

– Crop By Crop –

FORCING PERENNIALS

Species: *Leucanthemum x superbum* 'Snowcap'
Common name: Shasta daisy

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 GG Plus booklet: Firing Up Perennials II. Part 10 of the series features Leucanthemum x superbum 'Snowcap.'

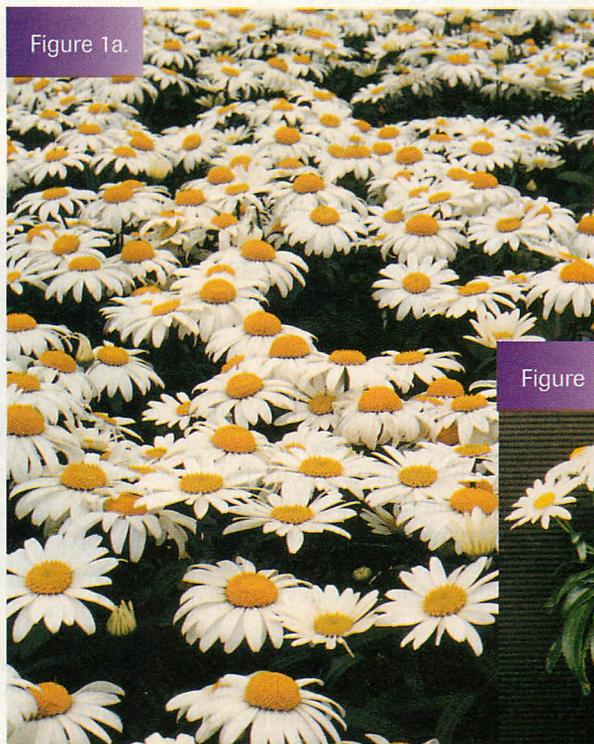


Figure 1a.



Figure 1b.

Figure 1a. *Leucanthemum x superbum* 'Snowcap' or Shasta daisy makes an impressive display when massed outdoors. Figure 1b. A naturally short, compact cultivar, 'Snowcap' makes an appealing flowering perennial in containers. Photo 1b courtesy of Catherine Whitman.

by ERIK S. RUNKLE, MEI YUAN,
 MARY-SLADE MORRISON,
 ROYAL D. HEINS, ARTHUR CAMERON,
 and WILL CARLSON

SHASTA daisy has been a longtime favorite herbaceous perennial in landscapes. Blooming naturally in June and July, a planting in the foreground or midborder makes a nice mass of white with yellow highlights. Plants fare well in full sun and can tolerate some partial shade.

Shasta daisy is fully hardy to USDA zones 4 to 8 and can be grown in most of the U.S. According to University of Georgia's Allan Armitage, it is short-lived in Southern gardens, declining after 2-3 years. But it can persist for many years in Northern gardens.

A member of the sunflower family (Asteraceae), most cultivars have large white ray flowers encircling a raised

center of tiny yellow disc flowers. Many selections have only one whirl of ray flowers. Some are semidouble, while others are fully double, and inflorescences are composed primarily of ray flowers.

Species And Cultivars

Leucanthemum x superbum, sometimes listed as *Chrysanthemum x super-*

PRODUCTION

FORCING PERENNIALS

bum and *C. maximum*, is a cross between *L. lacustre* and *L. maximum* (*C. lacustre* and *C. maximum*). There are dozens of Shasta daisy cultivars with extremely variable characteristics.

In the garden, the compact cultivars are becoming quite popular since they range from a few inches to a few feet tall. Some of the more popular cultivars include 'Alaska,' 'Esther Read,' 'G. Marconi,' 'Snow Lady,' 'Snowcap,' and 'White Knight.'

One of the more desirable and attractive short cultivars is 'Snowcap' (Figure 1), an introduction by Adrian Bloom of Blooms of Bressingham, UK. Rising above thick, glossy foliage are 3-inch-wide white inflorescences that are rarely taller than 12 inches in the landscape.

