# The Container Production of Herbaceous Perennials

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**This is the second in a series of articles on the container production of herbaceous perennials. As part of his M.S. degree program, James Locklear carried out a thorough search of literature on this subject. Beginning with the December 1981 BPI News a report on his findings will continue in this and subsequent issues.**

A consideration of the production of perennials must begin with their propagation. Before any other aspect of production can be dealt with fully, it is necessary to have an understanding of propagation requirements and methods.

Propagation methods fall into two catagories. The first is sexual, where the units of propagation, seeds, are the product of sexual reproduction. In the second catagory, no sexual reproduction is involved. This is termed asexual, and includes propagation by cuttings, division, layering, and tissue culture. Because of the exchange and reorganization of genetic material during sexual reproduction, plants propagated from seed will exhibit more variability than those propagated by asexual means.

Most perennials can be propagated by more than one method. The method most likely to be used commercially would be the one that was most economical and yet still produced plants of high quality. For many species, the most economical means of propagation would be by seed. Yet, if uniformity is important to quality, propagation by cuttings or division might be used. A discussion of propagation methods will point out such relative advantages and disadvantages, as well as describe techniques.

### Seed

Many perennials can be successfully propagated from seed. Generally simpler and less expensive than other methods, propagation by seed is probably the most often used means of increase for perennials.

Even so, there is a disadvantage to this method in that plants raised from seed may exhibit some undesirable variability in certain plant or flower characteristics. Because of this, named perennial cultivars are almost always propagated by asexual means, such as cutting or division. Named cultivars are available from seed, however, and careful control during the production of seed insures greater uniformity. An example is the Gaillardia cultivar 'Goblin,' which is easily raised from seed, yet remains consistent in its flower color and dwarf habit.

A number of perennials are offered by seed companies as mixed hybrid strains, such as 'McKana Hybrids' Columbine or 'Bressingham Hybrids' Coralbells. While such hybrids will be uniform in most plant characteristics, there may be variation in flower color. Also available are double-flowered cultivars of certain perennials such as Shasta Daisy. Such plants raised from seed, however, will not all exhibit the same degree of doubleness. In both cases a determination would need to be made as to whether such variation would be acceptable to the consumer.

Certainly any perennial that is offered as a species and not as a named cultivar could be

produced from seed, if such was the best means of propagation. Since wildflowers and many rock garden plants are usually sold as species, seed is an important method of propagation for these plants. In addition, biennials would be produced from seed.

The availability of seed can sometimes be a problem, although most of the more common and popular perennials are available from the major seed companies. These companies may also be able to help locate a source for species or cultivars that they do not list in their own catalogs. Hard-to-find seed could possibly be obtained from companies specializing in rare and uncommon species. These are often listed in the classified sections of gardening magazines. The seed exchanges of plant societies, such as the American Rock Garden Society, could also serve as a source. Finally, in some cases seed could be collected by the grower.

The first step in propagating perennials from seed is to gather information on the germination requirements of the plants to be offered. Probably the most comprehensive source for this information is **Park's Success with Seeds**, by Ann Reilly. Although not intended as a technical manual, this book contains information on the germination requirements of probably all of the commonly grown perennials, as well as some less common species. Other sources of such information for perennials, as well as wildflowers and rock garden plants, can be found at the end of this article.

Another important source of information are the seed companies themselves. Seed germination requirements are often included in catalogs, or are otherwise available from the companies. Recently, Mel Tessene of the Joseph Harris Seed Company published results of his company's research on the germination of nineteen perennial species in the Proceedings of the 12th International Bedding Plant Conference.

There are two major considerations in germinating seed. The first is any sort of treatment required to break seed dormancy so that germination may take place, and the second is providing the correct environmental conditions necessary for optimal germination and seedling growth.

While most annuals do not require any special treatment in order to obtain germination, some perennials do. In such plants seed dormancy exists, imposed by a hard seed coat, chemical inhibitors, or other internal physiological factors. Depending on the category of seed dormancy, special treatment is needed to overcome this dormancy or the seed will fail to germinate, even under the proper environmental conditions.

There are three main pregermination treatments employed to break seed dormancy. These are scarification, soaking, and stratification. Scarification is the process of abrading or mechanically altering hard seed coats so that they are permeable to water and gases. Soaking in water is also used to modify seed coats, to soften them, as well as to leach out chemicals in the seed coat which inhibit germination. Stratification, or moist-chilling, involves exposing seed to low temperatures in order to bring about physiological changes within the embryo which release the seed from dormancy. The basic procedures involved in providing these pregermination treatments are described by Hartmann and Kester in **Plant Propagation Principles and Practices** and Reilly in **Park's Success With Seeds** and will not be discussed further here. These books, along with the other references listed at the end of this article, should be consulted for information on which species require these special treatments.

