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Special Research Report #530 Production Technology
Energy Efficient Poinsettia Production #1

Diane Camberato[1], Brian Krug[2], and Roberto Lopez[1]
[1]Department of Horticulture, Purdue University, West Lafayette, IN 47907
[2]University of New Hampshire Cooperative Extension, Durham, NH 03824

BACKGROUND

The Christmas poinsettia is the second most valuable flowering potted crop sold in the United States (U.S.) and had a reported wholesale value in 2011 of $139 million in the top-15 producing states. Profitability is increasingly threatened as the cost to heat greenhouses has increased by over 120% in the last 15 years. As energy costs continue to increase and poinsettia prices remain relatively constant, poinsettia producers are lowering their greenhouse air temperature set points without knowledge of cultivar responses.

One strategy to address this issue is to reduce temperatures during finishing (RTF) or cold finish. Two red cultivars from each of the four major poinsettia breeding companies were selected based on their early response attributes (initiate and finish within 6 to 8 weeks), moderate to high-vigor, and naturally large bracts. These attributes are essential for RTF.

The objectives of this study were to quantify how RTF applied two weeks after the start of short days (SD) influence time to marketability and anthesis (first pollen shed), plant height, and bract area index.

MATERIALS & METHODS

Rooted cuttings of 'Advent Red', 'Christmas Eve Red', 'Christmas Feelings Red', 'Early Glory', 'Early Orion Red', 'Prestige Early Red', 'Orion Red', and 'Viking Red' were received at Purdue University in West Lafayette, IN (lat. 40°N) and the University of New Hampshire in Durham, NH (lat. 43°N) on week 31, 32, or 33 and transplanted into 6.5" containers. They were grown at day/ night temperatures (12 h/ 12 h) of 75/ 67°F [Average daily temperature (ADT) of 71 °F] and a 16-hour photoperiod provided by high-pressure sodium lamps, until the start of short days (SD) on 01 October.

Six plants of each cultivar and from each planting date were transferred to greenhouse compartments for RTF with constant temperature set points of 62 or 66 °F or day/night temperature set points of (12/12 h) 61/55, 68/56, 70/62, or 75/67 °F on 15 Oct.

RESULTS AND CONCLUSIONS

At both locations, quality parameters (height, bract area index, and bract area to height ratio) were reduced when plants were placed under RTF of 62 and 66 °F or when the day/night temperature set point (12 h/12 h) was 61/55 °F. For example, bract area index was reduced by 34, 52, and 88 in2 when the finishing temperature was lowered from 75/67 to 62, 66, and 61/55 °F, respectively, for plants transplanted on week 33. Time to anthesis (TTA) significantly increased across cultivars when poinsettia cultivars were finished at 61/55 °F. For example, average TTA of 'Prestige Early Red', 'Viking Red', and 'EarlyGlory' occurred after 15 December.

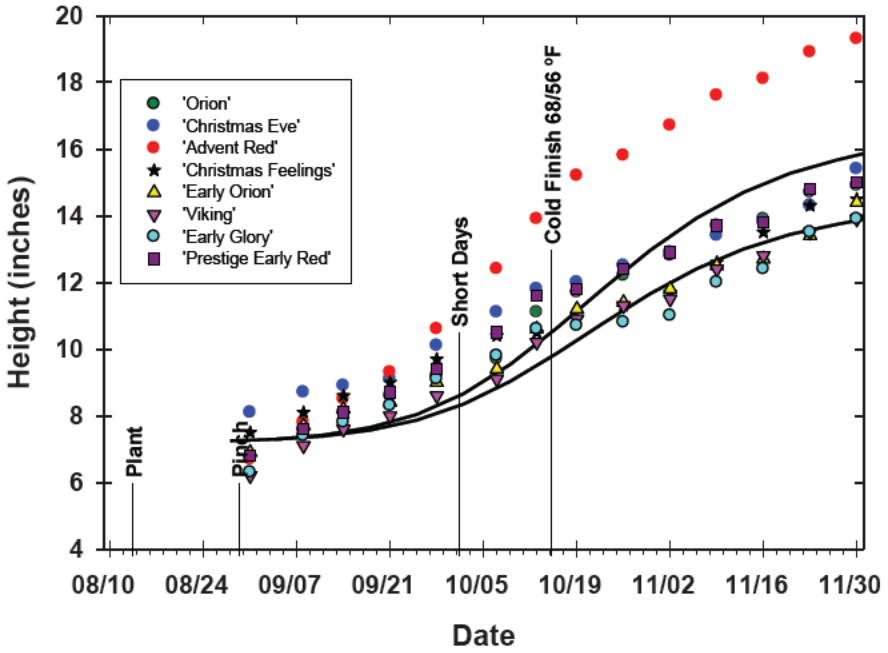

Figure 1. Graphical tracking of eight poinsettia cultivars that were planted on 13 August (week 33) and placed under reduced temperature finishing (cold finish) of 68/ 56 °F day/night on 15 Oct.

