to remain there through the winter.

However, seeds of most species fall into the second category. These may be collected, dried, cleaned, and stored under refrigeration until the most convenient time for sowing within the existing propagation schedule. I divide seeds in the latter category into two groups:

The first group includes seeds that will germinate immediately upon sowing either inside a greenhouse or outside when temperatures are warm enough. These seeds can be sown outside in early spring or in a warm greenhouse in January. They can also be sown outside in the fall to germinate in the spring if so desired.

The second group includes seeds that need a period of moist-cold stratification in order to germinate. Also, included in this group are a number of species whose seeds may not definitely need a cold period in order to germinate, but whose germination seems to be better if given a moist, cold treatment. Seeds of this group are usually sown outside in the fall to germinate in the spring, but seeds may also be sown in flats and placed in a refrigerator for several months in order to overcome internal dormancy.

## CUTTINGS

Many native plants are easily propagated by softwood stem cuttings taken in May, stuck in sand using a weak hormone powder (Hormroot #1, for example) under mist in a warm greenhouse. These will usually root in 3 to 5 weeks without bottom heat, but bottom heat will speed up rooting. Root cuttings are an especially good method for some species, and these are taken either in fall or spring depending upon the species. I usually use sand as a medium to avoid overwatering.

## DIVISION

Many wildflowers can be lined-out in field beds and divided each year, or every other year, depending on rate of growth. I lean towards spring division simply because sizing of plants seems easier at that time, but fall division is successful with many species as long as heaving of the soil over winter can be avoided.

## TISSUE CULTURE

Rapid conal multiplication of wildflowers is in its infancy, and much research needs to be done with this technique. There are several problems involving this method as applied to native plants. Firstly, many herbaceous perennials are difficult to disinfest, particularly those tissues growing below ground. Secondly the proper media for growth have yet to be defined.

Yet the potential for tissue culture is fantastic. In the case where a species can be propagated economically by conventional methods, it can be used to build up stocks of plants that will later be propagated by more economical methods. However, its real potential lies in its use for species that cannot at the present time be propagated economically by other means. For example, seeds of *Trillium* species normally take two years to germinate and approximately 3 to 5 years further growth to reach saleable size. It is, therefore, a good candidate for tissue culture propagation. Similarly, most of our native terrestrial orchids cannot be successfully propagated at this time, and research in tissue culture of this group is underway.

In conclusion, the following are lists of native plants and their respective propagation methods. Also included is a list of sources on wildflower propagation.

### PROPAGATION METHODS FOR NATIVE PLANTS

#### SEEDS

Seeds of the following species should be sown immediately upon ripening. In most cases, the seeds should not be allowed to dry out before sowing. Germination in some species will take two years, even if freshly sown.

*Asarum canadense* (wild ginger)  
*Calla palustris* (wild calla)  
*Caltha palustris* (marsh marigold)  
*Clintonia borealis* (blue-head lily)  
*Coptis groenlandica* (goldthread)  
*Dicentra cucullaria* (Dutchman's breeches)  
*Hepatica acutiloba* (sharp-lobed hepatica)  
*Jeffersonia diphylla* (twinleaf)  
*Sanguinaria canadensis* (bloodroot)  
*Stenanthium gramineum* (featherfleece)  
*Stylophorum diphyllum* (celandine Poppy)  
*Trillium* species (trillium)  
*Uvularia grandiflora* (merrybells)  
*Xerophyllum asphodeloides* (turkeybeard)

Seeds of the following species will germinate without any cold treatment. These can be sown outside in spring or in a greenhouse in late winter. They will also germinate perfectly

well in spring if sown outside in late fall.

*Aletris farinosa* (colicroot)  
*Aquilegia canadensis* (wild columbine)  
*Arisaema triphyllum* (jack-in-the-pulpit)  
*Asclepias tuberosa*; *A. incarnata* (milkweeds)  
*Baptisia australis* (blue false indigo)  
*Chrysanthemum leucanthemum* (ox-eye daisy)  
*Coreopsis lanceolata*; *C. auriculata*  
*Echinacea purpurea* (purple coneflower)  
*Epigaea repens* (trailing arbutus)  
*Erigeron pulchellus* (Robin's plantain)  
*Geranium maculatum* (wild geranium)  
*Helonias bullata* (swamp pink)  
*Liatris cylindracea*; *L. punctata*; *L. pycnostachya*  
*Linnaea borealis* (twinflower)  
*Mimulus* (monkeyflower)  
*Monarda didyma*; *M. fistulosa*  
*Polygala paucifolia* (fringed polygala)  
*Rudbeckia hirta*; *R. triloba*  
*Shortia galacifolia* (oconee bells)  
*Tiarella cordifolia* (foamflower)

Seeds of the following species need a period of moist cold in order to germinate. Also included in this list are species whose seeds may not definitely need a cold period for germination to occur, but who seem to germinate better with a cold treatment. Seeds of all species in this list can be allowed to dry out before sowing. Sow seeds outside in November or provide three months cold stratification in a refrigerator.