Because of its naturally short stature, 'Snowcap' makes an appealing container plant and is well-suited for flowering perennial production.

Although the environmental control of flowering is somewhat similar among Shasta daisy cultivars, our flowering recommendations apply only to 'Snowcap.' Some forcing comparisons among other cultivars are provided in Table 1.

1. Propagation

'Snowcap' is vegetatively propagated by tip cuttings, tissue culture, and division. Generally, mature plants are shipped in small containers or as bare-root divisions, but plugs are also available. Starting material, especially from tissue culture, is often more expensive than cultivars propagated from seed. But 'Snowcap' proved to be the most reliable, uniform, and trouble-free Shasta daisy we have studied.

2. Plant Size

Plants in 2¹/₄-inch containers have 12-16 leaves (Figure 2) and are suitable for 5- to 6-inch finishing pots. Gallon cans also can be used for finished plants and are suggested for bare-root plants. If bulking is desired, provide noncooled plants with photoperiods 14 hours or less.

3. Cold Treatment

A cold treatment of at least 6 weeks at 35°-45°F (2°-7°C) increases flowering percentage, hastens time to flower, and increases flower number for 'Snowcap.' Complete flowering of a population is not achieved for noncooled plants under any photoperiod (Figure 3a) and is achieved after only 3 weeks of cold when plants are forced under a 4-hour night interruption (NI) long day (Figure 3b).

Longer durations of cooling don't hasten flowering when plants are forced under long days, but they accelerate flowering under short days. We have cooled plants for 15 weeks with no detrimental effects. Plants can be cold-treated in a cooler with 9-hour photoperiods and 25-50 footcandles of light or in a cold greenhouse with natural short photoperiods.

Figure 2.

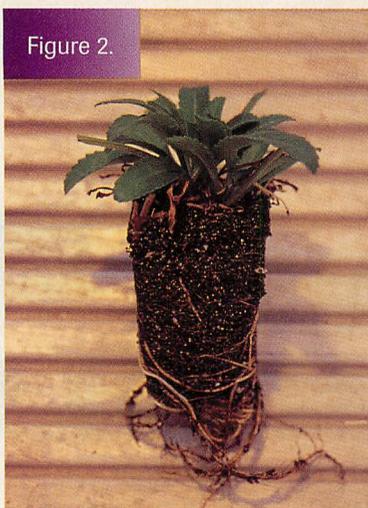


Figure 2. 'Snowcap' as a 2¹/₄-inch plant.

4. Photoperiod

Photoperiod's effects on flowering Shasta daisy were first investigated in the 1930s. 'Snowcap' is an obligate long-day plant when plants are not cooled. Plants remain vegetative under photoperiods of 14 hours (Figure 4a).

To flower noncooled 'Snowcap,' use photoperiods of 16 hours or a 4-hour night interruption (NI) during the middle of the night – for example, 10 p.m. to 2 a.m. Because some plants do not flower without cooling, we recommend cold treating plants.

Following 6 weeks of cold treatment, all plants will flower, but plants flower most rapidly under long photoperiods (Figure 4b).

In addition, plants under photoperiods of at least 16 hours or NI have three to five times as many flowers as those under shorter photoperiods.

We recommend forcing plants under at least 16 hours of light or with a 4-hour NI. Plants can be grown under contin-

Figure 3a. LEUCANTHEMUM xSUPERBUM 'SNOW CAP'
0 WEEKS OF SC
11 WEEKS OF FORCING AT 20C
PHOTOPERIOD
SD LD
PERCENTAGE FLOWERING
0 60

