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 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°C to 20°C). 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
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**

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).

**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

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Temp. (°F)</th>
<th>Stock Plants</th>
<th>Propagation</th>
<th>Bulking</th>
<th>Cooling</th>
<th>Forcing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leucanthemum</td>
<td>64-68</td>
<td>--</td>
<td>73-77</td>
<td>65-70</td>
<td>35-41</td>
<td>68</td>
<td>--</td>
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<tr>
<td>‘Snowcap’</td>
<td></td>
<td>--</td>
<td>3</td>
<td>3</td>
<td>&lt;13</td>
<td>&lt;13</td>
<td>6</td>
</tr>
<tr>
<td>Veronica</td>
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<td>&lt;13</td>
<td>&lt;13</td>
<td>&lt;13</td>
<td>LD</td>
</tr>
<tr>
<td>‘Red Fox’</td>
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<td>ND</td>
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<tr>
<td>Campanula</td>
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<td>3</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>‘Birch Hybrid’</td>
<td></td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>

LD = Long days, > 16 hours or Night Interruption ND = Natural days

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

**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. Plants were treated one week before photo was taken.

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

**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 beginning 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.

**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.
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).

**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.

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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.

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.

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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.

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