



# Success With Campanulas



Champion Lavender

The Champion series offers a relatively short greenhouse production time, tall stems and no cold requirement for flower development.

By John Dole, Todd Cavins  
and Theresa Bosma

Tall, open spikes of bell-shaped flowers mark the distinctive cut flower 'Canterbury Bells', or *Campanula medium*. The Champion series sports 1- to 1 1/2-inch-long, upward-facing flowers in four colors: Blue (actually purple), Pink (nice, clear pink), Light Blue (slightly paler purple than Blue) and Lavender (beautiful white with a purple cast). While some growers have had much success growing Champion in the field, it generally produces the tallest stems, at 24-30 inches, in the greenhouse. Striking and different, this species is rapidly becoming a popular cut flower.

*Campanula medium* has been grown for many years, but older cultivars were biennials requiring a lengthy cultivation time and cold or short days followed by long days for flowering. The lengthy flowering requirements made the crop unacceptable for large-scale greenhouse cut flower production. However, the cultivar series Champion now offers a production time of 18-23 weeks in the greenhouse with no cold requirement for flower development.

## PROPAGATION

Campanula is seed-propagated and works well when grown in plugs. During stage one, the seed should be germinated at 65-68° F, with a constant 68° F for four days after sowing providing the best results. Seedlings should germinate in 5-10 days. During stage two, after seeds germinate, apply 100 ppm nitrogen from a complete fertilizer and grow at 68-72° F. During stage three, when plants are filling out the plug tray, a media EC of 0.7-1.0 dS/m (2:1 dilution) or 1.0-1.5 dS/m (pourthru) should be maintained using a complete fertilizer. Sakata recommends using calcium nitrate at this stage. The seedlings are ready to transplant from the plug flat in stage four as they have 2-3 true leaves. Do not allow plugs to become root-bound and overgrown as they will stunt and not produce long stems after transplanting. Also, seedling Campanula plugs are especially susceptible to root and crown rots and should be handled accordingly. ♦



Champion Purple

**FLOWERING CONTROL**



When Champion was first grown in the United States some producers obtained long, strong stems while others had short plants that flowered quickly. The problem appeared to be photoperiod; we initiated experiments to determine the photoperiod and light intensity requirements of *Campanula Champion*. We germinated Champion Blue and Champion Pink seeds in 8- or 16-hour initial photoperiods; transplanted the seedlings when 2-3, 5-6 or 8-9 true leaves developed, and placed them under 8-, 12- or 16-hour final photoperiods.

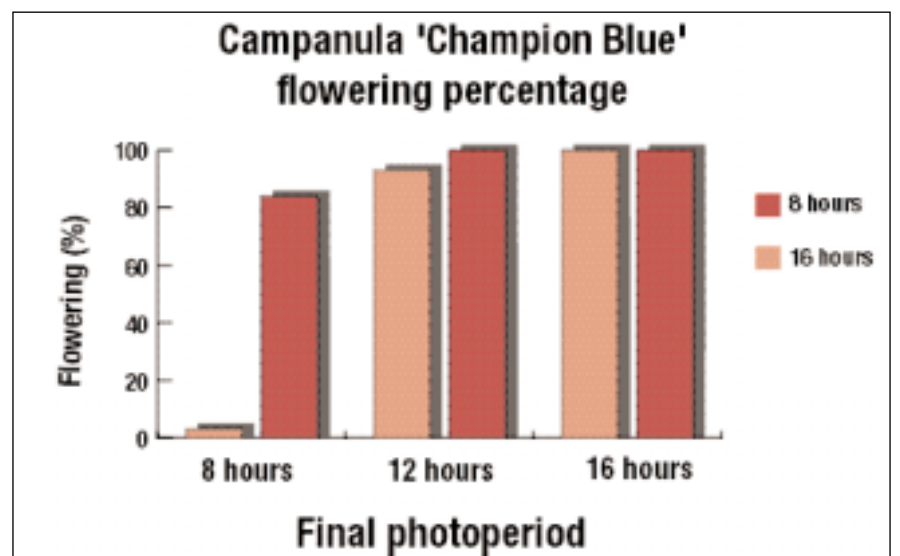


The lowest flowering percentage for Champion Blue (less than 1 percent) and Champion Pink (16 percent) resulted from plants grown in the 8-hour photoperiod continuously (see Figure 1 below). One hundred percent flowering occurred when *Campanula* were grown in the 16-hour final photoperiod, indicating that *Campanula Champion* are long-day plants. Plants grown initially in the 8-hour and finished in the 16-hour photoperiod had the longest commercially acceptable stems (see Figure 2, page 32). Plants needed to develop 8-9 leaves before all plants flowered, indicating that *Campanula Champion* has a juvenile phase, a period of vegetative growth before plants can produce flowers. Stem diameter was generally thickest for plants grown in the 8-hour, compared to the 16-hour, initial photoperiod. However, the 8-hour initial photoperiod delayed flowering compared to the 16-hour initial

Top: *Champion Pink*. Bottom: *Botrytis* on *Champion Pink* flowers.

