

FORCING PERENNIALS

— Crop By Crop —

Species: Campanula 'Birch Hybrid'
Common name: Campanula/Bellflower

Figure 1.

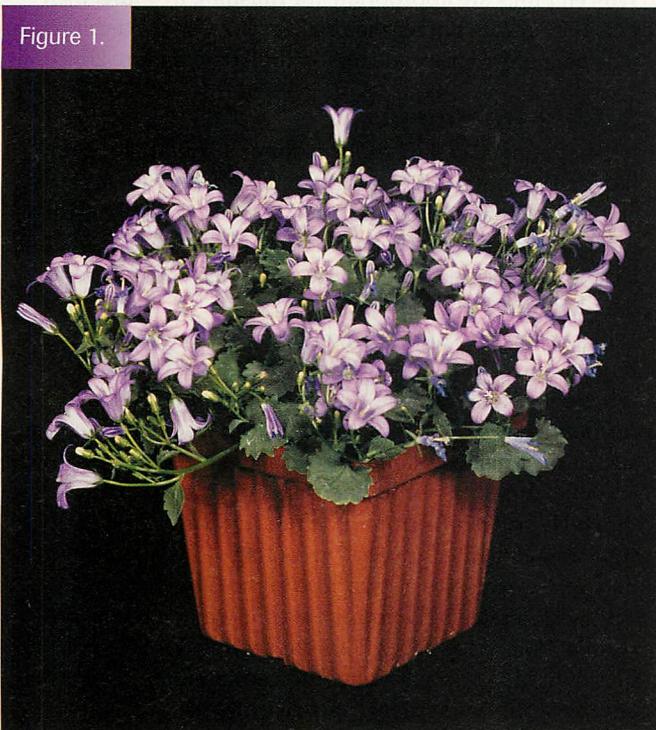


Figure 1. Campanula 'Birch Hybrid' makes an outstanding flowering potted perennial. This campanula is an outstanding selection because of its ample show of flowers and long bloom time. Photo courtesy of Leslie Finical.

Editor's note: Michigan State University and GREENHOUSE GROWER bring you our second series on forcing perennials. This group of articles will be bound into another GGPlus booklet: Firing Up Perennials II. Part seven of this series features campanula 'Birch Hybrid' or Bellflower.

by **LESLIE FINICAL, ALISON FRANE, ARTHUR CAMERON, ROYAL D. HEINS, and WILL CARLSON**

Amost spectacular addition to any garden, campanulas have much to offer, with showy flowers and a long bloom time. The Campanulaceae family includes more than 600 species that are annual, biennial, or perennial in nature. Native to the Northern hemisphere and especially concentrated in the Mediterranean sea area, campanulas are tough, versatile, and will grow in climates ranging from USDA zones 4 to 9. Plant performance is best where summers are cool.

Popular garden campanula species include *C. carpatica* 'Carpathian harebell,' *C. glomerata* 'Clustered Bellflower,' *C. medium* 'Canterbury Bells,' and *C. persicifolia* 'Peach-leaved Bellflower.' These species produce flowers atop stalks ranging from 6 inches to 4 feet tall.

There are several short-spreading species on the market, including *C. isophylla* 'White Italian bellflower,' *C. poscharskyana* 'Poscharsy Bellflower,' and *C. portenschlagiana*. The flowers are showy, bell-like, and will vary in size, form, and color. The five-lobed corollas come in a range of blue hues: purple to blue-white and also pink.

Campanula 'Birch Hybrid' (Figure 1) is an outstanding selection that is a cross between *C. portenschlagiana* and *C. poscharskyana*. Campanula 'Birch Hybrid' was introduced by Ingwerson and was named after the nursery where it was propagated – Birch Farm. There is a species named *C. betulifolia* that is sometimes confused with campanula 'Birch Hybrid.' Although the nomenclature is somewhat misleading, these are different species.

