

# Herbaceous Perennials: *Phlox Subulata*

## Schedule

Michigan State University researchers' 13-part series on herbaceous perennials covers topics from light to plant growth regulators to various species.

January: Light

February: Series Did Not Run

March: Noteworthy plants

April: Propagation

May: Series Did Not Run

June: *Heuchera*

July: Plant Growth Regulators

**August: *Phlox subulata***

September: *Scabiosa*

October: Garden performance

November: Ground covers

December: Quick-cropping

January 2002: *Hemerocallis*

February 2002: Postharvest

March 2002: *Tarella/Heucherella*

**Part five of our 13-part series on herbaceous perennials takes a look at *Phlox subulata*.**

by **ERIK RUNKLE, ROYAL HEINS, ART CAMERON, and WILL CARLSON**

**C**REEPING phlox is a popular evergreen low-growing ground cover that flowers naturally in the spring. Red, purple, pink, blue, or white flowers cover the entire plant for a short time in early spring, making it an appealing plant for the border or rock gardens. Creeping phlox is native to the Eastern United States, from New York to Maryland, west to Michigan, and is cold-hardy to about 40°F. If provided with full sun and a moist, well-drained soil, creeping phlox can re-

main in gardens for many years.

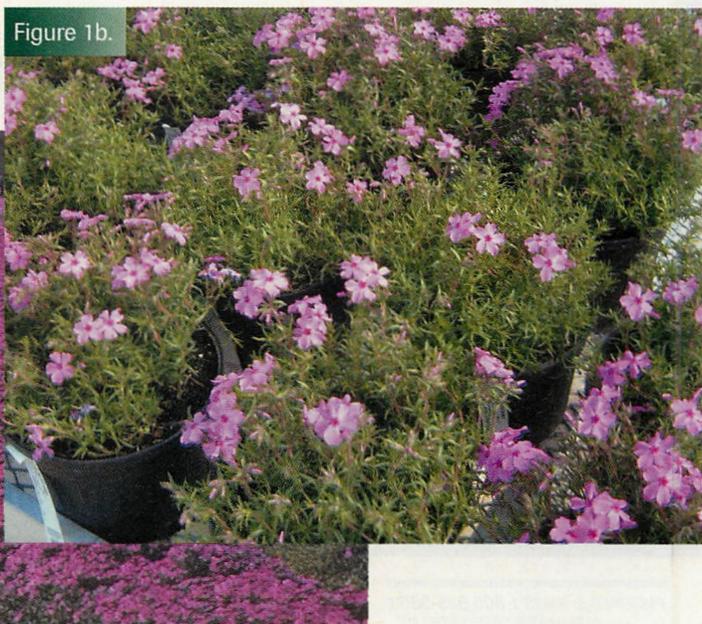
There are a multitude of creeping phlox cultivars that are essentially identical except when in flower. Common cultivars (and flower color) include 'Emerald Blue' (pale blue), 'Emerald Pink' (soft pink), 'Crimson Beauty' (rosy red), 'Red Wings' (crimson) 'Scarlet Flame' (rosy pink), and 'White Delight' (pure white). Many growers successfully produce flowering plants in the field or in containers when they flower naturally in the spring (Figure 1a and 1b). In this article you'll find growing tips and recommendations to flower containerized creeping phlox before or after the natural flowering season.

### Propagation

Commercially, creeping phlox is propagated primarily by stem cuttings and division. Plants can be obtained as unrooted cuttings, noncooled or cooled plugs, and field-grown clumps. Cuttings are moderately easy to root

following general vegetative propagation protocols (see *Greenhouse Grower*, April 2001), and it takes approximately three weeks from sticking until rooted in the plug. We have had the most success using a very porous media, such as a 50% perlite and 50% peat mixture. The photoperiod under which stock plants are grown does not appear to have an effect on rooting or subsequent

**Figure 1a & 1b.** When in flower, creeping phlox (*Phlox subulata*) is a stunning herbaceous perennial in the field (a), and can be produced as an appealing containerized perennial (b). *Figure 1a* courtesy of Marlene Cameron.