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Figure 1. Effect of 8- or 16-hour initial photoperiod and 8-, 12- or 16-hour finishing photoperiod on percentage of *Champion Blue* plants flowering.



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Figure 2. Effect of 8- or 16-hour initial photoperiod and 8-, 12- or 16-hour finishing photoperiod on Champion Blue stem length.

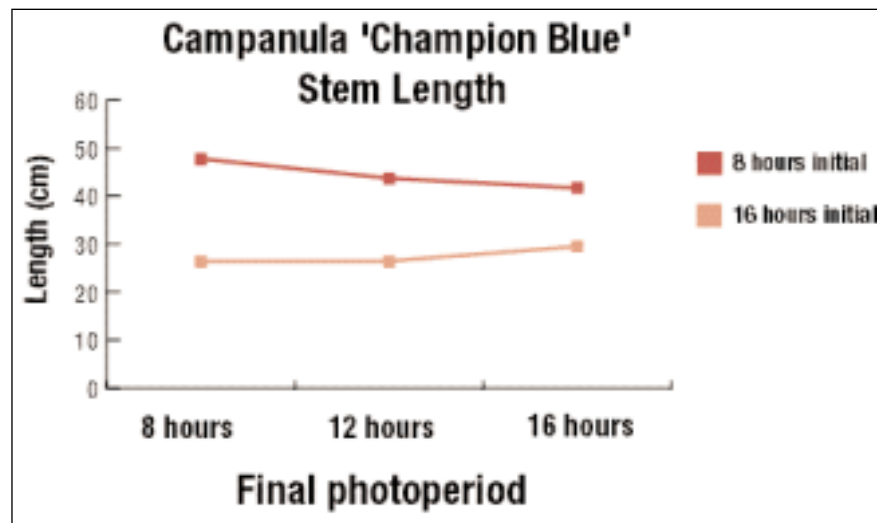
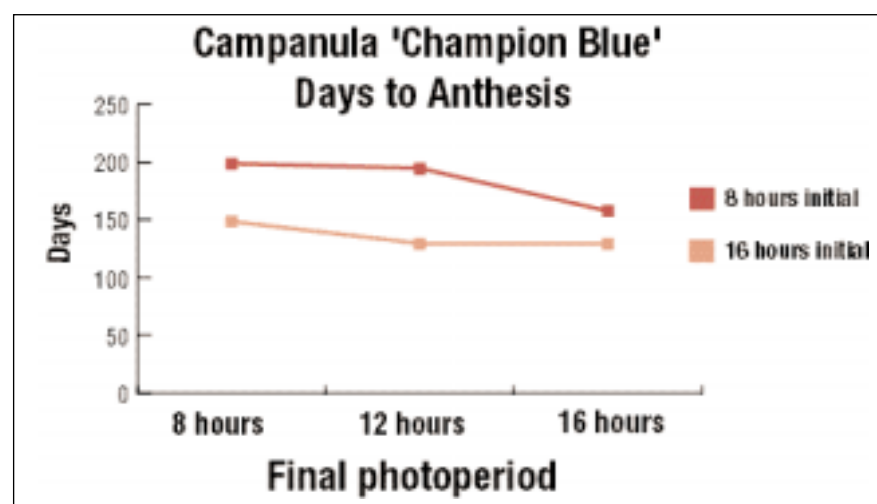


Figure 3. Effect of 8- or 16-hour initial photoperiod and 8-, 12- or 16-hour finishing photoperiod on Champion Blue crop time.



photoperiod (see Figure 3 above). Plants receiving high-intensity discharge (HID) supplemental lighting during the 16-hour initial photoperiod flowered 11 days quicker compared to plants not receiving HID supplemental lighting. We also calculated profitability for each treatment and the highest profits were obtained from campanula grown in the 8-hour initial photoperiod and transferred at 8-9 true leaves into the 16-hour final photoperiod.

According to Harold Wilkins, the original species *C. medium*, Canterbury Bells, a popular garden biennial, has a complex but remarkable environmental sequence. Flowers are initiated only after vernalization under short days (SD) followed by long days (LD). Only older seedlings perceive the cold and SD signals. Stem elongation occurs without flowering when plants are treated with gibberellic acid ( $GA_3$ ) under SD. If these elongated plants are cold-treated, they flower under LD at the same time as the vernalized plants grown under SD and subsequently placed under LD.