Campanula 'Birch Hybrid' is a vigorous, evergreen perennial with toothed, kidney-shaped basal leaves on long petioles. The branching stems bear numerous open star-shaped flowers that are deep violet in color. At its best, flowers will cover the entire plant in a 5-inch pot. New flowers continue to open June through September. Plant height and spread are 6 inches (15 centimeters) and 12 inches (30 centimeters), respectively. Campanula 'Birch Hybrid' is a true winner and should be included in any perennial-forcing program.

All the following production information is based on

PRODUCTION
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plants were propagated as follows: Take 1- to 2-inch cuttings and dip each in a rooting hormone, or separate small-rooted plantlets from stock plant. Plant and grow cuttings in plug trays under short days with mist for 1-2 weeks. The first signs of rooting should appear within 7 days.

2. Plant Size

Juvenility does not seem to be an obstacle in flowering campanula 'Birch Hybrid.' 128-cell plugs, with only 4-5 leaves at transplanting, flowered under 16-hour days with high-pressure sodium lamps (HPS). Time to flower is virtually the same for starting material of different sizes. After 6 weeks of cold at 41°F (5°C), 128-cell plugs flowered in 58 days (68°F forcing temperature), while 72-cell flowered in 56 days.

128-cell plugs had an average flower bud number of 84, while 72-cell plugs averaged 113 flower buds at first flower. 128-cell plugs are appropriate for finishing in 4- to 5-inch pots (Figure 2a). Larger material, such as 72- to 50-cell plugs, may be more appropriate for 1-gallon pots (Figure 2b).

3. Cold Treatment

Campanula 'Birch Hybrid' requires a cold treatment to flower. Without a cold treatment, the plant will remain vegetative under any photoperiod. A 6- to 9-week cold treatment at temperatures between 32°F (0°C) and 45°F (7°C) in a minimally heated greenhouse or lighted cooler is recommended for flower induction.

Increasing the cold treatment from 3 to 6 weeks reduces time to flower and dramatically increases flower number (Figure 3). Increasing the cold treatment beyond 6 weeks further decreases the time to flower but also decreases the size of the finished plant at flowering.

As the duration of cold increases, the growth habit of 'Birch Hybrid' shifts from prostrate and spreading to upright and elongated. Excessive cooling (15 weeks or more) may cause excessive elongation (Figure 2b).

Plugs tolerate cold exposure well if water stress is prevented. Plugs received 9-hour days with about 50 footcandles of light from cool-white fluorescent lamps in our coolers and were watered once or twice a week.

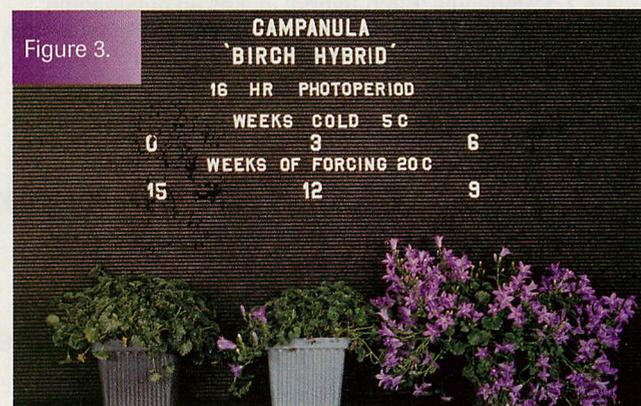


Figure 3. Influence of cooling on time to flower and flower number of campanula 'Birch Hybrid.' Plants were given 0-, 3-, and 6-week cold treatments at 41°F (5°C) and then grown in a 68°F (5°C) greenhouse under 16-hour days with high-pressure sodium lamps. Photo courtesy of Leslie Finical.



Figure 2a. Influence of cooling on different-sized starting material of campanula 'Birch Hybrid.' Here, 128-cell plugs were given a 15-week cold treatment and then grown under 16-hour days with high-pressure sodium lamps. Photo courtesy of Leslie Finical.

