FORCING PERENNIALS

– Crop By Crop –

Species: *Astilbe*
Common name: False Spirea


Figure 1a.


Figure 1b.

Figure 1. An appealing variety of field-grown astilbe forced in a greenhouse (a). Seed propagated species (*A. chinensis pumila*) also make attractive potted plants (b).

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 four of this series features astilbe or False Spirea.

by **ERIK S. RUNKLE, ROYAL D. HEINS, ARTHUR CAMERON,** and **WILL CARLSON**

THE attractive compound leaves and plume-like inflorescences of astilbe has made it the fifth best-selling herbaceous perennial in the U.S. and Canada. In the landscape, astilbe is a summer-flowering genus hardy to USDA zones 5-8, and prefers partial shade. It is a demanding plant in that it requires moist, well-drained soils, but the reward of a plant in flower is well worth the effort.

Astilbe makes an attractive potted plant and cut flower, with a variety of species having different flowering characteristics from which to choose (Figures 1a and 1b).

There are a multitude of excellent astilbe garden selections, some of which are well suited for potted plant production (DeHertogh, 1996). Perhaps the most common species are *A.* ×*arendsii*, *A. chinensis*, and *A. japonica*.

Table 1 provides a list of many of the species and cultivars that we

have studied, as well as their flower color and natural plant height in containers. Many other cultivars also exist.

In general, flower color and timing of vegetatively propagated cultivars are consistent within a population. For seed-propagated material, flower color within a species can vary from white to blush pink to deep magenta, and flowering time is longer and more variable. However, some dwarf seed-propagated species flower uniformly and are great candidates for flowering potted plant production.

1. Propagation

Most astilbe are propagated by division, but some are by seed. Most bare-root plant material is grown in The Netherlands and shipped to wholesale growers and distributers in North America. For seed propagation, sow seeds in the light at 63°-70°F (17°-21°C). Germination will occur in 7-14 days. Plugs (with 3-4 leaves) are ready for shipping or transplanting into larger containers in 8-10 weeks.

2. Plant Size

Many cultivars are available as bare-root, field-grown material (Figure 2a), which generally is mature and capable of flowering. The larger field-grown divisions (left) are suitable for 6-inch or gallon production; lower-grade divisions (right) are best reserved for 5-inch pots.

Some seed-propagated astilbe (Figure 2b) have a juvenile period in which they are incapable of flowering. To ensure uniform and complete flowering, we recommend that seed-propagated species have at least 5 (for *A. chinensis*, *A. chinensis pumila*, and *A. taquetii*) or 7 (for *A. xarendsii*) leaves before cold treatment. Five-inch pots are an appropriate final container size for these plants.

3. Cold Treatment

In nearly all instances, astilbe must undergo a cold treatment for flowering. The duration of cold required for complete, rapid, and uniform flowering varies by cultivar and starting material, but in general, bare-root plants require at least 10-12 weeks of cold at ≤41°F (5°C) (DeHertogh, 1996). Producers commonly store bare-root crowns below freezing. This duration of cold storage can be applied toward the cold requirement, providing that crowns are not exposed to warm temperatures for more than a few days.

For seed-propagated astilbe, we recommend cooling

Figure 2a.

Figure 2b.

Figure 2. Starting material of astilbe: field-grown, bare-root divisions (a) or plugs from seed (b).

Table 1. ***Flowering characteristics of various Astilbe spp. forced in containers at 68°F (20°C).***

Species	*A. xarendsii*				*A. chinensis*	*A. chinensis*	*A. japonica*		*A. thunbergii*
Cultivar	Bridal Veil	Cattleya	Fanal	Spinell	Superba	*pumila*	Deutschland	Peach Blossom	Ostrich Plume
Flower color									
Plant height	16 inches (41cm)	21 inches (54 cm)	16 inches (40 cm)	17 inches (44 cm)	19 inches (49 cm)	10 inches (25 cm)	11 inches (27 cm)	15 inches (38 cm)	19 inches (48 cm)
Weeks to first flower	7	7	6	7	8.5	11	5	6	7

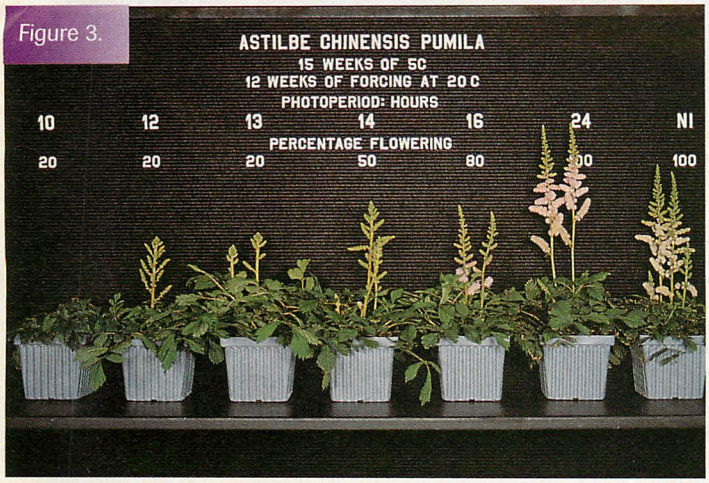

Figure 3.