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flowering. Anecdotal experience has suggested that cuttings taken from stock plants grown in a partially shaded environment root better than stock plants grown in full sun.

### Plant Size

Plants from plugs (with as few as 15 nodes) will often flower if provided with the proper cooling and forcing conditions. However, if not bulked, flowering plants will be small and marginally appropriate for small (e.g., four-inch) containers. Plant size and flower count will increase the longer it is bulked before cooling. Therefore, for flowering potted plant production, we recommend that plants be bulked after rooting and prior to cooling. From a rooted cutting, we suggest bulking plants for a minimum of two to four weeks for a four-inch (10 centimeter) pot, eight weeks for a six-inch (15 centimeter) pot, and 12 weeks for a gallon container. Use of multiple plugs in large

Figure 2a.



Figure 2a. Irrespective of photoperiod, flowering of *Phlox subulata* was poor if not provided with a cold treatment (0 weeks at 41°F/ 5°C). Flowering plants had only a few open flowers if they flowered at all.

containers (e.g., gallon pots) could reduce the bulking duration required to adequately fill the container.

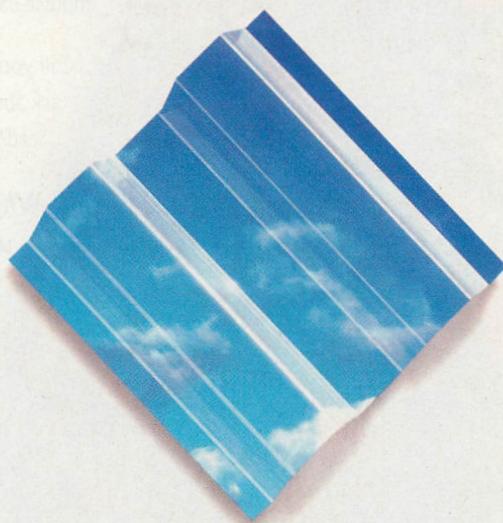
### Cold Treatment

Horticulturally, a cold treatment is required for flowering of creeping phlox. Without a cold treatment, flowering is sporadic and plants have few flowers, regardless of photoperiod (Figure 2a). The minimum cold dura-

tion for complete, uniform, and rapid flowering depends on cultivar, so we recommend providing plants with at least eight weeks of cold at 41°F (5°C). Cool plugs in a cooler (nine-hour photoperiods with 25 to 50 footcandles of light) or cold greenhouse (with naturally short photoperiods). To produce flowering plants after creeping phlox naturally flower outdoors, plants must be held in a refrigerated cooler until

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Figure 2b.

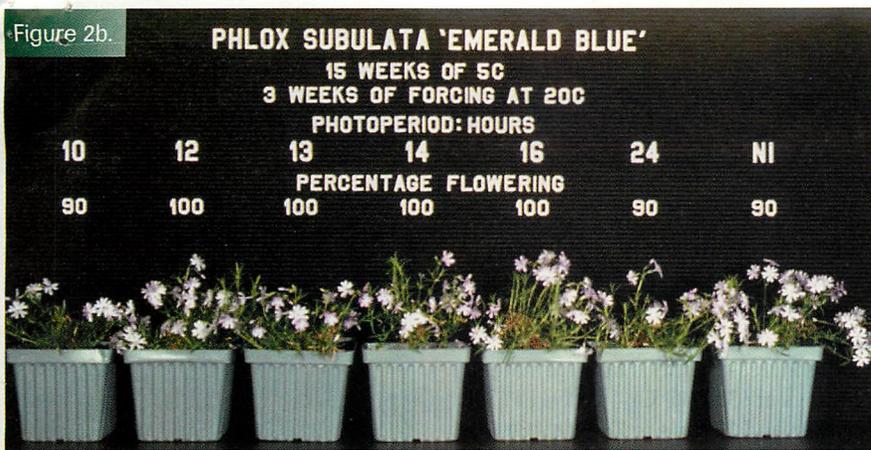


Figure 2b. *Phlox subulata* cold treated for 15 weeks at 41°F (5°C) flowered under photoperiods ranging from 10 hours to 24 hours of continuous light. Flowering percentage represents the proportion of plants in flower at the time the photograph was taken.

forcing. Flowers form during the cold period, and flower buds may be visible near the end of the cooling period.