After any necessary pregermination requirements have been met, the next consideration is the provision of environmental conditions that are optimal for good seed germination. While all species require adequate moisture and humidity in order to germinate, many perennials require specific light levels and temperatures for optimal germination and seedling development (consult sources listed).

Although a number of perennials will germinate under either light or darkness, some are specific in requiring one or the other. Seed requiring light should not be covered by the germination medium, but instead simply sown on the surface. Seeds requiring darkness could be covered by the medium or, if the seed is very fine, the seed flats could be placed in total darkness or covered with newspaper, black plastic, or any other material that will block out the light. Such coverings should be removed as soon as germination takes place.

Many species of perennials have rather specific temperature requirements for germination. Any difficulty encountered in meeting these requirements is largely dependent on when the seeds are sown. For example, if seed is sown in the summer, there may be a problem in getting good germination of seed requiring low temperatures. The opposite problem could occur in the winter, of course.

Most perennial seed will germinate well at a temperature range of 68-75°F. There would be no problem germinating such seed in the summer, and in the winter heating cables or pads could be used to keep the medium temperature up to the correct level. Seed requiring lower temperatures for good germination (55-65°F) may present a greater problem, however.

If low temperature-requiring seed is to be sown in the summer, steps must be taken to keep the germination medium cool. For an operation fortunate enough to have a special temperature-controlled germination room this would be no problem. In most situations, however, medium temperatures could be kept lower by frequent misting, shading, and/or placing seed flats close to greenhouse cooling pads. Another alternative would be to place the flats in some sort of burlap enclosure that is misted frequently. Evaporation of the water from the burlap would help cool the air inside the enclosure.

Perhaps the easiest way of meeting these low temperature requirements would be by outdoor sowing during the winter. Seed requiring low temperatures could be sown in moist flats and placed outside in a coldframe or similar unheated, but protective structure. This could serve the dual purpose of providing the cold-moist treatment necessary to break dormancy in some seed, as well as the correct temperatures for germination. Once the seed has received the duration of exposure to cold necessary to break dormancy, the flats could either be brought into the greenhouse or allowed to germinate under natural conditions outdoors.

A factor which is of major importance to the overall production scheme is the time at which seed is to be sown. Depending on the range of plants offered, it could be possible to sow seed almost every month of the year. But in most cases, there will probably be a main time of year when most of the seed for next year's crop will be sown.

The decision of when to sow seed is based to an extent on how much time is needed for germination to take place. Perennial species vary considerably in the amount of time required for germination, from a few days to months. Most of the more commonly grown species will germinate in 1-3 weeks, however.

After germination time is considered, the most important factor in determining when to sow seed is the amount of time necessary to produce a salable plant. If perennials are to be sold in packs or small pots (2¼ or 3"), then seed would be sown in the winter, somewhat similar to annual bedding plant production. If larger plants are offered, in 1 or 2 quart containers, for instance, then the seed for these plants would probably be sown in the summer.

If the goal of production is to produce plants which will bloom the year of their purchase, then these plants would require exposure to low winter temperatures in order to initiate flowers. As mentioned in Part One of this paper, such plants would also need to be at a stage of development that is receptive to this stimulus. A summer sowing would probably produce plants of sufficient size by winter to be receptive to the low-temperature stimulus to flowering.

The exact time seed should be sown during the summer would depend on local conditions, particularly the length of the growing season. Bud Heist of Conyers, Georgia, has found that seed sown in July produces a good-sized plant (in 1 quart containers) for him by the time winter arrives. In more northern regions, an earlier sowing, perhaps in June, might be necessary.

Other considerations that would affect the time of sowing would include the availability of seed, the need for pregermination treatment, the type of propagation facilities and their availability, and the availability of time and labor. Such factors, along with differences in the growing season, make it difficult to prescribe exact sowing dates that would be valid over much of the U.S. Experience under local

conditions and within a particular type of growing operation would be necessary in order to pin-point the proper time to sow perennial seed.