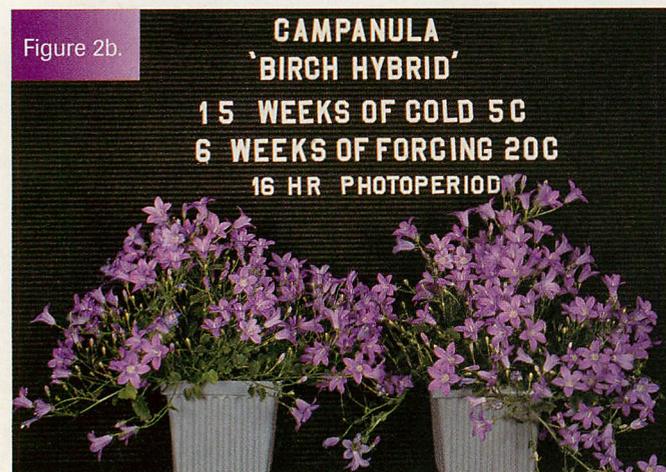


Figure 2b. Influence of cooling on different-sized starting material of campanula 'Birch Hybrid.' 72-cell plugs were given a 15-week cold treatment and then grown under 16-hour days with high-pressure sodium lamps. Photo courtesy of Leslie Finical.

observed responses of campanula 'Birch Hybrid.' Because flowering requirements within campanula vary, other species may not respond in the same manner.

1. Propagation

In the garden, campanula 'Birch Hybrid' is propagated by division in spring or fall. In the greenhouse industry, plants are propagated vegetatively by stem cuttings or division.

Obtaining production quality cuttings from campanula 'Birch Hybrid' is fairly simple. The best photoperiod for cutting production is short days, when photoperiods are less than 12 hours. Plants grown under short days produced many lateral branches with roots. Vegetative cuttings may be taken freely and rooted at 65°-70°F. A small number of

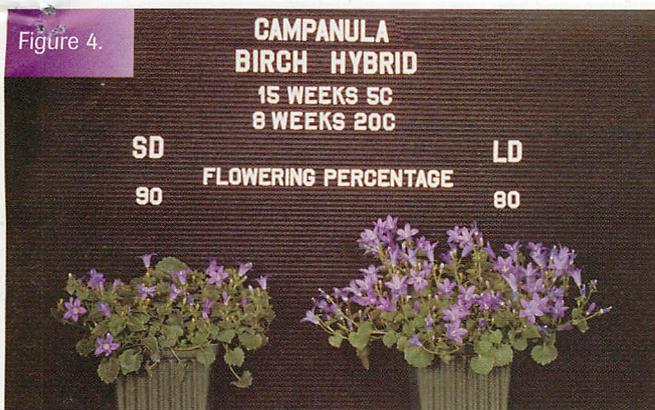


Figure 4. If cooled for 12-15 weeks, campanula 'Birch Hybrid' plants can be forced under both short days (SD) and long days (LD) with incandescent bulbs. Photo courtesy of Paul Korman.

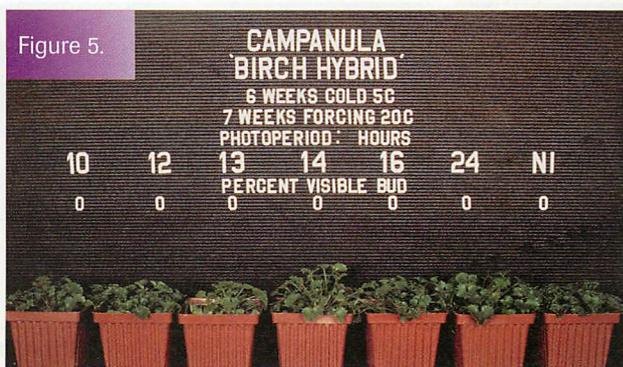


Figure 5. Influence of photoperiodic lighting provided with incandescent bulbs on plants cooled at 41°F (5°C) for 6 weeks. After 7 weeks in a 68°F (5°C) greenhouse, no flower buds were visible under any photoperiod. Photo courtesy of Leslie Finical.

4. Photoperiod

Campanula 'Birch Hybrid' can be forced under long or short days if it is properly cooled (Figure 4). Technically, 'Birch Hybrid' is considered a facultative long-day plant because it blooms slightly quicker under long days. Under short days, plants are shorter and more compact than plants grown under long days.