### Photoperiod

*Phlox subulata* is day-neutral following cold treatment; all plants flower at the same time under a wide range of photoperiods (Figure 2b). Therefore, provide natural photoperiods to plants once the cooling period is complete. Flower buds are usually visible within the first week of exposure to

warm temperatures. Plants grown under continuous (24-hour) light are spindly, and thus, this photoperiod is not recommended.

### Media, Fertilization, And Irrigation

We have not conducted experiments on root zone management of creeping phlox, but we can make some recommendations based on our experience. Creeping phlox has performed relatively well in a well-drained medium with a slightly acidic pH (5.8 to 6.2). A

constant fertilization regimen of 100 to 150 ppm N, 10 to 20 ppm P, and 100 to 150 ppm K (e.g., 20-10-20) has been sufficient for growth and flowering. Media should have excellent drainage, and plants should be kept slightly moist but not wet.

### Lighting And Spacing

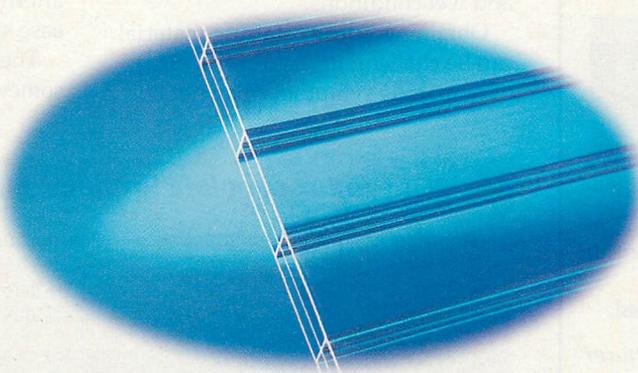
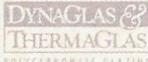
*Phlox subulata* grows best with moderate to high light levels, but plants can tolerate shade during the summer when light intensity is high. Although supplemental lighting is generally not necessary, in some trials we have observed greater flowering (more plants flower and with more flowers per plant) when grown under high light intensities.

### Plant Height Control

Growth of creeping phlox is prostrate and thus is naturally short (four to six inches). Therefore, the use of growth retardants is not necessary.

### Temperatures And Crop Scheduling

Following cooling, flowering occurs

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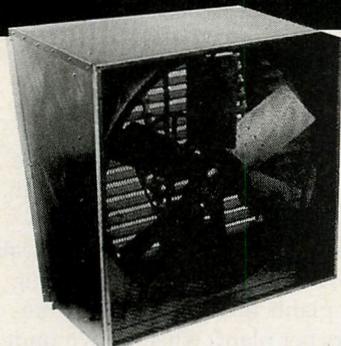
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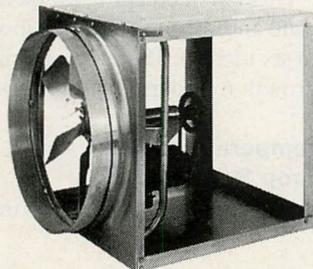
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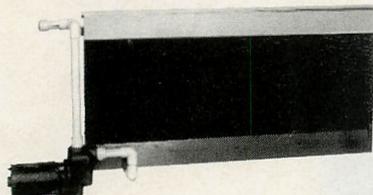
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quite rapidly. Generally, flower buds are visible at the end of cooling or within the first week of exposure to warm temperatures. Time from visible bud to flowering decreases as temperature increases, and is approximately 17 days at 63°F (17°C), 14 days at 68°F (20°C), and 12 days at 73°F (23°C) (Table 1). Flower count and flower size were similar when forced at a range of temperatures.

