

FORCING PERENNIALS

- Crop By Crop -

Species: *Saxifraga x arendsii* 'Triumph'

Common Name: Saxifrage

Editor's note: Michigan State University and GREENHOUSE GROWER bring you our third series on forcing perennials to flower.

Figure 1.



Figure 1. Small, delicate flowers and attractive foliage make *Saxifraga x arendsii* 'Triumph' an attractive potted flowering plant.

by **EMILY CLOUGH, ARTHUR CAMERON, ROYAL HEINS, and WILL CARLSON**

SAXIFRAGA is an extremely large genus containing more than 300 species and 200 natural hybrids. *Saxifraga* spp. grow naturally in many parts of the world, including Europe, Asia, and North and South America.

They are primarily alpine plants, and many species grow as small rosettes, forming dense mats. In their natural environment, they are sometimes found growing in the cracks of rocks. They are ideal for rock gardens and prefer raised, well-drained conditions.

Saxifraga x arendsii 'Triumph' was developed by the Arends nursery in Ronsdorf, Germany. Its parents are *S. exarata* and *S. rosacea*. The variety makes an attractive flowering potted plant, with its deeply dissected, succulent foliage and numerous, small, light pink to red flowers (Figure 1). *Saxifraga* spp. are already grown as potted flowering plants in Europe.

In the garden, plants typically bloom in April and May, and grow to a height of approximately 6 inches (15 centimeters). They are hardy to USDA zone 5 and do not perform well in warmer climates. High humidity and heat cause the centers to brown and will even cause plant death if the plants remain in these conditions. Because *Saxifraga* spp. prefer cool temperatures, this is an ideal crop for winter production.

1. Propagation

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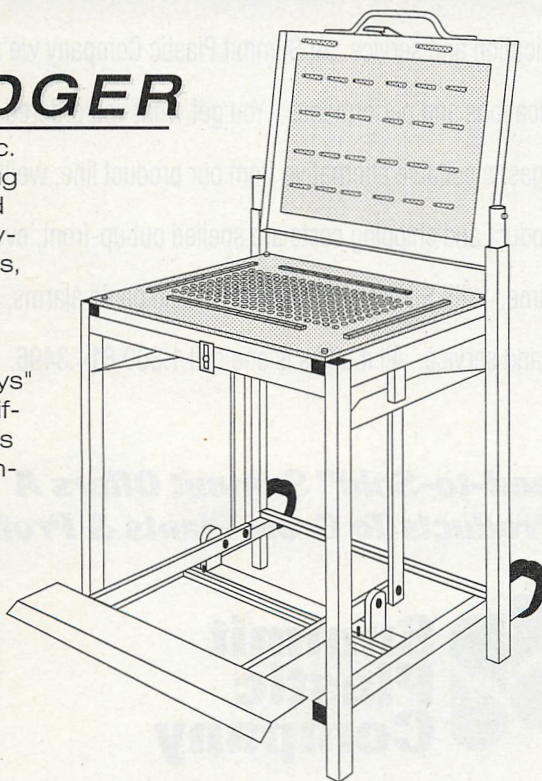
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Figure 2a.

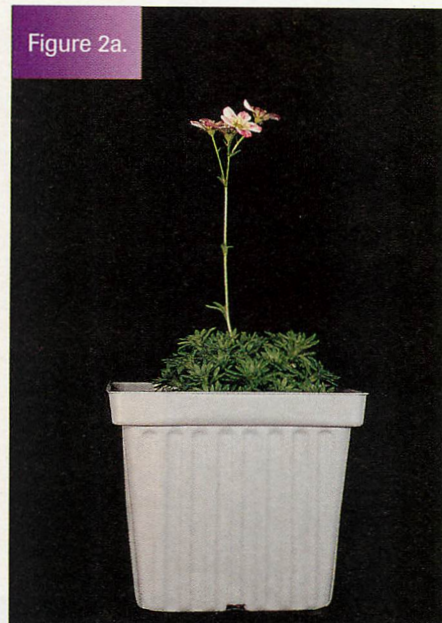


Figure 2a. When *Saxifraga x arendsii* 'Triumph' is forced from a single 128-cell plug, plants only produce one flowering stalk with two to five flowers per plant.

division or stem cuttings. The hybrid does not come true when grown from seed. Divisions can be made in early summer after flowering, but before the full heat.

