

## Production Tips For Top Performers

# Aquilegia vulgaris

'Winky Double Red and White' and 'Winky Double Dark Blue and White'



Fig. 1a 'Winky Double Red and White'



Fig. 1b 'Winky Double Dark Blue and White'

by **CATHY WHITMAN** and **SONALI PADHYE**

**A**QUILEGIA or columbines are among the most familiar and beloved flowers to grace our gardens in spring and early summer. There are approximately 65 species in the genus, most native to northern temperate and alpine regions, and countless hybrids exist. Plants produce showy flowers in many shades of purple, blue, lavender, red, pink, yellow or white. Most also have nectar spurs that can be up to 6 inches in length on some species. Aquilegia tend to be short-lived but they hybridize and self-sow freely. They will do best in part shade, in rich but well-drained soil and are hardy to USDA cold hardiness Zones 3 to 8.

The blooms on many aquilegia are nodding, but the flowers of the Winky series from Kieft Seeds face upwards. We have worked with two of the double-flowered varieties: 'Winky Double Red and White' (introduced in 2003) and 'Winky Double Dark Blue and White' (introduced in 2006). In both varieties, plants produce numerous charming flowers that are held upright

and many ruffled petals are easily visible (Fig. 1a and 1b).

### Timing Of Flowering

Though we consider them ornamental, the primary function of flowers is reproduction. Timing is everything to a flowering perennial plant in a temperate climate – flowering has to happen at the right time of year to coordinate with pollinator activity, and to have adequate time for seeds to develop and seedlings to establish before winter. Plants have evolved mechanisms to time their flowering for the appropriate season by responding to environmental conditions, including daylength and temperature.

### Vernalization And Juvenility

Some perennial plants will not flower until they've been through a winter or they receive a cold treatment. The effective temperatures for this cold treatment, or vernalization, are 37°F to 46°F for many species of herbaceous perennials. Commonly, these vernalizing temperatures need to be maintained for at least five to six weeks. In addition, some species won't flower

until plants have attained a certain size or age. These species have a juvenile phase – an early stage of growth during which they will not bloom even if conditions are correct for flower induction. Some species exhibit a combination of mechanisms: They require vernalization to flower but the cold temperatures won't work as a flowering trigger unless the plants have attained a certain size or age prior to the cold treatment. We have found this response in several species of herbaceous perennials, including aquilegia.

A number of the older aquilegia cultivars we have worked with won't flower the first year from seed and vernalization is ineffective on small seedlings. Plant breeders are addressing this issue and vernalization requirements of some new cultivars are reduced. Whenever we start to work with a new aquilegia cultivar, we ask: When are seedlings mature? Do they respond to vernalization? And how long does the cold treatment need to be?

### Treatments

We received 128-cell plugs of 'Winky Double Red and White' and 'Winky

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**Fig. 2** 'Winky Double Red and White' that received 10 weeks of cold treatment at 41°F. The plant on the left was cooled as a plug with about four leaves and did not flower. The other two plants were transplanted and allowed to develop 10 to 13 leaves prior to cold treatment under 16-hour long days (center) or nine-hour short days (right) in the greenhouse.



**Fig. 3** 'Winky Double Dark Blue and White' plants that received five weeks of cold treatment at 41°F. The plant on the left was cooled as a plug with about four leaves and did not flower. The plant on the right was transplanted and allowed to develop 10 to 13 leaves under nine-hour short days in the greenhouse, prior to the cold treatment. Many plants flowered following five weeks of cold, but for complete flowering of a crop, we recommend a 10-week cold treatment.

'Double Dark Blue and White' that had three to five leaves each. They were transplanted into 5 ½-inch pots and allowed to "bulk" under nine-hour short days or 16-hour long days created with incandescent lamps at 68°F for three or six weeks. Next, plants were given zero, five or 10 weeks of cold in coolers at 41°F, lighted for nine hours per day. A group of plants were also cooled as plugs and then transplanted. There were 10 plants in each treatment. All were then forced at 68°F under 16-hour long days created with high-pressure sodium lamps, because previous experiments have shown that forcing photoperiod has little effect on flowering of aquilegia.

**Results**

We used leaf numbers to quantify plant size and maturity. Plants of both varieties formed one to two new leaves per week at 68°F. Plants had six to eight leaves after three weeks of bulking, and 10 to 13 after the six-week bulking. Photoperiod during bulking did not affect leaf development or flowering.

No plants of either variety flowered without a cold treatment, and none that were cooled as plugs flowered. In order for all plants in a treatment to flower, both varieties required 10 to 13 leaves before vernalization – indicating they had completed their juvenile phase at that stage. All mature plants that received 10 weeks of cold flowered (Fig. 2). Over half of mature plants that received five weeks of cold did flower, but to ensure complete flowering, we recommend a cold treatment of 10 weeks at 41°F (Fig. 3).

Time to flower for mature, fully vernalized plants of both varieties was three to four weeks at 68°F.

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### PERENNIALS

More laterals, and thus more flower buds, formed on these plants when they had more time to bulk prior to vernalization. 'Winky Double Dark Blue and White' formed nearly double the number of buds when bulked to the 10 to 13 leaf stage versus the six to eight leaf stage (40 versus 22 per plant). 'Winky Double Red and White' had 50 percent more buds (30 versus 20 per plant) when bulked for the longer duration.

### Implications For Forcing

The key for successful scheduling of these aquilegia is to ensure plants are mature before the cold treatment, and then provide sufficient cold for them



**Fig. 4 'Winky Double Dark Blue and White' in the MSU trial garden showing their nice growth habit and striking flowers.**

to become vernalized. Plants should have 10 to 13 leaves before cold treatment begins, and be vernalized for 10 weeks. It may sound a little complicated, but basically we are just recreating the seasonal weather pattern of temperate climates.

These 'Winky Double' varieties are quite compact and have a height of 11 to 13 inches when their first flowers open. If height control is needed, we have found that daminozide (B-Nine, Dazide), chlormequat chloride (Cycocel) or uniconazole (Concise, Sumagic) can control elongation of aquilegia. **GG**

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