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**113**

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## **USE OF LONG DAYS TO TIME FLOWERING OF 'FREEDOM RED' POINSETTIA**

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Over the past several years, 'Freedom Red' and other new poinsettia cultivars have been introduced to commercial producers and consumers. These cultivars were selected for improvements in postharvest handling, appearance under artificial lighting, growth habit, earliness to flower, and floral display. Many of these improvements were brought about by changes in the way poinsettias are marketed and used. Growers must be able to supply mature plants before the Thanksgiving holiday weekend. Increased use of poinsettias in interiorscapes of malls and office buildings requires plants that "appear" red under artificial lighting. Consumers demand plants that hold the colored bracts well throughout the holiday season. Freedom Red, introduced in 1991 from the Paul Ecke Ranch in California, was developed with these considerations in mind. The Freedom series is now available in red, white, pink, marble, and the 'Jingle Bells' form (red with pink splotches).

A previous report indicated that Freedom Red initiates flowers 7 to 10 days before other cultivars (Hall et al., 1994). Additionally, because it has a more compact growth habit than older poinsettia cultivars, more time is needed for vegetative growth after the pinch and before flower initiation in order to finish a plant that is similar in size to

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other cultivars. There are two ways to provide this extra time: propagate and pinch the plants earlier or use long days to delay flower initiation. Nell et al. (1993) recommended using long days to delay floral initiation until September 29 for a December 1 harvest in areas such as the Pacific northwest, Great Lakes, and northeast United States. They recommended lighting until October 6 for a December 1 harvest in Florida, Texas, and the Gulf Coast states because of the faster vegetative growth achieved under the warmer temperatures and higher light intensity.

Because autumns in Kansas often differ considerably from conditions in northern or southern regions of the country, knowing how to manipulate this cultivar under local conditions is important. Therefore, objectives of this study were to determine how the use of long days to delay flowering would impact the production of Freedom Red from a single propagation date and to develop a prediction model that could be used for scheduling this cultivar in Kansas.

### Procedures

Rooted cuttings were received from the Paul Ecke Ranch and potted on August 17, 1995. One cutting was potted per 6-inch azalea pot filled with a commercial, bark-based, soilless, growing medium (Universal Mix from Strong-Lite, Pine Bluff, AR). Plants were pinched to induce branching after roots were visible on the growing-medium surface when removed from the pot. Standard commercial

**Table 1. Flowering of Freedom Red poinsettia as influenced by exposure to long days for various durations.**

Lighted until	Pollen Show		Height at Pollen Show (cm)
	Date	Ordinal Day	
Control (continuous natural daylengths)	December 7, 1995	342 d	25.9 c
September 28	December 5, 1995	340 d	27.8 c
October 12	January 2, 1996	368 c	30.8 b
November 2	January 12, 1996	378 b	30.8 b
November 23	January 30, 1996	396 a	35.6 a
LSD 0.05		3	2.0

Means followed by the same letter are not significantly different.

production procedures were followed (Ecke et al., 1990). Day and night temperatures were set at 70° and 64° F, respectively. Control plants were grown under natural day-length conditions. Other plants were divided into four treatments and held under artificial long days until September 28, October 12, November 2, or November 23. Artificial long days were provided by burning 100 W incandescent light bulbs suspended approximately 3 feet above the plants from 10:00 pm until 2:00 am each night. Plants then were moved to natural day length conditions. Date of and height at pollen show (anthesis) were recorded. Regression analysis of the data was done in order to develop a prediction model for flowering.

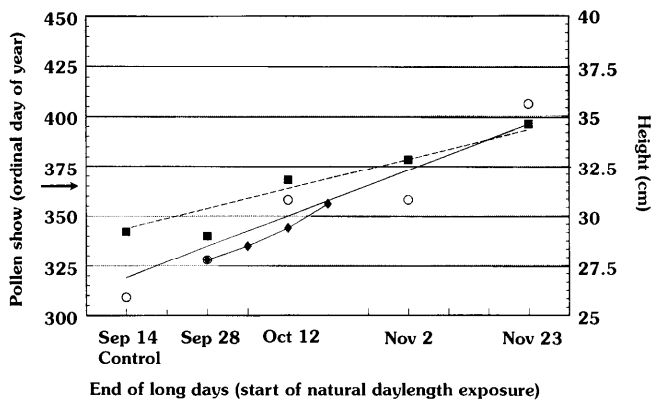
## **Results**

Data indicate that long days generally will delay the onset of flowering, while increasing plant height of Freedom Red poinsettias (Table 1). Maintaining long days until September 28 did not delay flowering of Freedom Red in comparison to the plants grown under natural daylength conditions. This agrees with Hammer (1993) who stated that Freedom should initiate flowers a week or so earlier than other cultivars (when the natural daylength is longer), indicating that Freedom cultivars have a different critical daylength than other poinsettia cultivars. Patranella et al. (1976) reported that natural initiation of several of the older Annette Hegg cultivars occurred on or about September 26. That work was conducted in

Columbus, Ohio, where the natural daylengths get shorter earlier in September than in Manhattan, Kansas. The natural daylength in Manhattan on September 28 is 11 hours 54 minutes, which would be reached several days earlier in Columbus. Therefore, if the Freedom series has a longer critical daylength, long days must be provided earlier in September in order to produce a taller plant or a plant that is marketable later in the poinsettia shipping season.

The prediction equation for pollen show is:  $y = 162.1 + 0.7048x$ , where  $y$  = predicted date when pollen would be visible on the primary cyathium, and  $x$  is the ordinal day of the year when long-day lighting would be terminated (exposure to natural short days begins). This equation accounts for 86% of the variability in predicting when Freedom Red poinsettias flower.

To market Freedom Red poinsettias on December 8 (ordinal day = 343), use the equation as follows to determine when to terminate long days and start exposure to natural short days:  $343 = 162.1 + 0.7048x$ ;  $343 - 162.1 = 0.7048x$ ;  $(343 - 162.1) \div 0.7048 = x$ ; therefore,  $x = 257$ . Thus, long-day lighting would be terminated on September 13. In a technical information bulletin prepared by the Poinsettia Growers Association (undated), the date to terminate long days was estimated by counting back 8 weeks from the desired delivery date (diamonds on Figure 1). The outcome is an earlier estimation to market. Timing can be influenced by the greenhouse temperature and the use of DIF (the difference between the day and



**Figure 1.** Day of pollen show (■) and plant height (○) of Freedom Red poinsettias when grown under long days until different dates. Solid line (—) is the regression line for height prediction:  $y = 0.1104x - 1.587$ ,  $R^2=0.652$ ; dashed line (- -) is the regression line for pollen show prediction:  $y = 162.1 + 0.7048x$ ,  $R^2=0.863$ . Timing of Freedom Red plants provided by Poinsettia Growers Association is represented by (◆). Arrow along the left y-axis indicates January 1.

night temperatures) to control plant height. To predict the height of these plants, the equation used would be  $y = 0.1104x - 1.587$  (this equation accounts for only 65% of the variability in predicting height). The final height predicted would be:  $y = 0.1104(257) - 1.587 = 26.8$  cm or 10.5 inches (not including the height of the pot). Further data collection using more treatments (dates when long days are terminated) at shorter intervals (only 3 or 4 days apart rather than 2 to 3 weeks) would lead to refinement of the equations and improved predictability of pollen show and final height.

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