### Perennials and Biennials That Can Be Propagated By Seed

**Alcea rosea** (Hollyhock)
**Anemone pulsatilla** (Pasque Flower)
**Anthemis tinctoria** (Golden Marguerite)
**Aquilegia spp.** (Columbine)
**Arabis spp.** (Rock-Cress)
**Armeria spp.** (Sea-Pink)
**Asclepias tuberosa** (Butterfly Weed)
**Aubrietia deltoides** (False Rock-Cress)
**Aurinia saxatilis** (Alyssum)
**Bellis perennis** (English Daisy)
**Bergenia cordifolia** (Bergenia)
**Campanula medium** (Canterbury Bells)
**C. carpatica** (Harebells)
**Catanache caerulea** (Cupid's Dart)
**Centaurea montana** (Cornflower)
**Cerastium tomentosum** (Snow-In-Summer)
**Cheiranthus spp.** (Wallflower)
**Chrysanthemum coccineum** (Painted Daisy)
**C. x superbum** (Shasta Daisy)
**Coreopsis spp.** (Coreopsis)
**Delphinium spp.** (Larkspur)
**Dianthus barbatus** (Sweet William)
**Dianthus spp.** (Pinks)
**Dictamnus albus** (Gas Plant)
**Digitalis purpurea** (Foxglove)
**Dodecatheon spp.** (Shooting Star)
**Doronicum spp.** (Doronicum)
**Echinacea purpurea** (Purple Coneflower)
**Echinops spp.** (Globe Thistle)
**Erigeron spp.** (Fleabane)
**Euphorbia spp.** (Spurge)
**Filipendula spp.** (Filipendula)
**Gaillardia x grandiflora** (Blanket Flower)
**Gentiana spp.** (Gentian)
**Geum spp.** (Geum)
**Helleborus niger** (Christmas Rose)
**H. orientalis** (Lenten Rose)
**Heuchera sanguinea** (Coral bells)
**Hibiscus moscheutos** (Hardy Hibiscus)
**Iberis sempervirens** (Candytuft)
**Lavandula angustifolia** (Lavender)
**Liatris spp.** (Blazing Star)
**Limonium spp.** (Hardy Statice)
**Linum perenne** (Flax)
**Lobelia cardinalis** (Cardinal Flower)
**L. siphilitica** (Great Blue Lobelia)
**Lunaria annua** (Moneyplant)
**Lupinus x regalis** (Lupine)
**Lychnis chalcedonica** (Maltese Cross)
**Lysimachia spp.** (Loosestrife)
**Mertensia virginica** (Bluebells)
**Monarda didyma** (Beebalm)
**Oenothera spp.** (Evening Primrose)
**Penstemon spp.** (Beardtongue)
**Platycodon grandiflorus** (Balloon Flower)
**Polemonium caeruleum** (Jacob's Ladder)
**Potentilla spp.** (Cinquefoil)
**Primula spp.** (Primrose)
**Rudbeckia spp.** (Cone Flower)
**Salvia spp.** (Salvia)
**Saponaria spp.** (Soapwort)
**Scabiosa caucasica** (Pincushion Flower)
**Stokesia laevis** (Stokes Aster)
**Thalictrum aquilegifolium** (Meadowrue)
**Trollius spp.** (Globe Flower)
**Viola cornuta** (Tufted Pansy)

### Sources Of Information On Seed Germination Requirements of Perennials

**The Ball Red Book** by Vic Ball (Ed.). Chicago, IL: Geo. J. Ball, Inc., 13th Edition, 1975. (general perennials)

**North Carolina Native Plant Propagation Handbook** by the North Carolina Wild Flower Preservation Society, Inc. Chapel Hill, NC: North Carolina Wild Flower Preservation Society, Inc., 1977. (woodland wildflowers)*

**Park's Success with Seeds** by Ann Reilly. Greenwood, SC: Geo. W. Park Seed Co., Inc., 1978. (general perennials)

**Plant Propagation Principles and Practices** by Hudson T. Hartmann and Dale E. Kester. Englewood Cliffs, NJ: Prentice-Hall, Inc., 3rd Edition, 1975. (general perennials)

**The Prairie Garden** by J. Robert Smith and Beatrice S. Smith. Madison, WI: University of Wisconsin Press, 1980 (prairie wildflowers)

**Prairie Propagation Handbook** by Harold W. Rock. Milwaukee, WI: Milwaukee County Park System, 5th Edition, 1977. (prairie wildflowers)**

**Seed Germination of Rock Garden Plants** by Dara E. Emery (Ed.). American Rock Garden Society, Inc. (rock garden plants and wildflowers)***

**Three Methods of Germinating Seeds.** American Rock Garden Society, Inc. (rock garden plants and wildflowers)***

AVAILABLE FROM:

*Totten Garden Center, 457-A, UNC
North Carolina Botanical Garden
Chapel Hill, North Carolina 27514

**Boerner Botanical Gardens
5879 S. 92nd Street
Hales Corners, Wisconsin 53130

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