Straight species of *Saxifraga* can be propagated by seed. Fresh seed (less than 1 year old) germinates quite easily and does not require a cold treatment. However, if seed has been stored, a cold treatment is recommended. Seedlings emerge in 8-10 days, but they grow very slowly. Mist and overhead watering should be avoided to control algae growth and washing away of the seedlings.

2. Plant Size

Juvenility was not a problem for 'Triumph,' and all the plants we received in 128-cell plugs flowered after the appropriate cold treatment. However, a single rooted cutting from a 128-cell plug will only produce one flower stalk with a total of two to five flowers (Figure 2a).

For a plant with more flowers, bulking is required before cold treatment. After plants were bulked for 15 weeks at 68°F (20°C) and cooled for 12 weeks

**PRODUCTION
FORCING PERENNIALS**

at 41°F (5°C), plants produced an average of 30 flower stalks and approximately 133 flowers (Figure 2b). A 128-cell plug will fill a 5-inch square pot in 6-9 weeks at 68°F (20°C). To decrease the amount of time needed for bulking, use several plugs per pot.

Figure 2b. Flower Number Before and After Bulking of *Saxifraga x arendsii* 'Triumph'

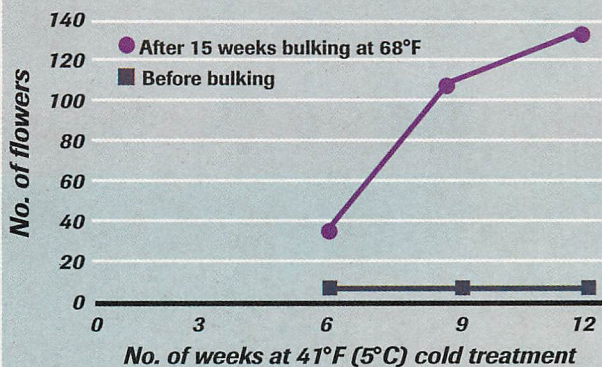


Figure 2b. Bulking dramatically increases the number of flowers per plant. After 15 weeks of bulking at 68°F (20°C), plants got cold treatments of 41°F (5°C) for 6, 9, or 12 weeks. Flower number of bulked plants increased with longer cold durations.

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3. Cold Treatment

'Triumph' has an obligate requirement for cold treatment. Without a cold treatment, plants do not flower (Figure 3a).

In the experiment's first year, 60%

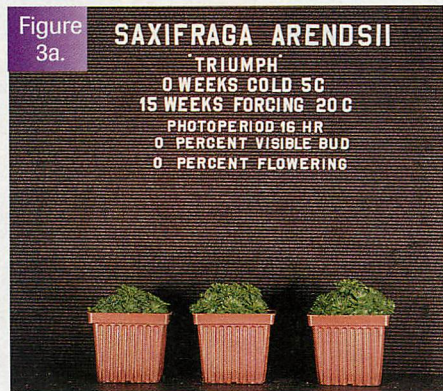


Figure 3a. Plants of *Saxifraga x arendsii* 'Triumph' do not flower without a cold treatment.

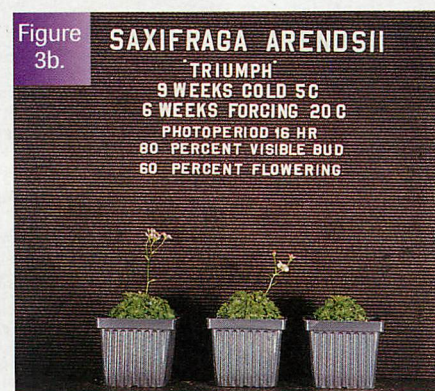


Figure 3b. In the experiment's second year, plants of *Saxifraga x arendsii* 'Triumph' required 9 weeks of cold treatment at 41°F (5°C) before 80% flowering occurred. In the first year, 60% of the plants flowered after 6 weeks of cold treatment. Flowering percentage refers to the proportion of plants with open flowers at the time the photograph was taken.