**Temperature.** Germinate seed at 60-70° F. Grow at 55-65° F nights during

Table 1. Production schedule for Campanula Champion

Cultural step	Production time (weeks)	Temperature (° F)	Photoperiod
Germinate seeds	1-1.5	68	8-hour short days
Grow seedlings	3-3.5	65-68	8-hour short days
Transplant to final location	4-5	55-65	8-hour short days
Flower	11-13	55-65	16-hour long days for a minimum of 7 weeks
Total	18-23		

production. Plants for field cut production can tolerate light frosts. According to Betsy Hitt of Peregrine Farm, temperatures down to 20° F have not caused problems. Plants may be able to take lower temperatures. Campanula are particularly

suited to unheated greenhouse production, which encourages long, thick stems and provides protection from weather. In areas of mild winters, plants can be field-planted in the fall and overwintered for early spring flowering.

**Light.** Plants should be forced under high natural light or HID if natural light levels are low. Supplemental HID lighting is used in northern Europe. Long days can be provided by incandescent mum lights illuminated from 10 p.m.-2 a.m.

**Water.** As with most species of campanula, plants should not be overwatered and should be grown on the dry side. On the other hand, campanula is one of the first species to wilt and may require frequent irrigation. Wilting should be prevented as it can cause crooked stems.

**Nutrition.** Campanula are moderate feeders. We have grown plants in containers using 250 ppm nitrogen from 20-10-20, but lower rates should be used with bed production due to less leaching. A medium EC of 0.7-1.0 dS/m (1:2 dilution) or 1.0-1.5 dS/m (pourthru) should be maintained. Sakata recommends using a calcium nitrate-based fertilizer. Sakata also reports that boron deficiency will induce distortion and tip abortion and iron deficiency will cause leaf tip burn.

**Media.** Any well-drained medium with a pH of 6.0-7.0 can be used.

**Spacing and Pinching.** Plants should be spaced 4-6 inches apart for single stem production and 10-12 inches apart for pinched production. The longest stems are produced with single-stem production, which is best for greenhouse production. Pinched production works best for field or unheated greenhouse production; 6-10 stems can be harvested per plant.

**Support.** Netting is helpful as stems are weak at the base, especially during low-light periods. Netting is highly recommended for outdoor production because the cup-shaped flowers fill with water and fall over.

**Schedule/Timing.** Production time varies from 18-23 weeks, with prompt transplanting and application of long days and warm production temperatures producing the shortest crop times (Table 1). Plants can be grown in ground beds, 1-gallon pots or 2-inch-deep flats. The longest stems will be obtained with ground beds and pots.

**Insects.** Plants are susceptible to thrips, aphids, spider mites and fungus gnats. Thrips are especially prevalent and can be particularly damaging to dark purple flowers. Fungus gnats are typically a problem during propagation.

**Diseases.** Campanula has problems with Botrytis, which

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can spot or blight the large flowers. Flower spotting can be especially prevalent on field-grown campanula. Root and stem rot (*Fusarium species*, *Rhizoctonia solanii* and *Sclerotinia sclerotiorum*) can be a major problem during production, especially from germination until plants are half-grown. Also possible are powdery mildew, aster yellows and a number of leaf spot diseases; the latter two diseases would be rare in the greenhouse.

**Postharvest.** Stems should be harvested when 2-3 lower flowers have opened. They will respond best to being placed in 100° F warm water immediately after harvest followed by a 24-hour, 5-percent sucrose pulse. Fresh cut, unstored flowers will have a vase life of 10-14 days. Cut stems can be stored at 35.5° F for one week in water or dry with little shortening of postharvest life; as with most species, however, storage in water provides the best results. Longer storage of up to three weeks in water or up to two weeks dry will result in a shorter vase life of 6-9 days. Although not tested, lower storage temperatures are recommended as flowers continued to open even during cold storage. Dry storage will probably be more effective at temperatures close to 32° F. In the arrangement or bouquet, continuous 1.0 percent or 2.0 percent sucrose solution works well. The stems take up much water and as such perform best with no foam in the vase. Buds continue to open after harvest.

Flowers are sensitive to ethylene, which causes browning and shriveling of open petals; buds may also discolor and die. Ethylbloc (1-MCP) and silver thiosulfate (STS) are effective at preventing ethylene damage.

## SUMMARY

The key points for successful Campanula Champion production are to grow them initially under 8-hour short days to enhance vegetative growth and transfer them at 8-9 true leaves into 16-hour long days for flowering. Too-short plants will result from plugs becoming root-bound and from long days being applied prematurely. Plants are susceptible to root and crown rot, especially in

the plug stage. Watch the watering, as underwatering-induced wilting will cause crooked stems and overwatering will promote rots. Finally, enjoy the striking beauty of a well-grown campanula cut flower. 

*This research was supported in part by Sakata Seed. We thank Vicki Stamback, Bear Creek Farm, for providing marketing information and Leah Aufill for production assistance.*

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