FORCING PERENNIALS

Species: Achillea
Common Name: Common Yarrow, Fernleaf Yarrow

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

ACHILLEA MOONSHINE
9 WEEKS COLD SC
7 WEEKS COLD 20C
16 HR PERM
VISI LE BUD
PRODUCTION FORCING PERENNIALS
Species: Achillea
Common Name: Common Yarrow, Fernleaf Yarrow

by ERIN NAUSIEDA, LOUIS SMITH, TAKAHIRO HAYASHI, BETH FAUSEY, ARTHUR CAMERON, ROYAL HEINS, and WILL CARLSON

Achillea species are multi-purpose plants that have been reportedly utilized since 1200 B.C. when Achilles, a great warrior of the Trojan War, used the herb to heal his soldier's wounds.

Today, the species are grown for medicinal teas, beer, liqueurs, ingredients in hair shampoo, sheep grazing, and even a turf grass substitute for residential lawns. The most common uses of Achillea, however, are for cut flowers and ornamental garden value in the landscape industry (Figures 1a, b).

Achillea, commonly known as yarrow, fernleaf yarrow, milfoil, or sneezewort is in the Asteraceae (Compositae) or Sunflower family. Species are hardy in USDA zones 3 to 8, and are naturally found in pastures, meadows, along roadides, and sand dunes throughout the northern hemisphere.

Though there are nearly 100 Achillea species, only a few are used as ornamental plants in the U.S. horticulture trade. The most popular species in landscapes today include A. millefolium, A. filipendulina, A. ptarmica, and A. tomentosa.

The height of the ornamental species in cultivation range from a few inches to a few feet. A. millefolium and A. filipendulina selections generally form upright clumps with multiple basal rosettes depending on the species. Achilleas spread by rhizomes and some can be overly aggressive; however, the best cultivars spread slowly and are very manageable.

Achilleas prefer full sun and well-

Figure 1a. Achillea's vibrant colors add dramatic contrast in the garden. Photo courtesy of Laura Colt. Figure 1b. Each plant continuously changes in color and texture throughout the growing season. Photo courtesy of Marlene Cameron.

Figure 2. Many Achilleas, including the cultivar 'Moonshine,' are well suited to container production and make attractive flowering potted plants. Photo courtesy of Leslie Finical.
PRODUCTION
FORCING PERENNIALS

drained to dry soils. With excess nitrogen and moisture, most species tend to become leggy and invasive. In climates where night temperatures typically remain below 70°F, plants produce stronger stems and don’t require staking.

New cultivars are continually being released and there is great variety in flower color from pale cream to vibrant red. The new millefolium hybrids, such as ‘Fireland,’ ‘Galaxy,’ and ‘Apple Blossom’ are especially attractive.

The texture and color of Achilleas continuously change from bud formation to flower senescence. Achilleas also demonstrate diverse foliage colors from soft gray-greens to intense deep-dark greens, which add great color contrasts to any garden display.

We have conducted research on six different species and nine different cultivars of Achillea (Figure 2). The following summary covers most of the Achillea spp. we have tested.

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Mutual confidence
in young bromeliad plants

Guzmania
'Samba'

Achillea
'Primera'

Guzmania
'Pax'

Guzmania
'Rana'

Guzmania
'Inno'

Guzmania
'Ambiance'

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PRODUCTION FORCING PERENNIALS

1. Propagation
Species and cultivars that are propagated from seed will bulk in cell trays and pots quite uniformly, but the flowers do not usually come true to color and the plants may vary in appearance. Millefoliums and filipendulinas tend to be weedy when propagated from seed.

The most popular selections of Achillea spp. are clones and thus must be propagated asexually. Rooting of stem cuttings is the method of choice for plug production, though division can be used.

For maximum stem cutting production per stock plant of Achillea 'Moonshine,' it is best to grow stock plants under photoperiods of less than 12 hours, though cuttings taken from plants grown under long days root well. Under short photoperiods, we have observed that stock plants of some Achillea cultivars produce numerous lateral shoots from the crown (Figure 3a, b, and c).

Keep in mind that cuttings in propagation are very susceptible to rot and mist frequency should be kept to a minimum. Remove cuttings promptly from mist once rooted.