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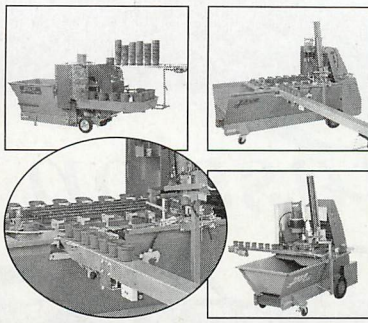
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Figure
 3c.

**SAXIFRAGA ARENDSII
 'TRIUMPH'**

12 WEEKS COLD 5C
 6 WEEKS FORCING 20C
 PHOTOPERIOD 16 HR
 100 PERCENT VISIBLE BUD
 100 PERCENT FLOWERING



Figure 3c. After 12 weeks of cold treatment, all plants of *Saxifraga x arendsii* 'Triumph' flowered. In the first year, only 9 weeks of cold treatment were required for 100% flowering.

of plants flowered after they had received a 6-week cold treatment at 41°F (5°C). In the experiment's second year, no plants flowered until they had received at least 9 weeks of cold treatment, when 80% of the plants flowered (Figure 3b). All plants flowered after 9 weeks of cold treatment in the first year and 12 weeks of cold treatment in the second year (Figure 3c).

As cold duration at 41°F (5°C) was increased from 6 to 15 weeks (year 1) or 9 to 15 weeks (year 2), time to flower decreased about 10 days. Cold treatment had no effect on either flower number or plant height when plants were grown from 128-cell plugs. However, after plants had been bulked for 15 weeks at 68°F (20°C), flower number increased substantially as cold duration increased from 6 to 12 weeks (Figure 2b).

During cold treatment, plugs or pots of *S. x arendsii* 'Triumph' can be cared for easily. They need only minimal lighting, such as a 9-hour day with fluorescent lamps, which provides approximately 50 footcandles. Water occasionally – about once every 1½ - 2 weeks. Too much water damages these plants. They do not require much water during forcing and even less during cooling.

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4. Photoperiod

S. x arendsii 'Triumph' behaves as a facultative, long-day plant. After cold treatment, it flowered under any photoperiod of 10-24 hours as well as a 4-hour night interruption from 10 p.m. to 2 a.m. But it flowered about 3 weeks faster under 24 hours than it did grown under 10-hour photoperiods (Figure 4).

Under continuous light, plants forced directly from a 128-cell plug without bulking produced only a few flowers per plant (an average of 2), and the flower stalks tended to topple. Plants grown under 10-hour photoperiods were about 2 inches shorter than those grown under photoperiods of 12 hours or more, and they averaged five flowers per 128 cell-plug.

The most compact, floriferous plants were grown under 10-hour photoperiods. But plants grown under longer photoperiods – up to 16 hours – were still attractive and made acceptable potted flowering plants.

