Herbaceous Perennials: Quick-cropping Part III

Part 13 of our 14-part series on herbaceous perennials takes a look at quick cropping three species: *Leucanthemum* x *superbum* 'Snowcap,' *Veronica longifolia* 'Red Fox,' and campanula 'Birch Hybrid.'

by **AMY ENFIELD, ERIK RUNKLE, ROYAL HEINS, ARTHUR CAMERON,** and **WILLIAM CARLSON**

IN the January 2002 issue of *Greenhouse Grower*, we discussed the keys to success for quick-cropping of herbaceous perennials. The primary objective of quick-cropping herbaceous perennials is to efficiently and rapidly propagate, bulk, and force high-quality perennials in a uniform and predictable manner. The sequence of quick-cropping is stock plant management, propagation, bulking, cooling (if needed), and forcing into flower.

Our previous article discussed the specifics for quick-cropping three photoperiodic species. In this article we will discuss the specifics for quick-cropping three species that require a cold treatment to flower: *Leucanthemum* x *superbum* 'Snowcap', *Veronica longifolia* 'Red Fox,' and campanula 'Birch Hybrid.'

Leucanthemum x *superbum* 'Snowcap'

Stock Plant Management

Leucanthemum x *superbum* 'Snowcap' requires long days to flower without a cold treatment, and flowers faster under long days following cold treatment. With or without cold, plants flower when photoperiods are greater than 13 hours. Therefore, to maintain vegetative growth, stock plants should originate from noncooled plants and should be maintained under photoperiods of 13 hours or less (Figure 1). This requires pulling black cloth over plants from about March 15 through September 15 in most of the northern hemisphere to shorten the day. Any combination of opening and closing black cloth that gives at least 11 hours of darkness (maximum 13 hours light) is acceptable. Leucanthemum 'Snowcap' stock plants should be grown at 64°F to 68°F (18°to 20°C).

Figure 1. Example of vegetative leucanthemum 'Snowcap' stock plants growing under a 12-hour photoperiod with supplemental lighting during the winter.

Cuttings harvested every four to five weeks ensure continued branching and cutting production.

Propagation

Tip cuttings should be propagated in plug flats containing a well-drained media such as a 50% peat, 50% perlite mixture. Dipping the cutting base into a rooting hormone (e.g., 1,500-ppm liquid IBA) accelerates rooting and improves rooting uniformity. Like stock plants, propagate leucanthemum 'Snowcap' cuttings under a photoperiod of 13 hours or shorter to maintain vegetative growth. During propagation, root zone temperature should be 73°F to 77°F (23°C to 25°C), and the relative humidity maintained around 90%. With these conditions, plug flats can generally be removed from propagation after two to three weeks.

Bulking

Leucanthemum plugs should be bulked under noninductive photoperiods of 13 hours or less (Figure 2). The

Schedule

Michigan State University researchers' 14-part series on herbaceous perennials covers topics from light to plant growth regulators to various species.

January '01: Light
February: Series Did Not Run
March: Noteworthy plants
April: Propagation
May: Series Did Not Run
June: *Heuchera*
July: Plant Growth Regulators
August: *Phlox subulata*
September: *Scabiosa*
October: Ground Cover I
November: Ground Cover II
December: *Oxalis crassipes* 'Rosea'
January '02: Quick-cropping I
February: Series Did Not Run
March: Quick-cropping II
April: Series Did Not Run
May: Quick-cropping III
June: Quick-cropping IV

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duration of bulking is dependent on the size of the finish pot. For example, for a five-inch pot, three weeks of bulking at 68°F (20°C) is adequate.

Table 1.		Stage Of Production					
Species		Stock Plants	Propagation	Bulking	Cooling	Forcing	Total
	Temp. (°F)	64-68	73-77	65-70	35-41	68	--
Leucanthemum 'Snowcap'	Weeks	--	3	3	5	7	18
	Daylength	<13	<13	<13	<13	LD	--
Veronica 'Red Fox'	Weeks	--	3	3	5	6	17
	Daylength	ND	ND	ND	ND	ND	--
Campanula 'Birch Hybrid'	Weeks	--	3	3	6	10	22
	Daylength	ND	ND	ND	ND	ND	--

LD = Long days, ≥ 14 hours or Night Interruption ND = Natural days

Table 1. Recommended temperatures and photoperiods and minimum production durations (in weeks) for five-inch flowering pot plant production.

Vernalization

Leucanthemum 'Snowcap' will flower without a cold treatment if long photoperiods are provided. However, a five-week cold treatment improves the uniformity of crop flowering and reduces time to flower from start of long day forcing. Without cold, a crop flowers over a period of four weeks taking on average nine weeks to reach first flower. Following five weeks at 41°F (5°C), plants flower uniformly within one week of each other after only seven weeks of long days (Figure 3).

Figure 2.

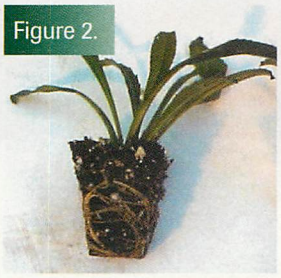

Figure 2. Example of a well-rooted vegetative *Leucanthemum* x *superbum* 'Snowcap' plug.