Figure 3. *Astilbe chinensis pumila* cold treated for 15 weeks at 41°F (5°C) flowers under photoperiods of at least 12 hours or with a 4-hour night interruption (NI). Most rapid flowering occurs under 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.

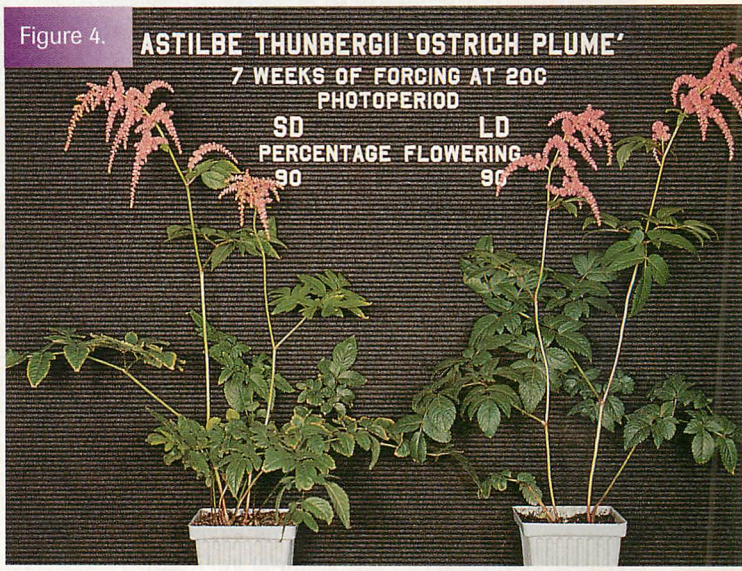

Figure 4.

Figure 4. Cold treated field-grown, bare-root astilbe flower regardless of photoperiod. Short days (SD) equal 9-hour days. Long days (LD) equal 9-hour days with a 4-hour night interruption.

plugs for 15 weeks at 41°F (5°C) so that all plants in a population flower with a high inflorescence count. Shorter durations (9 or 12 weeks) induce flowering, but flowering percentage and inflorescence number are lower. Cool plugs in a cooler (9-hour photoperiods with approximately 25-50 footcandles of light) or cold greenhouse (with natural short photoperiods). Reduce watering frequency since crowns go dormant and foliage dies back.

4. Photoperiod

Astilbe are sensitive to photoperiod prior to cold treatment. Under short days (less than 16 hours of light), growth ceases and plants go dormant within a few weeks. Thus, to bulk seed-propagated plants, long days should be provided by extending the natural photoperiod to 16 hours, or by providing a 4-hour night interruption (NI) (for example, 10 p.m. to 2 a.m.).

Seed-propagated plants should be forced under photoperiods of at least 12 hours following cold treatment (Figure 3). Longer photoperiods (16 hours or with NI) accelerate flowering by up to a week. Under natural short day photoperiods, light with a minimum of 10 footcandles at plant height. Plants grown under continual light (24 hours per day) flower nonuniformly and are very tall.

Daylength has no horticultural effect on flowering of bare root plants (Figure 4), except that plants can be taller under long days than short ones. Thus, following cold treatment, provide field-grown plants with natural photoperiods during forcing.

5. Media, Fertilization, And Irrigation

Astilbe prefers a moist, well-drained medium with a slightly acidic pH (5.8-6.2). A constant fertilization regimen of 100-150 ppm N, 10-20 ppm P, and 100-150 ppm K (for example, 20-10-20) is sufficient for growth and flowering.

Astilbe does not tolerate water stress. Plants require relatively frequent irrigation, especially under high-light levels. If plants dry out, their foliage irreversibly turns brown and crispy, which makes plants unattractive and perhaps unsalable.

6. Lighting And Spacing

Astilbe prefers moderate light levels, and plants should be shaded during periods of high light intensity. Supplemental lighting is generally not necessary. Plants can be placed pot-to-pot until growth reaches beyond the pot; thereafter, space plants to prevent elongation and thin growth.

7. Plant Height Control

Naturally short, compact species and cultivars (*A. chinensis pumila* and *A. japonica* 'Deutschland' and 'Peach Blossom') are well suited for potted plant production since height control is not necessary.

For taller cultivars, DeHertogh (1989) recommends applying B-Nine as a foliar spray (two 5000 ppm applications 1 week apart) soon after inflorescences begin to elongate. The timing of the application is critical. In our trials, all five tested growth retardants were ineffective at limiting plant height since they were applied prior to inflorescence elongation.

