Forcing Perennials

Crop By Crop

Species: Lavandula angustifolia
Common Name: Lavender

Editor's note: In this exclusive series, Michigan State University researchers tell growers how to give the public what they want: perennials in flower. We’ve already covered the basic science behind forcing techniques and explained how cold temperatures affect perennials. Now we offer precise prescriptions for forcing numerous crops. This month we start with lavender. These 10 articles will be bound into a handy booklet at the end of the year.

by Catherine Whitman, Royal Heins, Art Cameron, and Will Carlson

Native to the Mediterranean region, lavender is grown both for its aromatic oil, which is used in perfumes, and as an ornamental for its purple flowers and attractive grey-green foliage (Figure 1).

In North America, lavender is hardy in USDA zones 5-9, and is popular in rock gardens or flower borders. Both the foliage and flowers are fragrant, with the flowers often being dried and used in potpourri. Since demand for both herbaceous perennials and herbs has been growing recently, lavender can be marketed in either of these popular categories.

Lavender typically blooms in late June, so in spring when the majority of garden plants are sold, it normally isn’t in flower. While the foliage is attractive, the presence of flowers makes lavender even more appealing, especially for impulse purchases.

Figure 1. Lavandula angustifolia makes a terrific flowering potted plant.
Lavandula angustifolia 'Munstead' 2V4 SIZE 10 WEEKS S C

Figure 3. Influence of photoperiod on flowering of `Munstead' lavender plants cooled for 10 weeks. Flowering percentages were approximately 50 under short days (SD), and 100 under night interruption (NI).

Figure 4. Influence of photoperiod on flowering of `Hidcote' lavender plants cooled for 15 weeks. LD are required for flowering of this cultivar.

Lavender could be marketed as a potted flowering plant that customers can subsequently plant outdoors and enjoy for many years. The flower buds and flowers remain attractive for several weeks so the plants have good shelf life.

At Michigan State University (MSU), we have been researching the flowering requirements of lavender to develop schedules for year-round forcing.

Many different species and cultivars of lavender exist. English lavender, Lavandula angustifolia, is the one most commonly cultivated in North America. Most of our experiments were done with the cultivar 'Munstead.' A few experiments included another seed-propagated L. angustifolia cultivar, 'Hidcote,' which has an attractive upright growth habit and dark purple flowers.

**Flower Induction Requirements**

Many annual bedding plants bloom when they reach a certain size. Adequate plant size is also necessary for flowering in perennials.

The requirement for size in perennials, however, interacts with other factors. Most perennials flower in response to specific environmental conditions like temperature or daylength. But many perennial plants must attain adequate size before they will respond to the environmental cues.

**1. PLANT SIZE**

For uniform and consistent flowering in 'Munstead' lavender, plants should be grown under natural photoperiods until they have at least 40-50 leaves (20-25 nodes) before the beginning of the cold treatment. With fewer leaves, uniformity, percentage of plants flowering, and flower number decrease.

In experiments on plants with 14-20 leaves (7-10 nodes), only 20% of the plants flowered and they only had one or two flowers per plant. This result compares with 100% flowering and 6-11 flowers per plant on those with 40-50 leaves (Figure 2). In our experience, plants from 128-cell trays had...
18-24 leaves, and those from 50-cell trays had 36-50 leaves.

2. COLD TREATMENT

‘Munstead’ lavender requires exposure to a period of low temperatures for uniform and rapid flowering. Uncooled plants are very slow to flower and the flowering percentage is extremely low (Figure 2).

While 5 weeks of treatment at 40°F (5°C) promotes some flowering, at least 10 weeks of cold is recommended. Increasing the duration of cold treatment from 10 to 15 weeks has little influence on subsequent time to flower but may increase flowering percentage.

Plants can be overwintered as plugs or potted plants in a minimally heated greenhouse, or cooled in a 40°F cooler under lights. Coolers used for MSU research were lit for 9 hours per day with cool-white fluorescent lamps at approximately 50 footcandles.

3. PHOTOPERIOD

Once cold requirements have been met, ‘Munstead’ lavender plants will bloom under any photoperiod. However, long days (LD) can substitute for suboptimal cold treatment to some extent.

Flowering percentage in plants cooled for 10 weeks was increased when they were subsequently forced under night interruption (NI) long days compared to 9-hour short days (Figure 3).

If plants were cooled for 15 weeks, LD did not improve flowering. Therefore, plants that have been cooled for 15 weeks can be forced under natural daylengths.

If plants are cooled for fewer than 15 weeks, or overwintered in a greenhouse where temperatures periodically become quite warm, they should be forced under LD for most rapid and uniform flowering.