### Disease And Insect Pests

Perhaps the greatest challenge of producing creeping phlox is to obtain and maintain plants that are free of pathogens, viruses, and nematodes. We have frequently observed stem die-back in which leaves turn yellow then brown, and often symptoms spread to the entire plant, resulting in plant death (Figure 3). Numerous pathogens have been identified and reported with *Phlox subulata*, including *Fusarium*, *Colletotrichum*, *Rhizoctonia*, and *Thielaviopsis*. Symptoms are generally more prevalent when temperature and light intensity are high. However, downy mildew can be problematic with cool and wet conditions.

Obtaining "clean" starting material can be challenging, as disease, virus, or nematode symptoms may not be

Figure 3.



**Figure 3. Creeping phlox displaying stem die-back, which is a common disease symptom. Leaves turn yellow then brown, and often the disease spreads to the entire plant.**

readily apparent until plants experience some form of stress (such as under- or over-watering). To address this issue, Yoder Brothers and Green Leaf Enterprises offer rooted cuttings that have been culture-indexed for systemic fungi and twelve viruses. Once plants arrive, keep benches sanitary and use only sterile media and pots. To reduce disease incidence, consider implementing a regular (e.g., monthly) fungicide program using chemicals in rotation. Avoid over-watering plants and watering after mid-afternoon, and rogue plants when disease symptoms appear.

The stem and bulb nematode is a somewhat common pest that can be

Table 1. *Phlox subulata* Production Schedule

Duration	Cultural practice	Temperature	Photoperiod
3 weeks	Take Cuttings ↓ Rooting	72°F to 75°F (22°C to 24°C)	Natural daylength
-OR- <b>Plant plugs</b>			
2-4 weeks for 4" pots 8 weeks for 6" pots 12 weeks for gallons	Grow until plants fill final container	63°F to 68°F (17°C to 20°C)	Natural daylength
8 weeks	Cold treatment	35°F to 45°F (1°C to 7°C)	Natural daylength or 9 hours of light in cooler
	Begin forcing		Natural daylength
↓	↓	↓	<u>Visible bud to flower</u> 63°F - 17 days 68°F - 14 days 73°F - 12 days
↓	↓	73°F (23°C) Flower in 14 days	
↓	68°F (20°C) Flower in 16 days		
63°F (17°C) Flower in 19 days			

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difficult to identify and control. It feeds within leaves, so it is often erroneously called a foliar nematode. Characteristic symptoms, unique to creeping phlox, are crinkling and reduction of the upper leaves, stems that are thick and brittle and have a tendency to split, and short internodes. Severely infested plants have a hollow appearance, like they are being "eaten from the inside

### Formula For Success: **Phlox Subulata**

1. Obtain and maintain pest-free plants; beware of nematodes, viruses, and a host of diseases. Rogue infested plants immediately.
2. Bulk rooted cuttings under natural days before cooling.
3. Provide plants with at least eight weeks of cooling at 41°F (5°C).
4. Force plants under natural photoperiods and ship just before first flowering.

out." Once nematodes are confirmed present, the best control strategy is to dispose of all infested plants.

### Postharvest Concerns

*Phlox subulata* flowering is ephemeral. Individual flowers last about a week at room temperature. Therefore, it is best to ship plants a few days before open flower, so that just a few flowers are open when they reach a retail center (as in Figure 1b). **GG**

**About the authors:** Erik Runkle is assistant professor and Royal Heins, Arthur Cameron, and William Carlson are professors, Department of Horticulture, Michigan State University, East Lansing, MI 48824. They would like to thank the research contributions of Alison Frane and Kari Robinson; current and former greenhouse technicians David Joeright, Mike Olrich, and Dan Tschirhart; Paul Pilon (Sawyer Nursery), Willie Faber (Yoder Brothers), and Fred Warner (Michigan State University) for their input; and the generous industry supporters who have made this research possible.

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