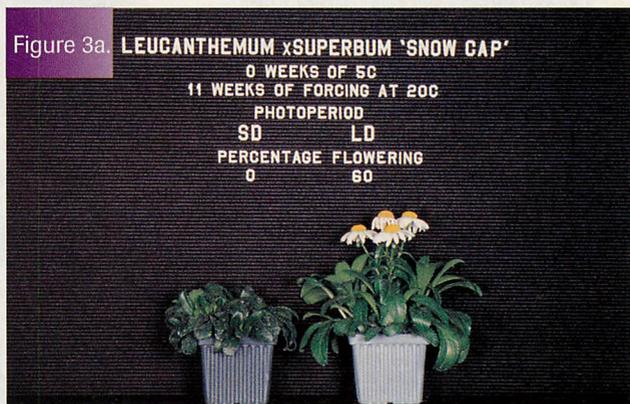


Figure 3a. 'Snowcap' requires a cold treatment for complete flowering. Without cold, only 60%-80% of plants flower under long days (LD, 9-hour photoperiods with a 4-hour night interruption) and no plants flower under 9-hour short days (SD).

Figure 3b. LEUCANTHEMUM xSUPERBUM 'SNOW CAP'
3 WEEKS OF SC
8 WEEKS OF FORCING AT 20C
PHOTOPERIOD
SD LD
PERCENTAGE FLOWERING
0 100

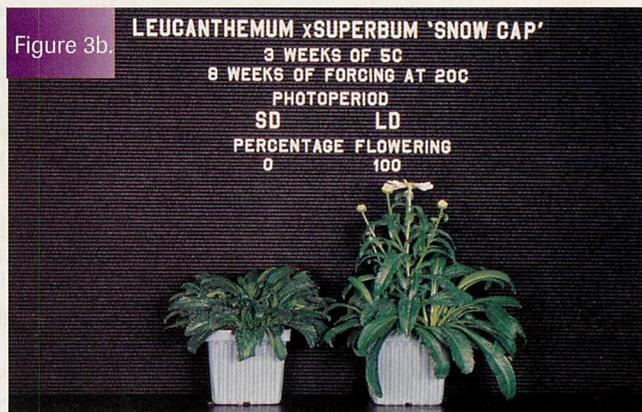


Figure 3b. After 3 weeks or more of cooling at 41°F (5°C), all plants flower under LD, and those plants that flower under SD are significantly delayed.

Table 1. Forcing comparisons for three cultivars of Shasta daisy

	'Snowcap'	'Snow Lady'	'White Knight'
Propagation	tissue culture or division	seed	seed
Cold treatment	horticulturally required	not required, but flowering is more uniform with cooling	horticulturally required
Forcing with long days	beneficial (required without cold)	beneficial	beneficial
Time to flower at 68°F (20°C)	7 weeks	9-10 weeks	7-8 weeks
Sensitivity to pesticides	none observed	very sensitive	moderately sensitive
Final plant height under LD	7 inches (18 cm)	6 inches (15 cm)	6 inches (15 cm)

ual light, 24 hours a day, for slightly earlier flowering – by about 5 days. Plant height above the pot increases nearly two-fold – from 5 to 9 inches (12-22 centimeters) – as the photoperiod increases from 10 to 24 hours.

Long days can be delivered as day-extension or as NI lighting under natural short-day photoperiods. For the most efficient lighting, extend the day length to 16 hours when photoperiods are longer than 12 hours. When day lengths are less than 12 hours, provide NI lighting for 4 hours. For all lighting strategies, provide a minimum of 10 footcandles at plant height from incandescent, cool-white fluorescent, metal halide, or high-pressure sodium lamps.

5. Media And Fertilization

'Snowcap' prefers a moist, well-drained medium with a slightly acidic to neutral pH: 5.8-6.8. A constant liquid fertilization regimen of 100 to 150 ppm N, 10 to 20 ppm P, and 100 to 150 ppm K (for example, 20-10-20) is sufficient for growth and flowering. Plants were about 1/3 smaller at low fertility (below 50 ppm N) concentrations (Figure 5).

6. Irrigation

Plants have thick, fleshy leaves and require relatively frequent irrigation, especially under high light levels. Fortunately, plants recover well from drought stress, but if the stress is prolonged, leaf margins will become

necrotic. Plants forced at less than 60% container capacity were about half the size of plants that were never allowed to dry out. Plants flowered about 1 1/2 inches taller when frequently irrigated compared to plants forced at less than 60% container capacity.