LD can be provided either by extending the daylength to 16 hours, or by night-break lighting for 4 hours from 10 p.m. to 2 a.m.

Incandescent, high-pressure sodium, cool-white fluorescent, and metal halide lamps have proven to be effective at a minimum light intensity of 10 footcandles. When using incandescent lamps, about 1.5 watts of lamp wattage per square foot of growing space is required. Lighting should be provided from the start of forcing until flower buds are visible.

There is an important difference in flowering requirements between ‘Munstead’ and ‘Hidcote.’ ‘Hidcote’ requires LD in order to flower uniformly — even after 15 weeks of cold treatment (Figure 4). Provide LD for at least 3 weeks from the start of forcing, or until flower buds are visible.

4. MEDIA

Lavender is susceptible to root rot, so the use of a sterile, well-drained...
medium is especially important. Avoid waterlogging. The pH should be maintained around 6.0.

5. LIGHTING AND SPACING

This plant is native to sunny regions, so plant quality will be best under high-light conditions. Provide full natural light intensity during late spring forcing. Supplemental lighting with 500 footcandles of light from high-pressure sodium lamps has greatly improved plant quality during winter and early spring forcing in Michigan.

Lavender is a relatively upright plant, so pots can be closely spaced.

6. FERTILIZATION

Lavender requires moderate levels of fertility. Constant fertilization at 100-150 ppm N from a balanced fertilizer is adequate.

7. IRRIGATION

Grow plants on the dry side, and allow the media to dry between irrigations. Lavender will tolerate drought more readily than excessive water.

8. PLANT HEIGHT CONTROL

Lavender plants are fairly compact and shrubby, but the stem of the inflorescence may elongate excessively. In growth regulator trials, A-Rest and Sumagic effectively controlled this elongation (Figure 5).

We have had good success using one or more applications of 5-10 ppm of Sumagic on ‘Munstead’ lavender. Begin applications when shoots begin to elongate—about 1 week before flower buds are visible.

9. TEMPERATURES AND CROP SCHEDULING

The time to flower depends on plant size and forcing temperature. Plants with 40-50 leaves and cooled for 15 weeks will reach the visible bud stage in about 5 weeks at average daily temperatures of 61°F (16°C), 4 weeks at 66°F (19°C), or 3 weeks at 70°F (21°C).

Once buds are visible, the first flowers generally open after 4-5 weeks. Total crop time is approximately 10 weeks at 61°F, 8 weeks at 66°F, and 7 weeks at 70°F (Table 1).

Lavender plants are compact, upright, and have more flowers when forced at temperatures at or below 65°F (Figure 6 and 7). Plants become floppy and weak and flowering percentage is reduced if forced at day and night temperatures above 73°F.

The lavender inflorescence flowers over a long period allowing a fairly wide window for shipping and marketing.

10. DISEASE AND INSECT PESTS

Rhizoctonia is the biggest disease problem we have encountered. It can cause plant mortality before, during, or after cold treatments. Preventive fungicide drenches for control of rhizoctonia are recommended. We have not observed any insect problems on lavender.

About the authors: Catherine Whitman is a former graduate student and Drs. Art Cameron, Royal Heins, and Will Carlson are professors in the Department of Horticulture, Michigan State University, East Lansing, MI 48824.

### TABLE 1.

<table>
<thead>
<tr>
<th>Growing Time</th>
<th>Cultural Practice</th>
<th>Temperature</th>
<th>Photoperiod</th>
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</thead>
<tbody>
<tr>
<td>4-6 weeks</td>
<td>Chill seeds</td>
<td>36°-40°F (2°-4°C)</td>
<td>Any</td>
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<tr>
<td>2-3 weeks</td>
<td>Sow seeds</td>
<td>65°-75°F (18°-24°C)</td>
<td>Natural daylengths</td>
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<td></td>
<td>Germination OR purchase plugs</td>
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<tr>
<td>15-20 weeks</td>
<td>Grow until at least 40-50 leaves have formed</td>
<td>58°-70°F (14°-21°C)</td>
<td>Natural daylengths</td>
</tr>
<tr>
<td>10-15 weeks</td>
<td>Cold treatment</td>
<td>35°-45°F (1°-7°C)</td>
<td>Natural daylengths or 9 hours of light</td>
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<td>(Can be held longer if needed)</td>
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Begin Forcing

- 70°F (21°C) 70°F (21°C)
- 65°F (19°C) 7 weeks flower
- 61°F (16°C) 8 weeks flower
- flower