*Anemonella thalictroides* (rue anemone)  
*Aruncus diocus* (goat's beard)  
*Aster spectabilis*; *A. novae-angliae*  
*Chelone lyonii* (pink turtlehead)  
*Cimicifuga racemosa* (black cohosh)  
*Cornus canadensis* (bunchberry)  
*Dicentra eximia* (wild bleeding heart)  
*Eupatorium coelestinum*; *E. fistulosum*  
*Gentiana clausa*; *G. crinita*  
Native grass species — *Andropogon*, *Sporobolus*, etc.  
*Hieracium aurantiacum* (orange hawkweed)  
*Iris pseudacorus*; *I. versicolor*  
*Lobelia cardinalis* (red cardinal flower)  
*Rudbeckia fulgida* var. *sullivantii* (perennial coneflower)  
*Sabatia kennedyana* (plymouth gentian)  
*Sarracenia purpurea* (pitcher plant)  
*Silphium perfoliatum* (cup plant)  
*Solidago puberula*; *S. sempervirens*  
*Trollius laxus* (spreading globeflower)  
*Vernonia noveboracensis* (ironweed)  
*Veronicastrum virginicum* (Culver's root)

## CUTTINGS

The following species are usually propagated by softwood cuttings taken in late May or early June.

*Aster* species — *A. spectabilis*, *A. novae-angliae*

*Chelone lyonii* (pink turtlehead)  
*Chrysogonum virginianum* (green and gold)  
*Eupatorium coelestinum*; *E. fistulosum*  
*Linnaea borealis* (twinflower)  
*Mitchella repens* (partridgeberry)  
*Monarda didyma*; *M. fistulosa*  
*Phlox stolonifera*; *P. divaricata*; *P. ozarkana*  
*Vernonia noveboracensis* (ironweed)  
*Veronicastrum virginicum* (Culver's root)

The following species may be propagated by root cuttings. The proper time to take the cuttings is listed next to the species.

*Anemone canadensis* (Canada anemone) — spring  
*Asclepias tuberosa* (butterfly weed) — spring  
*Coptis gorenlandica* (goldthread) — spring  
*Dodecatheon meadia* (shooting star) — fall  
*Stokesia laevis* (Stokes' aster) — fall  
*Viola pedata* (bird-foot violet) — early spring

### DIVISION

The following species are often propagated by division in either fall or early spring.

*Acorus calamus* (sweet flag)  
*Anemone canadensis* (Canada anemone)  
*Calla palustris* (wild calla)  
*Chimaphila umbellata* (pipsissewa)  
*Clintonia borealis* (blue-bead lily)  
*Cypripedium pubescens* (yellow ladys-slipper)  
*Dicentra cucullaria* (Dutchman's breeches)  
*Disporum lanuginosum* (yellow mandarin)  
*Galax urceolata* (galax)  
*Geranium maculatum* (wild geranium)  
*Iris cristata*; *I. pseudacorus*; *I. versicolor*  
*Podophyllum peltatum* (Mayapple)  
*Sanguinaria canadensis* (bloodroot)  
*Shortia galacifolia* (oconee bells)  
*Vancouveria hexandra* (inside-out flower)

### SELECTED PUBLICATIONS ON WILDFLOWER PROPAGATION

- Brooklyn Botanic Garden. 1979. Gardening with Wildflowers. Handbook No. 38. Brooklyn Botanic Garden, Brooklyn, NY.
- Curtis, Will C. 1978. Propagation of Wild Flowers. New England Wild Flower Society, Framingham, MA.
- National Council of State Garden Clubs. 1981. Director of Resources on Wildflower Propagation. Missouri Botanical Garden, St. Louis, IL.
- North Carolina Wild Flower Preservation Society. 1977. Propagation Handbook, North Carolina Botanic Garden, Chapel Hill, NC.
- Phillips, Harry R. 1985. Growing and Propagating Wild Flowers. The University of North Carolina Press, Chapel Hill, NC.
- Steffek, Edwin F. 1983. The New Wildflowers and How to Grow Them. Timber Press Portland, OR.

VOICE: How many cuttings were you getting from the butterfly root?

BILL BRUMBACK: You can cut the root into only a few sections. It used to be thought that you could not move that plant. However, it has been shown that you can cut them up into pieces and they will come back.

VOICE: What are the germination requirements for trillium seeds?

BILL BRUMBACK: Trillium is a two-year plant. Seeds need a cold period so that during the subsequent warm period the root will grow out. You then need another cold period to release the shoot inhibition. The leaf the first year will be a single leaf. By the third year you will see the three-leaf whorl.

## PROPAGATION OF HERBACEOUS PERENNIALS BY ROOT CUTTINGS

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**Why propagate by root cuttings?** It is a relatively cheap and simple way to propagate perennials and is the only way to propagate some cultivars asexually. In comparison to propagation by shoot cuttings, it is less costly because root cuttings do not require expensive humidification or misting systems and bottom heat is unnecessary. Many root cuttings will regenerate new plants without any added heat. Most commercially grown perennials are field-grown, mechanically harvested, and shipped bare-root. This facilitates the taking of roots as the plants are being prepared for shipping. For plants with thick, fleshy roots the sticking of roots can be mechanized. This year we installed Bouldin and Lawson equipment that allowed us to reduce the time it takes to stick 20,000 oriental poppy roots from 2 or 3 days to less than one full day. Paper cutters are used to trim soft rooted plants, such as phlox, which saves a considerable amount of time.

There are many plants that produce underground shoots which can be treated in the same manner as root cuttings (Tables 1 and 2). The main difference between the two is that underground shoots have preformed buds or bud initials which produce shoots readily in propagation, whereas roots have to develop buds. Hartmann and Kester discuss root bud development in their book, *Plant Propagation: Principles and*