2. Plant Size
Plugs from 32- to 128-cell trays with three to five nodes per plant are appropriate for a five-inch pot. Juvenility has not been a problem with any of the vegetatively propagated cultivars tested. Bulking before a cold treatment is not required but is desirable to fill a five-inch or larger pot.

3. Cold Treatment
A. tomentosa 'King Edward VDT' was greatly influenced by a cold treatment. Without cold, most 'King Edward VIII' flowered after 15 to 20 weeks under a 16-hour high pressure sodium (HPS) photoperiod and easily filled five-inch pots, gracefully hanging over the pot and forming nice, soft mounds.

After cold, plants flowered within six weeks but lacked adequate vegetative growth and flower number. 'King Edward VIII' will benefit from bulking before the cold treatment. In our experiments, a cold treatment is given at 41°F (5°C) in controlled temperature coolers under fluorescent lights.

None of the other Achillea cultivars we have tested appear to require a cold treatment for flower induction (Figures 4a, b, c, and d; Table 1). On most Achilleas, there was an increase in the number of lateral shoots following cold treatments. This may have been due to a direct effect of cold or to increased light levels. It is also possible that cold treatments reduce apical dominance.

A. filipendulina 'Gold Plate,' however, actually produced fewer lateral shoots per plant after 15 weeks of cold. This was due to the dramatic decrease in time to flower, which gave the lateral shoots less time to develop. Also, A. filipendulina cultivars naturally have few or no basal shoots (Figure 5).

4. Photoperiod
All Achillea cultivars tested are facultative long-day plants, which means they flower under all photoperiods, but flower more rapidly, consistently, and uniformly under long days (Table 1). Under nine-hour photoperiods, no flowering occurred without cold for any cultivar tested except 'Apple Blossom' and 'Paprika.'

Even after cold, low flowering percentages (50% on average) were observed under nine-hour photoperiods. Short days, however, increased vegetative growth and lateral shoot development on all the cultivars tested.

Avoid constant 24-hour lighting because it tends to cause rapid bolting with insufficient plant bulking.

We have tested 'Anthea,' 'Coronation Gold,' 'Moonshine,' and 'Paprika' under 10-, 12-, 13-, 14-, 16-, and 24-hour photoperiods and a four-hour night interruption from 10 p.m. to 2 a.m. at 68°F (20°C) (Figure 6).

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WITH less nitrogen and water, *Achillea spp.* are dry-land plants and not typically tolerant of intensely wet conditions. Disease problems may arise from over-watering, especially if water collects on the leaves. *Botrytis* is common on cultivars derived from *Taygetea* that possess more leaves at the base of the plant. Also, *The Pearl* is very susceptible to powdery mildew.

### 6. Lighting And Spacing

*Achillea* spp. are full sun, high light plants. In many cases, gray foliage is indicative of plants that are adapted to high light, such as *Anthea* and *Moonshine*. During Michigan winters, we have found that supplemental lighting improves flower quality and induces more lateral shoots for all species tested (Figure 7). Increasing supplemental light from nine to 16 hours per day increased plant height with *Galaxy*, *Hope*, and *Terra Cotta* (Table 1).

*Achillea* spp. may be placed pot to pot when first brought into the greenhouse, then spread out after growth initiates. Some cultivars, such as *Paprika*, develop multiple lateral shoots and require more space. On the other hand, *Hope* and *Terra Cotta* are narrow upright growers and require less space per pot. Keep in mind, however, that closer spacing can increase plant height and reduce lateral branching.
7. Plant Height Control
Many Achillea cultivars naturally grow to four feet in the garden. In the greenhouse, plant height was both cold and photoperiod dependent. Most cultivars tested were six to eight inches (15 to 20 centimeters) shorter after a 15-week cold treatment, compared to the plants that received no cold. Also, long-day plants were on average four inches (10 centimeters) taller than the short-day plants.

Since long-day photoperiods are necessary for 100% flowering, growth retardants are recommended for the taller cultivars such as 'Hope' and 'Terra Cotta.' We conducted a preliminary experiment on A. millefolium 'Summer Pastels' using A-Rest, B-Nine, Bonzi, Cycocel, and Sumagic. Of the five growth regulators, A-Rest, B-Nine, and Sumagic reduced plant height, while the other two chemicals were not effective.