Forcing To Flowering

Following a cold treatment, leucanthemum 'Snowcap' is a quantitative long-day plant. This means flowering occurs faster as daylength increases.

The most rapid flowering occurs when photoperiods are 16 hours or greater or plants receive a four-hour night interruption. We suggest using a four-hour night interruption from 10 p.m. to 2 a.m., with a minimum of 10 footcandles from any electrical light source when plants are forced from mid-August to mid-April. Days are long enough from mid-April to mid-August that lighting is not necessary. For forcing during low light periods of the year, supplemental lighting will improve plant quality. Total crop

Figure 3.

Figure 3. If photoperiods have been maintained correctly, following five weeks at 41°F (5°C) Leucanthemum 'Snowcap' will begin to flower about seven weeks after the start of forcing at 68°F (20°C).

time from the start of propagation to first flowering for a five-inch pot is 18 weeks (Table 1).

Veronica longifolia 'Red Fox' Stock Plant Management

Once plants have flowered, *Veronica longifolia* 'Red Fox' grows vegetatively until the plant is exposed to a cold treatment. Thus, stock plants can be maintained under natural days year round. Stock plants should be grown at 64°F to 68°F (18°C to 20°C), and cuttings should be harvested every four to five weeks to ensure continued branching and cutting production.

Propagation

Tip cuttings should be propagated in plug flats containing a well-drained medium, such as a 50% peat, 50% perlite mixture. Dipping the base of the cuttings into a rooting hormone such as 1,500-ppm liquid IBA accelerates rooting and improves rooting uniformity. Like stock plants, Veronica 'Red Fox' can be propagated under natural days. During propagation, root zone temperature should be 73°F to 77°F (23°C to 25°C).

We suggest propagating under high humidity conditions (90% relative humidity) with minimal misting (Figure 4). Moisture control is important to avoid leaf rot, which occurs after prolonged exposure to mist. Once rooting begins, humidity should be lowered (to ~75%) and misting can be eliminated. Using these conditions, plug flats can generally be removed from propagation after two to three weeks.

Caution: Veronica 'Red Fox' is sensitive to the fungicide Terraclor, as we have killed plants with drench applications (Figure 5), and possibly other

Figure 4.

Figure 4. Veronica 'Red Fox' should be propagated under high relative humidity (90%) with little to no mist to prevent leaf rot.

Figure 5.

Figure 5. Veronica 'Red Fox' is sensitive to the fungicide Terraclor. Plants were treated one week before photo was taken.

pesticides. We suggest testing any pesticide on a few plants before applying it to the entire crop, and rinsing the foliage after a fungicide drench to minimize possibilities of phytotoxicity.

Bulking

Veronica plugs can be bulked under natural days (Figure 6). Plugs can be pinched at the start of bulking to increase lateral branching, thus increasing flower number. The duration of bulking is dependent on the size of the finish pot. For example, for a five-inch pot, we have found three weeks of bulking at 68°F (20°C) to be adequate.

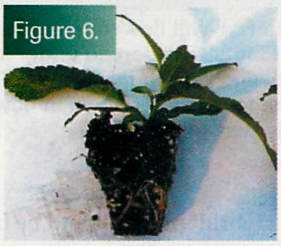

Figure 6. Example of a well-rooted veronica 'Red Fox' plug.

Vernalization

Veronica requires a minimum of five weeks cold at 41°F (5°C) to flower, although longer durations are not deleterious (Figure 7). Plants should not be pinched after cold treatment. If shoots are pinched after cooling, inflorescences will be removed and flowering will be sparse.

Forcing To Flowering

Veronica 'Red Fox' is a day-neutral plant following cold. Therefore, Veronica can be forced to flowering under natural days year round. For forcing during low light periods of the year, supplemental lighting should be provided to improve plant quality. From the start of forcing, veronica 'Red Fox' takes six weeks to reach first flowering at 68°F (20°C). Total crop time from the start of propagation to first flower for a five-inch pot is 17 weeks (Table 1).

Campanula 'Birch Hybrid' Stock Plant Management

Like Veronica 'Red Fox,' campanula 'Birch Hybrid' grows vegetatively after plants flower following a cold treatment. Thus, stock plants can be maintained under natural days year

round. Campanula 'Birch Hybrid' stock plants should be grown at 64°F to 68°F (18°C to 20°C). Cuttings should be harvested every four to five weeks to ensure continued branching and cutting production. It is important that stock plants be harvested/thinned regularly so shoots develop with thick stems (Figure 8). Without regular harvesting, stock plants develop many shoots that become spindly. Thin, spindly cuttings root poorly.

Propagation

Compared to many species, campanula 'Birch Hybrid' cuttings root poorly unless the propagation media is highly aerated and well-drained. Tip cuttings should be propagated in well-drained media containing at least 50% perlite. We have had more success in rooting when plug flats are propped up on the mist bench to ensure good drainage. Rooting hormone, such as a 1,500-ppm liquid IBA dip, accelerates rooting and improves rooting uniformity.

