

Recent Findings May Make You Rethink Cyclamen



Today's varieties are not the same old cyclamen you may be used to growing, and they may require updated growing methods. New research suggests the correct interplay of temperature and light intensity may significantly enhance the quality of your cyclamen crop.

By
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The introduction of fast growing, seed propagated cyclamen cultivars with flowers in many different colors, improved growing techniques and expedited scheduling have created renewed interest and increased opportunities for cyclamen. Most cultural recommendations for cyclamen were, however, developed years ago, and today's cultivars may vary in their requirements and respond to temperature differently than the earlier cultivars propagated by corms.

LEAF FORMATION

The process of flower initiation and development is naturally important for producing cyclamen. The first flower on a cyclamen plant is expected to initiate at the node of the sixth fully expanded leaf. As more leaves develop, flowers continue to initiate at the nodes. Growing conditions favorable for the formation and development of leaves are therefore a provision for fast and abundant flowering.

In many plants, temperature is important for the formation of leaves. The higher the temperature in a species-specific range, the faster the appearance of leaves.

From transplant to the stage of five or six fully developed leaves, the recommended temperature for cyclamen is 68° F. This temperature has probably proven to be suitable because it supports good leaf formation without adversely affecting any other growth process, such as flower initiation.

Beyond the six-leaf stage, the recommended production temperature is 57–60° F, although leaves continue to initiate and develop on a cyclamen plant at other temperatures. The main reason to lower the temperature during the development of the flowers is to improve flower

color and postharvest quality. Maximum acceptable temperature for cyclamen is suggested at a relatively low 77° F.

EFFECTS OF LIGHT ON PLANT DEVELOPMENT

In addition to temperature, the amount of light cyclamens receive during the day is essential for plant growth and development. In an earlier study, cyclamen was grown at 3, 7.5 or 12 mol·day⁻¹·m⁻² during the initial nine weeks following transplant. The temperature was 68° F at all light levels. (The 3, 7.5 and 12 mol·day⁻¹·m⁻² correspond to continuous light of 520, 1300 and 2080 foot-candles for eight hours, or 260, 650 and 1040 foot-candles for a day of 16 hours.)

The low light of 3 mol·day⁻¹·m⁻² is commonly measured in a Midwestern greenhouse during a short winter day with a few periods of sunshine. The 7.5 mol·day⁻¹·m⁻² corresponds to greenhouse conditions during a sunny day in early March, and 12 mol·day⁻¹·m⁻² can be expected during a cloudy summer day. Even though the temperature was the same in this study, cyclamen grown at the higher light levels produced more leaves.

Light intensity is more important than the length of day for growth, leaf development and rate of flowering. At similar light conditions, a long day would provide more total light than a shorter day, and the longer day may then appear to be a more suitable production environment. Even at the same total light, however, a longer day at a moderate light level may be more beneficial for cyclamen than high light intensities during a short day.

The tolerance to high light is dependent on temperature conditions. Shading is usually

recommended at 4,000 foot-candles, although cyclamen can be exposed to "full sun" at lower than 77° F. At the recommended 68° F to the six-leaf stage followed by 60° F, cyclamen probably can benefit from light levels above 12 mol·day⁻¹·m⁻².

THE EFFECTS OF TEMPERATURE

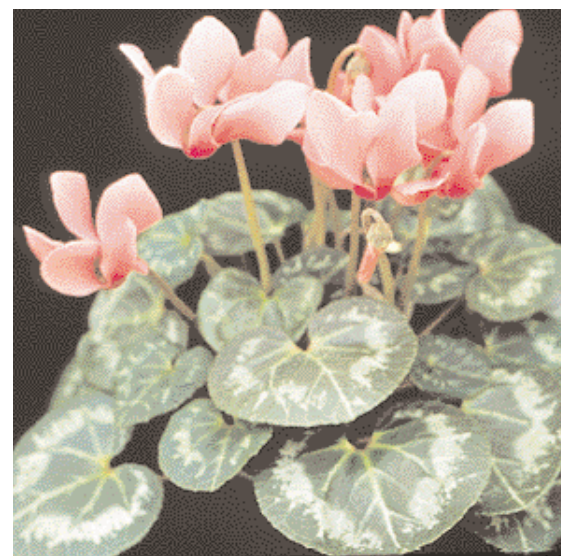
The cultivar Miracle Deep Salmon was selected to determine the effects of temperature during leaf formation and development in cyclamen. Plug plants were received 11 weeks from seeding from the Hortus Group, Castroville, Calif. The plants were transplanted into 4-inch pots filled with Premier Pro-Mix BX (Premier Horticulture, Premier Brands Inc., Red Hill, Pa.) and placed in a greenhouse at 68° F.