8. Temperature And Crop Scheduling
In the garden, most Achilleas will perform well in USDA zones 3 to 7 or 8. Plants grown in warmer areas should probably be treated as annuals because disease problems are common at higher temperatures and humidity. Achillea spp. do not seem to tolerate high temperatures in the greenhouse as well because the plants tend to easily wilt under hot sunny conditions.

We recommend forcing between 64°F and 68°F (18°C and 20°C) to achieve optimum plant quality and flower timing. Based on their research results, University of Georgia researchers also recommend cool temperatures for forcing 'Summer Pastels.' The cultivars we have tested should flower in four to nine weeks when forced between 64°F and 68°F (18°C and 20°C).

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Cuttings can be taken from stock plants and moved directly into production after rooting, bypassing the cold treatment altogether. Salable plants may be produced in as little as nine weeks from harvest of the cuttings.

In addition, fuller plants can be produced by bulking rooted cuttings under SD photoperiods for several weeks prior to providing LD photoperiods for flowering.

### Table 1. Forcing Comparisons and Recommendations for Achillea

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Cold recommended for 100% flowering and optimal growth</th>
<th>Photoperiod required for 100% flowering and optimal growth</th>
<th>Responses to recommended forcing temperatures</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. aegyptiaca 'Taygetea'</td>
<td>Not tested</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A. clypeolata x 'Taygetea' 'Anthea'</td>
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<tr>
<td>A. clypeolata x 'Taygetea' 'Moonshine'</td>
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<td>A. filipendulina 'Gold Plate'</td>
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<td>A. filipendulina x clypeolata 'Coronation Gold'</td>
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<tr>
<td>A. millefolium x 'Taygetea' 'Apple Blossom'</td>
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<td>Long Days</td>
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<tr>
<td>A. millefolium x 'Taygetea' 'Galax'</td>
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<td>A. millefolium x 'Taygetea' 'Terra Cotta'</td>
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<tr>
<td>A. ptarmica 'The Pearl'</td>
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<td></td>
</tr>
<tr>
<td>A. tomentosa 'King Edward VIII'</td>
<td>Yes, minimum duration unknown</td>
<td>Day neutral after cold</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Responses to recommended forcing temperatures:

- **Temp. (°F)**: Temperatures required for flowering and optimal growth.
- **Plant Height (cm)**: Height of plants under recommended conditions.
- **Days to visible bud**: Days from planting to visible bud formation.
- **Days from visible bud to flower**: Days from visible bud to first flowers.
- **Weeks to flower**: Total weeks from planting to first flowers.
- **Comments**: Detailed descriptions of the cultivars' characteristics and growing conditions.

### 9. Disease And Insect Pests

Achilleas are usually quite resistant to most diseases and insects in the greenhouse and the garden. But as
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mentioned previously, 'Taygetea' hybrids such as 'Moonshine' and 'Apple Blossom' are susceptible to Botrytis and other fungal diseases under high temperature and humidity environments. Achillea 'The Pearl' was very vulnerable to powdery mildew. No persistent or detrimental insects were observed.

10. Postharvest Concerns

Shipping should begin as soon as the first flower opens. Most cultivars continue to flower for three or more weeks in the greenhouse, and typically bloom throughout the growing season in the garden.

Formula For Success: Achillea

1. Choose a superior clone.
2. Use rooted cuttings with at least two to three nodes.
3. Grow under short days for up to several weeks to increase lateral shoots.
4. Force between 64°F and 68°F (average daily temperature). Avoid higher temperatures.
5. Force with 16-hour photoperiods or with night interruption.
6. Water and fertilize sparingly to limit disease and plant height.
7. Ship at first flower.

Deadheading is recommended in the garden to encourage lateral shoot growth. If flowers are grown for fresh arrangements, they may be picked when in color. The flowers may be picked at any stage before pollen sets if they are destined for dried arrangements. The flowers don't possess the most attractive scent, but it dissipates when the flowers dry.

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