Figure 1 displays the average weekly height (graphical tracking) of each of the eight cultivars planted on 13 August (week 33) and placed in RTF on 15 October (week 42) at 68/ 56 °F. Until the start of RTF (cold finish), the height of all the cultivars was above the graphical tracking curve because we did not use plant growth regulators. Allowing the plants to grow above the curve prior to RTF compensated for the reduced stem elongation that occurred during RTF. In Figure 1 we can see that the final heights of all eight moderate to high vigor cultivars planted on week 33 in our study were within or near the 14 to 16-inch range. As would be expected, final height of all the poinsettia cultivars planted on weeks 31 or 32 was significantly greater than those planted on week 33.

One of the most important factors that can limit cold finishing is the delay in timing that can occur from reduced temperatures. In our study, TTA increased by 2 to 15 d and 15 to 22 d, as the finishing temperature was reduced during the day/night by 5/5 °F (70/62 °F) and 7/11 °F (68/56 °F) respectively, beginning on 15 Oct., compared to the 75/ 67 °F treatment. Therefore, early season cultivars with a 6 to 8 week response time should finish and be marketable between mid- to late-November. It is also important to note that

plants can be marketable from a few days to 2 weeks before anthesis depending on the cultivar.

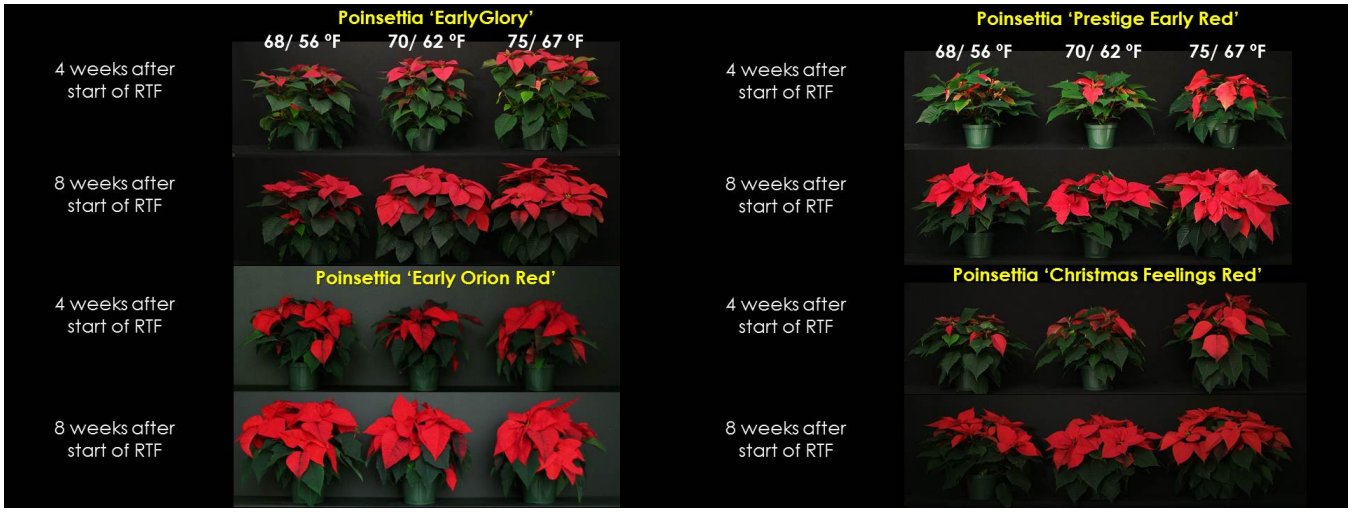

Figure 2. Poinsettia 'EarlyGlory', 'Early Orion Red', 'Prestige Early Red' and 'Christmas Feelings Red' four and eight weeks after being placed under reduced finishing temperatures of 68/56, 70/62 or 75/67 °F.

IMPACTS TO THE INDUSTRY

Although reducing heating costs is the primary draw to RTF, there are other added benefits to this production scheme. Other benefits that have been reported include reduced or no PGR usage, an increased post-harvest life of the plants and intense and brighter bract colors. This can translate into higher consumer satisfaction.

All of the red cultivars that we tested in our three years of trialing were successfully cold finished at 68/56 ºF and 70/62 ºF without excessive delays in timing or negative effects on height or bract area.

Keep in mind that the base temperature or the temperature at which the developmental rate is zero, is 50 °F for poinsettia. Therefore, night temperatures should never drop below 55 °F to obtain a desired ADT. Likewise, excessively high temperatures during the day can also cause problems. The practice of RTF of poinsettia has shown promise as a cost savings technique in this study.

Acknowledgments

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For Additional Information Contact: Roberto Lopez at rglopez@purdue.edu or read the Cold Finishing Up North and Revisiting Poinsettia Cold Finishing articles in Greenhouse

Grower magazine volume 27 issue 8 and volume 28 issue 9 or Development of *Euphorbia pulcherrima* under reduced finish temperatures in HortScience volume 47 issue 6. These articles are available at: www.flowers.purdue.edu.

American Floral Endowment
Phone: 703.838.5211
Fax: 703.838.5212
www.endowment.org
afe@endowment.org