

Perennials Produced As Bedding Plants

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INTRODUCTION

Perennials are providing the "new" look in landscapes. Naturalistic flower beds of perennials offer subtle variations in color and foliar pattern during the season. They thrive for an indefinite number of years, but die to the ground every year; they have annual stems and perennial rootstocks.

During the first growing season after a spring sowing many perennials produce only vegetative growth, but flower the second and each subsequent year of the plant's life. Since the home gardener usually demands "instant color," perennials for the bedding plant market must be grown in such a way that the plants flower the same season they are purchased by the consumer.

Nurserymen provide field-grown plants started from seed or transplants in the spring preceding the year of purchase. After a summer of vegetative growth, the plants are dug up in late fall. By this time the top growth is dead and only the crown and roots remain. These are then packed in boxes and placed in large coolers at -3°C to 1°C until spring. In preparation for shipping to retail centers, the crowns, still devoid of leaves, may be individually planted in small plastic bags of soil with crowns remaining exposed at the top of the bag. Each bagged plant is then placed in its own open-top box with a color picture of its characteristic foliage and flower. Bare-root plants may also be planted by garden centers for late spring sales. Several leaves may have sprouted by the time of purchase, and plants may or may not display a flower bud. This method of production is very successful; however, such plants are larger than flatted bedding plants.

A few producers have used greenhouses or cold frames for an alternative production scheme. Containerized perennials are started during summer months in the greenhouse and are overwintered at 35-40°F in hotbeds, polyethylene-covered houses, or microfoam-covered beds. Plants are sold in spring either green

or in bud after a flush of new vegetative growth stimulated by raised temperatures and naturally lengthening photoperiod.

The objective of this research was to explore the environmental requirements for growth and development of four perennial species and to develop a cultural scheme for production of containerized bedding plants. Highly popular species were selected: columbine [*Aquilegia x hybrida*], Shasta daisy [*Chrysanthemum x superbum*], basket-of-gold [*Aurinia saxatilis*], and lupine [*Lupinus* 'Russell Hybrid'].

RESULTS

Seeds of each species were germinated and grown to various sizes in a 65°F night temperature greenhouse using standard practices. These plants were cold-stored and/or treated under several daylengths. More complete results will be available elsewhere, but the following is a summary of the findings:

1) Each of the 4 species were induced to flower by cold treatment; at least 10 weeks were required for columbine (Figure 1), 12 for basket-of-gold and lupine (Figure 2), and 16 for Shasta daisy.

2) Flower-inducing treatments were not effective until after plants were mature, as shown in Table 1.

Thus, 2 groups of species have been identified:

A. quick-maturing types which require only 3 months of vegetative growth at 65° before cold storage.

B. slow-maturing types which require 6 months of vegetative growth at 65° before cold storage.

Because of this required minimum size, only columbine could be produced from transplant to finish in small volume cell packs (48 cells/11 inch x 21 inch flat). The large size of the mature plants necessary for flower induction of basket-of-gold, Shasta daisy, and lupine necessitated the use of larger volume cells (18 cells/11 inch x 21 inch flat), or 3 to 4 inch pots.

3) While seed catalog information was sufficient for germination of most species, the need to scarify lupine seeds is not listed. A 45-60 minute soak in concentrated sulfuric acid improved germination in 4 days from 3% without scarification to 81% with scarification.

4) Forcing cold-stored plants to visible flower buds before spring sales was achieved in a range of times. Time varied according to whether plants were grown under short daylengths or long daylengths.

Table 2. Forcing periods for 4 herbaceous perennial species when grown in long days or short days.

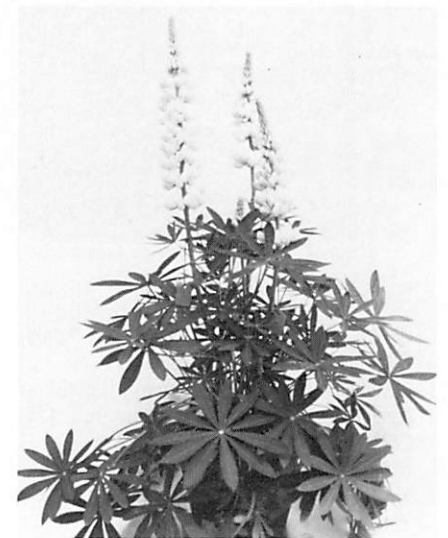
Species	Approximate Forcing Period For Visible Flower Buds (weeks)	
	Short Days	Long Days
Columbine	9-13	7-9
Shasta Daisy	13	4-7
Basket-of-Gold	2-3	2
Lupine	5	2

Long daylengths during forcing hastened flower bud development by 1-8 weeks compared to short days and may be used commercially for this purpose.

5) Long daylengths caused plants to elongate, especially columbine and basket-of-gold, so a growth retardant might be needed. For columbine, a B-Nine spray at 2000 ppm was quite effective when applied when some new foliage had developed after cold storage.

CONCLUSION

Production of perennial bedding plants to market with spring annuals is feasible. The technology differs by earlier sowing followed by a cold treatment. The date of sowing is affected by the length of the juvenile period (Table 1), as well as the length of the inexpensive summer growing period. (Dropping temperatures to 40°F in November saves fuel compared to maintaining 65° through December). Thus basket-of-gold and lupine would be sown in April, and columbine and Shasta daisy in July. By November, plants are mature and ready to move to cold storage. Facilities might consist of coldframes, unheated greenhouses, or refrigerated storage. Time of raising the



'Russell Hybrid' lupine produced as a containerized bedding plant.

Table 1. Minimum Age (Size) for Cold Treatment of 4 Herbaceous Perennial Species.

Species	Earliest Stage Plants Ready for Flower-Inducing Treatments	
	Description	Approximate Age (mo)
Columbine	12-15 Leaves	3
Shasta Daisy	Multiple Crowns	3
Basket-of-Gold	10 Crowns	6
Lupine	---	6

temperature for forcing depends on market demand, but would usually begin in early April for columbine and Shasta daisy, late April for basket-of-gold and lupine. Forcing temperatures may be adjusted to slow down or speed up bud development as needed.

Consumers need to be made aware that these plants are spring and early summer flowering species, and should be encouraged to buy and plant them as soon after the frost-free date in their area as possible.

When considering these results along with those of Lopes and Weiler, and Kusey *et al.*, natural causes of flowering in the perennial garden seem to be the following:

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Table 3. Natural blooming season and cause of flowering for several herbaceous perennial species.

Flowering Period	Species	Causes of Flowering
May	Basket-of-Gold, Bleeding Heart	Winter Cold
June-July	Columbine, Lupine, Shasta Daisy	Winter Cold and Summer (long) Daylengths
July-August	Baby's Breath	Summer (long) Daylengths
September	Chrysanthemum	Fall (short) Daylengths



'Fairyland' Columbine produced as a containerized bedding plant. 'McKana's Giant' Columbine elongated more and required chemical growth retardant.

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