7. Lighting And Spacing

As with all Shasta daisies, 'Snowcap' prefers moderate to high light levels. Supplemental lighting is recommended during the winter, when light levels are naturally low. Under such conditions, provide 400-500 footcandles with high-pressure sodium or metal halide lamps for up to 16 hours daily. Plants can be spaced closely because they are naturally compact.

8. Plant Height Control

'Snowcap' is a naturally short, compact cultivar. Height control is not necessary. In con-

tainers, plants under photoperiods of 16 hours or NI rarely exceed 9 inches.

9. Temperatures And Crop Scheduling

Time to flower for cooled plants depends on the forcing temperature. At 61°F (16°C), plants take 9 weeks from the start of forcing to flowering. Forcing time is 7 1/2 weeks at 66°F (19°C), 7 weeks at 68°F (20°C), and 6 weeks at 73°F (23°C) (Table 2). Temperatures above 73°F accelerate flowering by no more than a few days and can cause a reduction in flower number and size.

For the highest flower count and largest flower size, force at cool temperatures (60°F). As the forcing temperature increases,

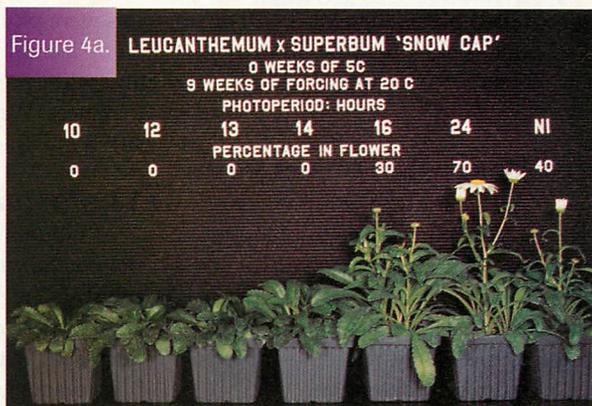


Figure 4a. Noncooled 'Snowcap' requires long days for flowering, but flowering percentage is never 100%.

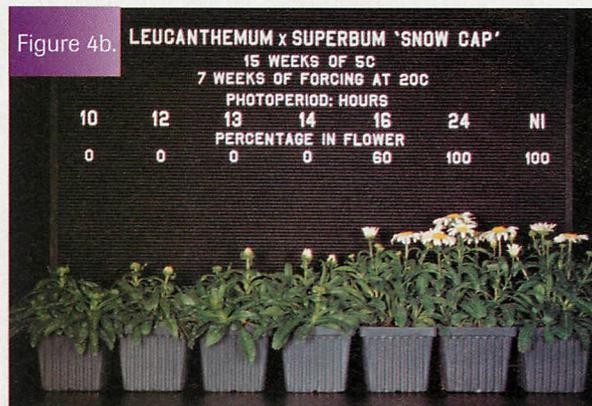


Figure 4b. 'Snowcap' cold-treated for 15 weeks at 5°C (41°F) flowers under all photoperiods of at least 16 hours or with NI. Flowering percentage represents the proportion of plants in flower at the time the photograph was taken.

Table 2. <i>Leucanthemum x superbum</i> 'Snowcap' Production Schedule			
Growing time	Cultural practice	Temperature	Photoperiod
Receive plants			
≥ 6 weeks	Cold treatment	35°-45°F (2°-7°C)	Natural daylength or 9 hours of light in cooler
Begin forcing			≥16 hours or 4-hour night interruption
↓ ↓ ↓ ↓ ↓ 61°F (16°C) Flower in 9 weeks	↓ ↓ 68°F (20°C) Flower in 7 weeks	↓ 73°F (23°C) Flower in 6 weeks	
Number of days from visible bud to flower			
61°F (16°C) - 34 days			
68°F (20°C) - 25 days			
73°F (23°C) - 22 days			

flower count and flower size decrease. In addition, plant height increases from 4 inches to 8 inches as forcing temperature decreases from 73°F to 61°F. Cooled plants develop 19-20 or 21-22 nodes below the first inflorescence when forced under long or short days.