5. Lighting And Spacing

We used two different lamp types to

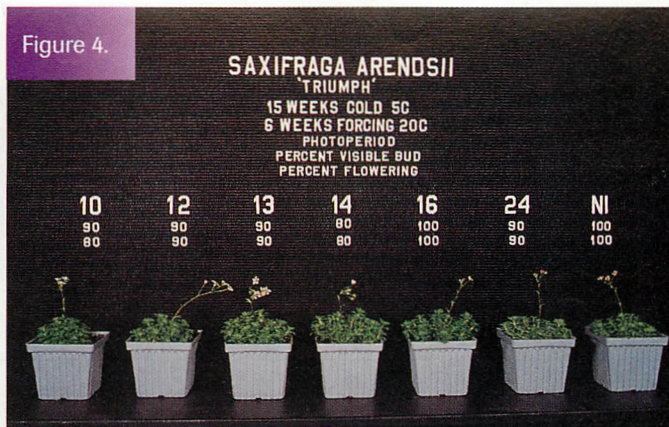


Figure 4. *Saxifraga x arendsii* 'Triumph' behaves as a facultative long-day plant. Plants grown under 24 hours flowered about 3 weeks before this photograph was taken, and here they are almost finished flowering. Plants under 10 hours have just opened their flowers.

Formula For Success: *Saxifraga x arendsii* 'Triumph'

1. With small starting material, like a 128-cell plug, bulk plants until they fill out the pot. Do this 6-9 weeks before the cold treatment starts.
2. Provide a cold treatment of 35°-45°F (2°-7°C) for 9-12 weeks to achieve 100% flowering.
3. Choose a photoperiod that is appropriate for your goal. Plants grown under 10-hour photoperiods will be very compact – 4 inches tall – with more flowers, but they will take 6 weeks to flower. Those grown under 16-hour photoperiods will flower in about 3 weeks with slightly fewer flowers, and plants will be about 2 inches taller.
4. Force plants at temperatures of 59°F (15°C)-68°F (20°C).
5. Ship plants before the first flower opens.



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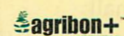
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Table 1.

***Saxifraga x arendsii* 'Triumph' Production Schedule**

Growing time	Cultural practice	Temperature	Photoperiod
2 weeks	Root cuttings	55°-60°F (13°-16°C)	Natural daylength
6-8 weeks	Grow in plugs	55°-60°F (13°-16°C)	Natural daylength
- OR - Purchase plugs			
6-9 weeks	Bulk (if starting from small plug size, such as a 128-cell)	65°-68°F (18°-20°C)	Natural daylength
9-12 weeks	Cold treatment	35°-45°F (2°-7°C)	Natural daylength or 9 hours of light in cooler
↓ ↓ ↓ ↓ 59°F (15°C) Flower in 6 weeks	Begin forcing ↓ ↓ 64°F (18°C) Flower in 4 weeks	↓ 68°F (20°C) Flower in 3.5 weeks	These times to flower were recorded for plants grown under 16 hours of light with day extension from HPS lamps Number of days from visible bud to flower 59°F (15°C) - 19 days 64°F (18°C) - 16 days 68°F (20°C) - 15 days

provide day-extension lighting. In one experiment, we used natural days supplemented with day extension from high-pressure sodium (HPS) lamps to provide 16-hour photoperiods. In the other experiment, we tested photoperiods ranging from 10 to 24 hours and a 4-hour night interruption using natural days supplemented with HPS lamps and day extension from incandescent (INC) lamps. Day-extension lighting using HPS lamps provided approximately 30% more light than INC lamps.

There was no obvious effect of the different lamp types on flowering *S. x arendsii* 'Triumph.' Because the variety doesn't respond strongly to light quantity or quality, it can be grown in low light conditions. It is an ideal crop for winter.

Since *Saxifraga* spp. are such small plants, they can be spaced close together.

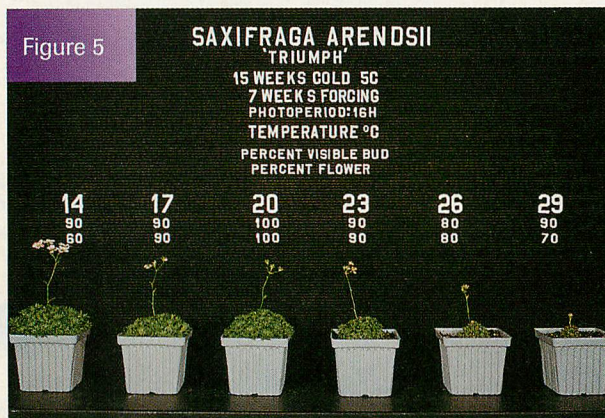


Figure 5. Growth and flowering are reduced when plants of *Saxifraga x arendsii* 'Triumph' are grown at temperatures warmer than 75°F (24°C). Growing plants at temperatures between 59°F (15°C) and 68°F (20°C) will result in attractive plants with dark flower color.

er. Spacing them with 1-2 inches between pots is sufficient since the foliage does not grow much beyond the pots, and the flower stalks are held upright over the foliage.