8. Temperatures And Crop Scheduling

Seed-propagated plants take approximately 11 weeks to flower at 68°F (20°C) and 14 weeks at 63°F (17°C) after 15 weeks of cold (Table 2). Warmer temperatures hastened flowering by no more than 1 week, and plants forced above 73°F (23°C) displayed heat stress symptoms, such as necrotic leaf margins and even plant death (Figure 5). Inflorescence number is greatest and plants are tallest at cooler temperatures (63°-68°F or 17°-20°C). During forcing, plants develop approximately seven nodes below the first inflorescence.

Time to flower for field-grown plants varies by cultivar, ranging from 5 to $8^1/_2$ weeks at 68°F (20°C) (Table 1).

Table 2. **Astilbe chinensis pumila Production Schedule**

Growing time	Cultural practice	Temperature	Photoperiod
1-2 weeks	Sow seeds Germination	63°-70°F (17°-21°C)	Natural daylength
8-10 weeks	Grow on until ≥ 5 leaves	63°-68°F (17°-20°C)	≥ 16 hours or 4-hour night interruption
-OR- *Plant plugs with ≥ 5 leaves*			
15 weeks	Cold treatment	35°-45°F (1°-7°C)	Natural daylength or 9 hours of light in the cooler
Begin forcing			***≥ 16 hours or 4-hour night interruption***
↓ ↓ ↓ ↓ ↓ 63°F (17°C) Flower in 98 days (14 weeks)	↓ ↓ 68°F (20°C) Flower in 77 days (11 weeks)	↓ 73°F (23°C) Flower in 74 days (10.5 weeks)	***Visible bud to flower*** 63°F (17°C) - 43 days 68°F (20°C) - 31 days 73°F (23°C) - 29 days

Regardless of cultivar, plants take 26 - 34 days from visible inflorescence to first flower.

9. Disease And Insect Pests

Plants are susceptible to Pythium and Botrytis because plants need to be kept moist at all times. To reduce disease incidence, avoid watering after mid-afternoon. Removing dead leaves and drenching plants with a fungicide at planting is also recommended. We have not observed any particular insect problems with astilbe.

10. Postharvest Concerns

The pink- and red-flowering cultivars have a long postharvest life (2 or 3 weeks), but the white-flowering cultivars are shorter lived (1 week), and are perhaps best sold just prior to first flowering. Care should be taken so that plants do not dry out, even for short periods of time.

Figure 5.

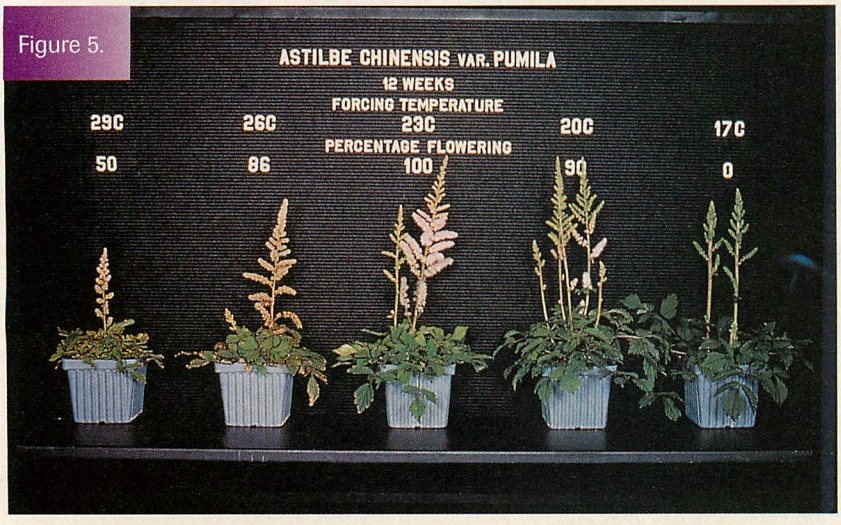

Figure 5. Flowering of *A. chinensis pumila* takes approximately 14 weeks at 63°F (17°C), 11 weeks at 68°F (20°C), and 10½ weeks at 73°F (23°C). At warmer temperatures, inflorescence count decreased and plants became stressed, as indicated by the necrotic leaf margins.

Formula For Success: Astilbe

1. For vegetative growth, provide noncooled plants with photoperiods ≥16 hours, or use a 4-hour night interruption.

2. Provide field-grown, bare-root plants with ≥10 weeks of cold. For seed propagated astilbe (*A. chinensis pumila*), provide plants that have ≥ five leaves with 15 weeks of cold followed by photoperiods of ≥12 hours.

3. Force plants at ~68°F (20°C); avoid temperatures above 73°F (23°C).

4. Never allow plants to dry out and shade plants under high light intensities.

References:

DeHertogh, A.A. 1996. *Holland Bulb Forcer's Guide*, 5th ed. Intl. Flower Bulb Centre, Hillegom, The Netherlands.

DeHertogh, A.A. 1989. *Holland Bulb Forcer's Guide*, 4th ed. Intl. Flower Bulb Centre, Hillegom, The Netherlands.

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