Like stock plants, campanula 'Birch Hybrid' cuttings can be propagated under natural days. During propagation, root zone temperature should be 73°F to 77°F (23°C to 25°C). The relative humidity should be maintained around 90%. Using these strategies, plug flats can generally be removed from propagation after two to three weeks (Figure 9).

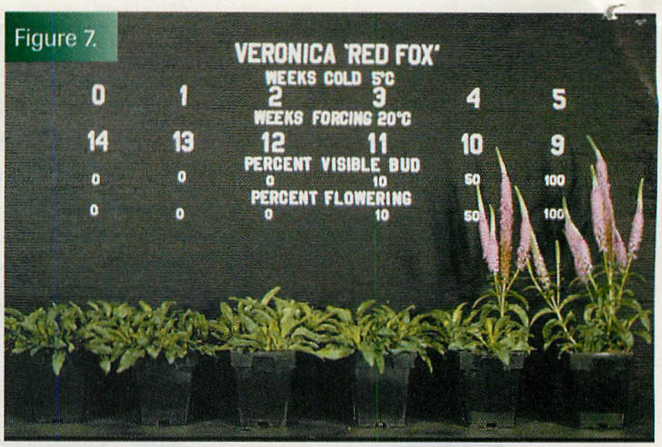

Figure 7. Veronica 'Red Fox' will flower completely after five weeks at 41°F (5°C). Plants were forced under long days for 14 to nine weeks following zero to five weeks of cold (left to right). The plant on the far right had been in flower for three weeks when the photo was taken.

Bulking

Campanula 'Birch Hybrid' plugs should be bulked under natural days. The duration of bulking is dependent on the size of the finish pot. For example, for a five-inch pot, three weeks of bulking at 68°F (20°C) is adequate.

Vernalization

Campanula 'Birch Hybrid' requires at least a six-week cold treatment at 41°F (5°C) to flower. Longer durations are not harmful, but shorter durations will result in sparse or no flowering (Figure 10). Lateral shoots should not be pinched following cold.

Figure 8. An example of campanula 'Birch Hybrid' stock (a). It is important to thin stock plants regularly (b). Stock plants that are harvested regularly develop shoots with thick stems (left), while overgrown stock plants produce spindly shoots (right).

Forcing To Flowering

Campanula 'Birch Hybrid' is a day-neutral plant, so plants can be forced to flowering under natural days year round. For forcing during low light periods of the year, supplemental lighting improves plant quality. Adequate pot spacing (four to five inches between pots) is important because flowering stems cascade over the sides of the pot. From the start of forcing, campanula 'Birch Hybrid' takes 10 weeks to reach first flowering at 68°F (20°C). Total crop time from the start of propagation to first flowering for a five-inch pot is 22 weeks (Table 1).

Caution: *Campanula portenschlagiana* (a parent of 'Birch Hybrid') is easily

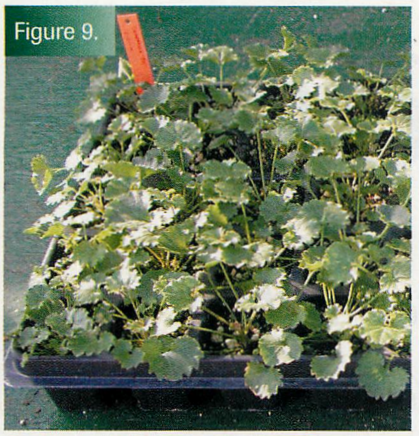

Figure 9. If the correct protocol is used, campanula 'Birch Hybrid' plug flats can be removed from propagation after two to three weeks.

confused with 'Birch Hybrid' and is sometimes sold as 'Birch Hybrid'. Campanula 'Birch Hybrid' tends to have larger flowers, and Campanula portenschlagiana flowers with little or no cold. **GG**

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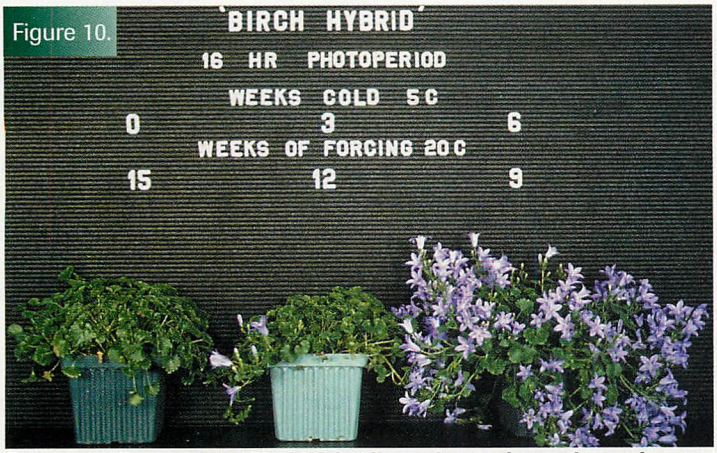

Figure 10. Campanula 'Birch Hybrid' requires at least six weeks at 41°F (5°C) to flower. Shorter durations will result in sparse or no flowering. ***Photo courtesy of Leslie Finical.***