6. Media, Fertilization, And Irrigation

In the garden, *S. x arendsii* 'Triumph' and other *Saxifraga* species

prefer well-drained soils. In the *Ball Perennial Manual* on propagation and production, Jim Nau says soils with a gravel or sandy base are best for extending plant life.

The plants in our experiments were grown in a high-porosity soilless medium containing sphagnum peat moss, perlite, vermiculite, and composted bark that, if allowed to dry out between watering, was an acceptable media for growing *S. x arendsii* 'Triumph.' We fertilized at every irrigation using 125 ppm N, 12 ppm P, and 125 ppm K, which was sufficient for growth and development. We maintained pH levels of 5.8-6.2.

7. Plant Height Control

Because of 'Triumph's' natural short stature, it does not require any height control.

(Continued on page 66.)

8. Temperatures And Crop Scheduling

Forcing temperature influences flower timing as well as plant quality. *S. x arendsii* plants flowered fastest – in 3 weeks – when they were grown at 75°F (24°C). At temperatures above 75°F (24°C), flowering percentage decreased and bud abortion occurred. Time to flower was increased to 4 weeks when plants were grown at 84°F (29°C). In addition, plants grown at this warm temperature had burned leaves and barely grew at all.

At cooler temperatures, plants took longer to flower, but were much more attractive, producing a few more flowers per stalk. Flowers had darker pigmentation than those grown at warmer temperatures (Figure 5). Plants grown at temperatures warmer than 75°F (24°C) had very small flowers with almost no pigmentation.

Time to flower was 6 weeks for

plants grown at 59°F (15°C), 4 weeks for plants grown at 64°F (18°C), and 3.5 weeks for plants grown at 68°F (20°C). Use temperatures of 59°F (15°C)-68°F (20°C) for the highest quality plants.

A problem growing this crop is trying to prevent flowering while forcing during late winter or early spring, when day temperatures in the greenhouse rise dramatically. Flowering occurs quite quickly after cold treatment, and *Saxifraga* spp. can grow quite well at cool temperatures. Development is estimated to occur at temperatures as low as 1.5°C. One strategy that can be used to address this problem is bulking the plants longer at warm temperatures (60°F [16°C]) before providing cold treatment.

Once a sufficient cold treatment has been given (9-12 weeks when temperatures are between 35°-45°F [2°-7°C]), move plants to a house with warmer temperatures. This strategy will reduce the amount of time in fluctuating cold and warm temperatures, which makes scheduled flowering difficult.

9. Disease And Insect Pests

S. x arendsii 'Triumph' is susceptible to *Rhizoctonia*, which causes root and crown rot. If watering is carefully monitored and plants are allowed to dry between watering, incidences of *Rhizoctonia* should be less frequent. No insect pests were observed on *S. x arendsii* 'Triumph.'

10. Postharvest Concerns

S. x arendsii 'Triumph' holds its flowers for approximately 3 weeks. Flowers have a faint, sweet scent that adds to the plant's beauty.

If sold as a flowering potted plant, include watering instructions because many consumers are apt to overwater and kill the plants. Plants should be shipped just before the flowers open so retailers can take full advantage of their blooms during sale. **GG**

About the authors: Emily Clough is a graduate research assistant and Arthur Cameron, Royal Heins, and Will Carlson are professors, Department of Horticulture, Michigan State University, East Lansing, MI 48824. Sources include the *Index of Garden Plants* and *Ball Perennial Manual*.

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