5. Lighting And Spacing

Campanula 'Birch Hybrid' grows best in the garden under full sun conditions, but it will tolerate partial shade. Flower number is decreased under low light conditions. Using high-intensity lighting, such as HPS lamps, to provide photoperiodic lighting decreases the time to flower and improves overall plant quality.

Cooled plugs forced under 16-hour

day-extension lighting from HPS lamps flowered about 10 days faster and had a higher flower number than those lighted with incandescent bulbs. The decrease in time to flower, though, may be attributed to warmer temperatures caused by high-intensity lighting.

High-intensity lighting also may be necessary to induce flowering of campanula 'Birch Hybrid' plants that have received less than 12 weeks of cold. In one instance, plants were given a 6-week cold treatment and placed under seven different photoperiods. The photoperiods consisted of 9-hour natural days that were extended with incandescent bulbs.

After 10 weeks in the greenhouse, no visible buds were observed under any photoperiod (Figure 5). In contrast, plants given a 15-week cold treatment achieved visible bud in 3-4

weeks under both 9-hour short days and night interruption provided with incandescent lighting (Figure 4).

In one experiment, 128-cell plugs were given a 6-week cold treatment and then grown under 16-hour days with HPS lamps. 100% flowering was observed, and the plants remained under these conditions for 15 weeks. The plants were cut back to the base while still flowering, and half the plants were moved to 9-hour short days. The plants remaining under 16-hour days grew back and resumed flowering, while the plants moved to short days became vegetative. A longer cold treatment may be necessary for plants to resume flowering under short days.

Because the plants are compact, spacing can be fairly close. Spacing 1-2 inches between pots should be suffi-

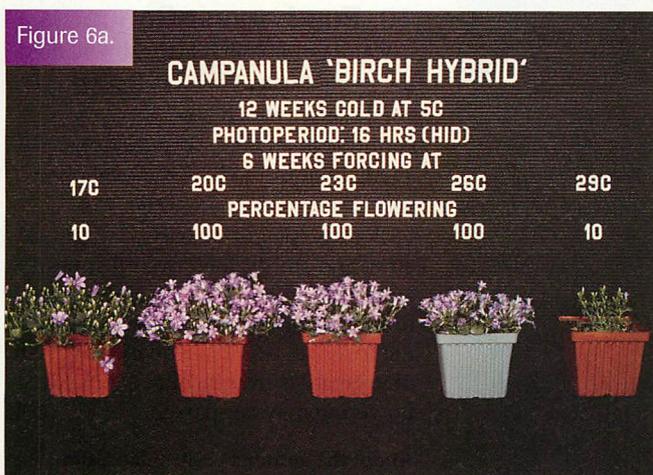


Figure 6a. Influence of forcing temperature on time to flower of campanula 'Birch Hybrid'. Time to flower decreases with increased temperature, but so does quality. Photo courtesy of Alison Frane.

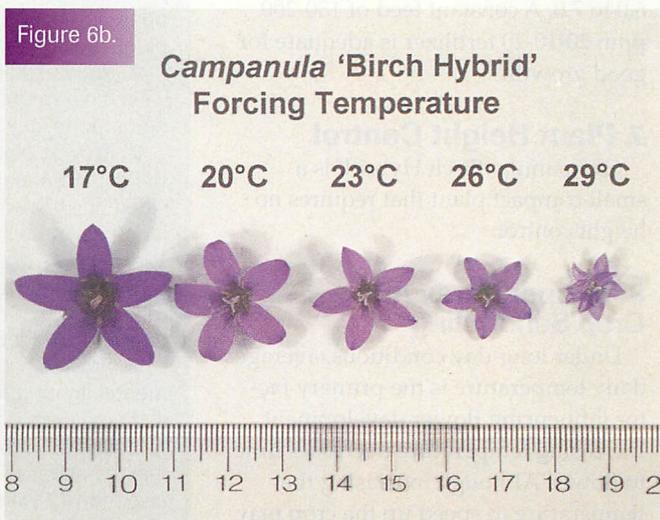


Figure 6b. Influence of forcing temperature on flower size of campanula 'Birch Hybrid'. Photo courtesy of Alison Frane.