Two weeks later, plants were grown either at 60° F or 68° F. Plants were moved after three, six or nine weeks from the initial temperature and left at the second temperature until flowering.

The day length was 16 hours, and the light intensity 10 mol·day⁻¹·m⁻² (approximately 850 foot-candles during the 16 hours). The plants were watered with fertilizer solutions of 100 ppm using Peters 15-16-17 (The Scotts Company, Marysville, Ohio). Time to first color appearance in the flower bud, first open flower and three open flowers was recorded for each plant.

The number of days counted from the start of temperature treatments to color, first and three open flowers are shown in Figures 1 and 2. Figure 1 shows the number of days for plants started at 68° F, and Figure 2 the plants started at 60° F. The arrows on the bars illustrate the move from the initial to the second temperature after three, six or nine weeks.

For the plants grown continuously at 60° or 68° F without any change of temperature during development, flower color and flowering were observed earlier for plants grown at the higher temperature. Flowering with three open



Miracle Deep Salmon in flower. (All photos and graphs courtesy of Jeff Werner, University of Alaska, Fairbanks, Alaska.)

flowers required an average of 24 weeks from seeding at 68° F and 26 weeks at 60° F. The first color of the bud was recorded after 136 days from seeding at 68° F and after 140 days at 60° F. The development from first color of the bud to first open flower took, on average, 25 days at 68° F and 35 days at 60° F. Six or seven days were required, independent of temperature, for the opening of two additional flowers.