10. Disease And Insect Pests

Generally, 'Snowcap' has few diseases, but *Pythium* can be troublesome, especially when plants are overwatered early in forcing. A preventative fungicidal drench after transplanting is suggested. Occasionally, whiteflies, aphids, or thrips can be problematic.

Some other cultivars of Shasta daisy, such as 'Snow Lady' and 'White Knight,' are extremely sensitive to many insecticides, causing moderate to severe phytotoxicity. Symptoms include leaf and flower burn, chlorosis, and widespread plant death in some instances. We have not noted any sensitivity in 'Snowcap.'

11. Postharvest Concerns

At moderate temperatures (68°F), the postharvest life of 'Snowcap' is roughly 2 weeks. Flower longevity increases with cool temperatures and decreases with warm temperatures. Ship plants just as the first flower

Formula For Success: 'Snowcap'

1. Cool plants (plugs or small containers) for 6 weeks at 35°-45°F (2°-7°C).
2. Force plants at 61°-68°F (16°-20°C) and avoid temperatures above 73°F (23°C).
3. During forcing, provide long days by either extending the day length to 16 hours or providing a 4-hour night interruption.
4. For cultivars other than 'Snowcap,' beware of pesticide phytotoxicity.
5. Ship at first flower.

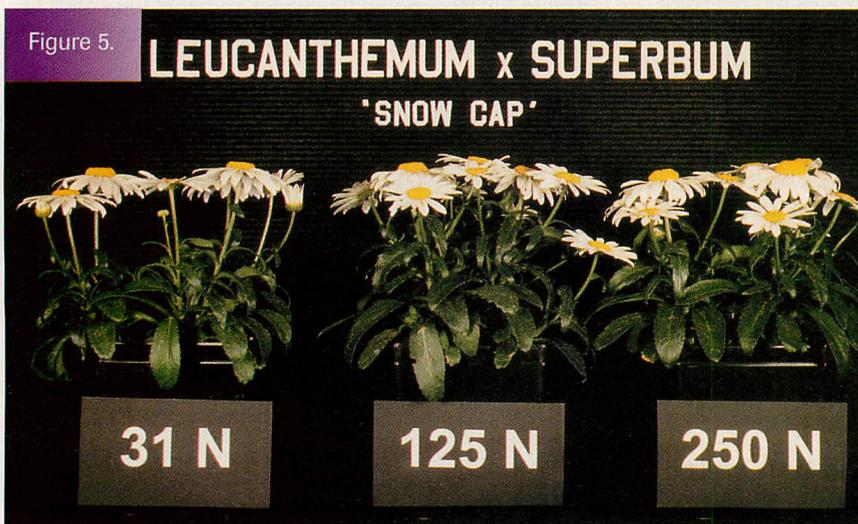


Figure 5. Flower number and plant size are greatest when 'Snowcap' is provided with a constant liquid fertilizer regimen of at least 100 to 150 ppm N, 10 to 20 ppm P, and 100 to 150 ppm K.

opens, and subsequent flowers will open if adequate light is provided. Plants will continue to require frequent watering.

One negative aspect of 'Snowcap' is its odor, which some people find objectionable, especially when many plants are in a confined area. But all the other merits of this cultivar make it one of the most desirable, easy, and uniform Shasta daisy selections for flowering perennial production. **GG**

About the authors: Erik S. Runkle and Mary-Slade Morrison are graduate research assistants; Mei Yuan is a former research assistant; and Drs. Royal D. Heins, Arthur Cameron, and Will Carlson are professors, Department of Horticulture, Michigan State University, East Lansing, MI 48824.