Table 1.

Campanula 'Birch Hybrid' Production Schedule

Growing time	Cultural practice	Temperature	Photoperiod
3-4 weeks	Vegetative cuttings → Root	72°-76°F (22°-24°C)	Natural short days or photoperiod < 12 hours
4-5 weeks (72-cell plug) Longer for larger	Bulk or pinch to increase vegetative growth	68°-72°F (20°-22°C)	Natural short days or photoperiods < 12 hours
-OR- Purchase plugs			
6-9 weeks	Cold treatment	35°-45°F (2°-7°C)	Natural short days or 9 hours of light in the cooler
Begin forcing			<p>> 16 hours of light with HID or use a 4-hour night interruption with incandescent if plants receive 12-15 weeks of cold at 63°F (17°C)</p> <p>Number of days from visible bud to flower 63°F (17°C) - 26 days 68°F (20°C) - 21 days 74°F (23°C) - 17 days</p>
↓	↓	↓	
↓	↓	↓	
↓	↓	74°F (23°C)	
↓	68°F (20°C) Flower in 6 weeks	Flower in 5 weeks	
64°F (17°C) Flower in 7 weeks			

cient and help minimize the occurrence of disease and stretching.

6. Media, Fertilization, And Irrigation

Generally, campanulas are not picky about soil. Most thrive in chalky soil but will tolerate acid soils. Most are lime-tolerant or have a preference for lime. 'Birch Hybrid' will grow well in any well-drained media.

Plants can tolerate drought and should not be allowed to sit in excess water. The soil pH should range from 6.0 to 7.0. A constant feed of 150-200 ppm 20-10-20 fertilizer is adequate for good growth.

7. Plant Height Control

Campanula 'Birch Hybrid' is a small compact plant that requires no height control.

8. Temperatures And Crop Scheduling

Under long-day conditions, average daily temperature is the primary factor influencing flower development. Increasing temperature decreases time to flower. Although increasing the temperature to speed up the crop may seem desirable, delayed flowering and diminished plant quality may result

when a crop is grown too warm.

The time to flower of 'Birch Hybrid' after beginning long days depends on forcing temperature: about 7 weeks at 64°F (17°C), 6 weeks at 68°F (20°C), or

5 weeks at 74°F (23°C). Plants will flower faster at the warmer temperatures up to 78°F (26°C) but will experience heat delay if flowering at temperatures above 78°F (26°C) (Figure 6a). During forcing, try temperatures of 64°-74°F because plant and flower size are larger at cooler temperatures (Figure 6b).

Formula For Success: 'Birch Hybrid'

1. Match starting material to desired final size. Smaller starting material will produce a small finished product. 128-cell plugs are appropriate for 4- or 5-inch pots. Larger plugs are suitable for 1-gallon pots.

2. Provide plants with a 6- to 9-week cold treatment at 41°F (5°C) before long-day treatment (LD).

3. Provide plants with LD after the cold treatment. LD are best provided by HID lamps for 16-hour day-lengths. Plants that have received 12-15 weeks of cold can be forced with night interruption from 10 p.m. to 2 a.m. with a minimum light intensity of 10 footcandles.

4. Provide plants with supplemental lighting from high-pressure sodium lamps during the dark winter months. High-intensity lighting may be necessary for plants given less than 12 weeks of cold.

5. Force between 64°F and 74°F (17°-23°C).

9. Disease And Insect Pests

No disease or insect pests were observed on campanula 'Birch Hybrid' during the course of this research.

10. Postharvest Concerns

Campanula 'Birch Hybrid' will hold the initial flush of flowers for about 4 weeks, after which new flowers will continue to emerge. Because flowers are small, their immediate removal upon senescence is not necessary.

Because plants are fairly drought-tolerant and sturdy, their overall appearance will remain good for quite some time. Cutting them all the way back to the base will result in a quick new flush of vegetative growth, but continued flowering may be sparse. **GG**

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