EFFECT OF CHANGING TEMPERATURES

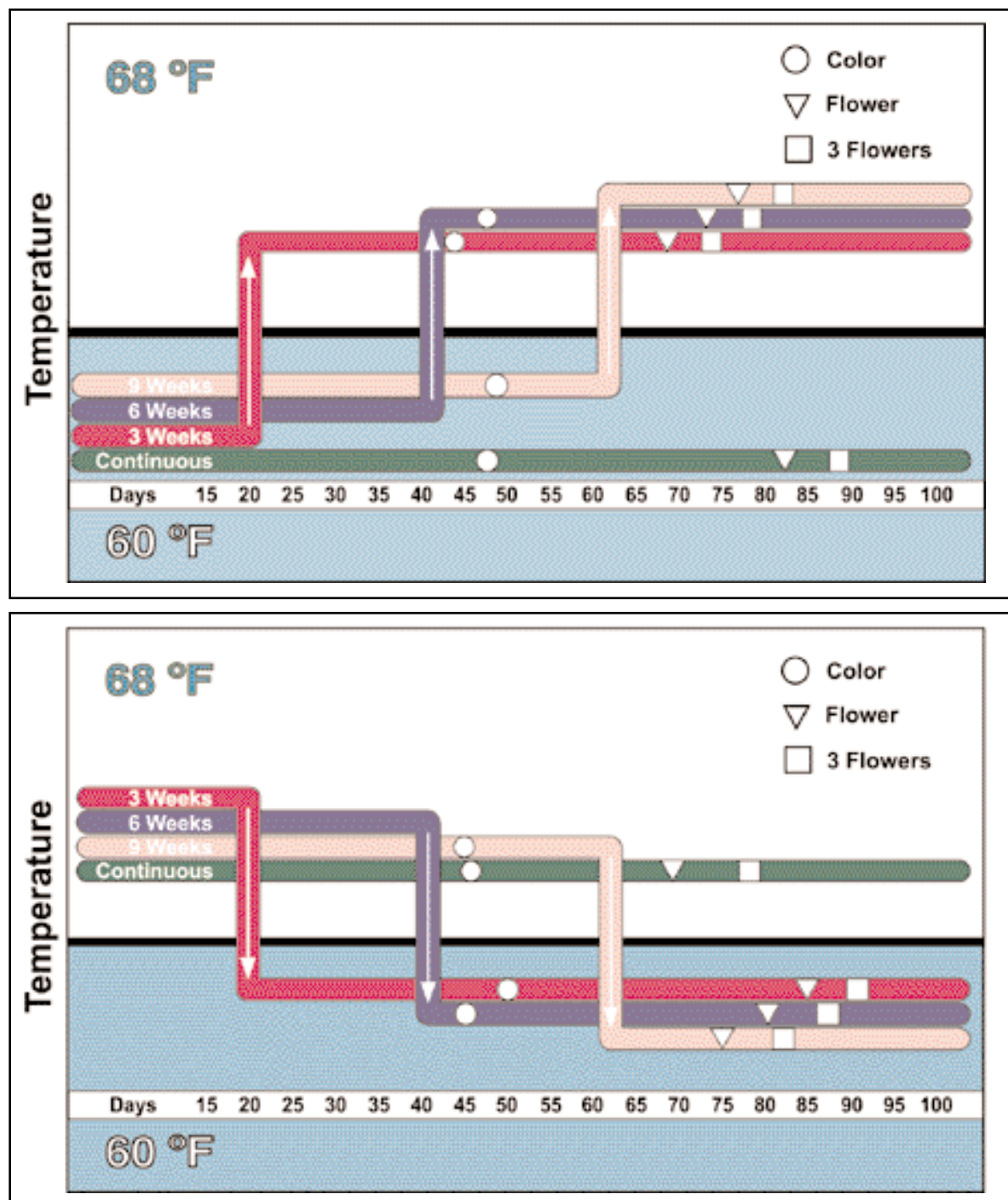
For plants moved between temperatures, both temperature environments affected rate of development. Plants grown at 60° F for more than three weeks had color appearance approximately five days later than the plants grown at continuous 68° F. On the other hand, three initial weeks at 68° F was not enough to offset the slower color appearance recorded at continuous 60° F. Opening of the first flower was not influenced by temperature during early development. Flowering was not delayed by the initial three weeks of 60° F, and a higher initial temperature did not speed flowering compared to continuous 60° F.

The plants responded to the current temperature conditions without any apparent modifications or alterations of the growth response by the earlier temperature exposure. Cyclamen grown with nine weeks at 60° F, for instance, required 28 days from color to first flower. The move from 60° to 68° F occurred between the developmental stages of color and first flower for these plants. For 13 of the 28 days, the temperature was 60° F, and the remaining 15 days were at 68° F.

If the progression between color appearance and first open flower is assumed to advance at a similar rate each day when exposed to a constant temperature, the daily rate of development can be estimated to 0.029/day (1/35 days) at continuous 60° F and 0.04/day (1/25 days) at continuous 68° F.

Considering these estimated daily rates,

Figure 1 (top) and Figure 2 (bottom). Number of days from start of temperature treatment to color, first open flower and three open flowers.



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Cyclamen in early stages of development.

flowering can be predicted 29 days after color appearance with a change from 60° F to 68° F after 13 days. Cyclamen grown with nine initial weeks at 68° F, flowered 30 days after color with 18 days at 68° F and 12 days at 60° F.

Considering results of the treatments with continuous 60° F or 68° F, flowering with 68° F for 18 days followed by 60° F is estimated to 28 days. The close correlations between the estimated and observed flowering times for plants moved to a second temperature suggest the direct effect of the present temperature exposure on rate of development.

SUMMARY

Recommended temperatures for cyclamen production are 68° F during the expansion of the first five or six leaves, followed by 60° F through the remainder of development. The higher initial temperature is expected to support fast initial leaf unfolding. Reducing the temperature during the final stages of development is suggested to improve plant quality, flower size and color, and postharvest life.

Since postharvest characteristics were not determined in this study, the effect of temperature on the quality of the produced plants cannot be evaluated. Although a lower temperature slightly slows flower development, reducing the temperature during the final stages is still recommended to ensure high plant and postharvest quality.

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