

COLORADO GREENHOUSE  
GROWERS ASSOCIATION, INC.



# Research Bulletin

Bulletin 363

Edited by David E. Hartley

September 1980

## EARLY DISBUDDING IMPROVES QUALITY OF MINIATURE CARNATIONS

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The quality of spray chrysanthemums (pompons) is often improved by removing the terminal flower bud soon after the bud forms. This disbudding procedure can result in longer flower stems (pedicels). The spray of flowers, as a whole, is more open, less "clubby" and more useful.

We were able to also improve the spray formation on miniature carnations by removing the terminal flower bud. Bud removal at an earlier stage of development resulted in longer pedicels and internodes within the flower spray.

### Methods

Four cultivars of miniature carnation, 'White Elegance,' 'Toni,' 'Red Baron' and 'Twinkle' were planted on June 7 at the W.D. Holley Plant Environmental Research Center, Colorado State University. Two raised soil benches, 3.5' x 33', in a FRP greenhouse were divided into 32 equally sized plots with buffer plots at each end of the benches. Eight plots of each cultivar were randomly planted within the two benches. Each plot was 7 ft.<sup>2</sup>, with four rows of seven plants for a total of 28 plants per plot or four plants per ft.<sup>2</sup>

Four replicated treatments were given to each cultivar. The terminal bud of each spray was removed at four stages: (1) as early as feasible after bud formation, (2) when the bud was 1/4"-1/2" diameter, (3) when the bud first showed color and (4) when the flower was fully opened.

Data were taken on the first five stems cut each week and included stem grade, pedicel length, internode length and stem length. Data was taken on the remaining stems for length and grade only. All stems were cut below two vegetative breaks.

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The grading system used was as follows:

Blue grade	— stems longer than 14 inches
	— 5 or more saleable flowers
	— strong stems
Red grade	— stems larger than 14 inches
	— 4 saleable flowers
	— strong stems
Green grade	— stems longer than 14 inches
	— 3 saleable flowers
	— strong stems
Design grade	— stems less than 14 inches, or
	— fewer than 3 flowers, or
	— weak stems

An eleven week period of fall production was chosen for determining the effects of the treatments; the week of highest production plus the previous and succeeding five weeks.

### Results

*Stem Length* — The overall length of flower stems was not significantly changed by disbudding treatments. Stem length was measured from the base of the stem to the top of the flower on the uppermost pedicel. All stems were longer than the minimum 14" length (Table 1).

*Pedicel Length* — Earliest bud removal (treatment 1) resulted in the longest pedicels for each cultivar. Generally, pedicel length increased the earlier the terminal bud was removed from the plant (Table 1).

*Internode Length* — The internode length, or the distance between flower pedicels, increased with early bud removal in three cultivars. The internode length of 'Red Baron' was unaffected by time of disbudding.

*Production* — There was no significant difference in the number of flower stems as a result of disbudding treatment. All cultivars produced 5-6 flower stems per plant or

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Table 1. Stem, flower pedicel and internode length of miniature carnations after removing the terminal bud when it was: (1) first visible (2) 1/2"-1/4" diameter (3) first showing color (4) fully open flower.

Cultivar	Disbudding Treatment	Stem Length (Inches)	Pedicel Number And Length (Inches)				Internode Number And Length (Inches)			
			1	2	3	4	1	2	3	
'White Elegance'	1	20.0	2.8	5.1	7.2	—	3.3	3.8	—	
	2	19.4	2.3	4.0	5.9	—	2.6	3.4	—	
	3	20.2	2.2	3.8	5.6	—	2.5	3.5	—	
	4	19.1	2.0	3.4	5.2	—	2.3	3.3	—	
			HSD <sup>Z</sup>	.2 <sup>Z</sup>	.3	.4	—	.2	.2	—
'Toni'	1	21.9	2.7	4.3	5.7	7.6	2.6	3.2	3.1	
	2	22.6	2.4	4.1	5.5	7.3	2.5	3.1	3.2	
	3	22.6	2.1	3.6	5.0	6.8	2.2	3.1	3.3	
	4	21.7	1.9	3.3	4.6	6.3	2.1	3.0	3.2	
			HSD <sup>Z</sup>	.2	.2	.2	.4	.1	.1	.1
'Twinkle'	1	18.1	1.8	3.4	4.7	6.2	2.8	3.3	3.2	
	2	17.7	1.7	2.8	3.8	5.2	2.4	3.0	3.2	
	3	18.7	1.7	2.8	3.9	5.0	2.3	3.0	3.3	
	4	18.4	1.6	2.6	3.6	4.9	2.2	3.0	3.1	
			HSD <sup>Z</sup>	.1	.2	.2	.2	.1	.1	.1
'Red Baron'	1	16.5	1.7	3.1	4.6	7.1	2.1	2.4	2.5	
	2	15.8	.9	2.2	3.8	5.6	1.7	2.4	2.6	
	3	16.5	.9	2.0	3.6	5.3	1.7	2.4	2.6	
	4	16.1	.9	1.9	3.5	5.3	1.5	2.4	2.6	
			HSD <sup>Z</sup>	.2	.2	.2	.4	.1	NS	NS

<sup>Z</sup>HSD — Differences greater than this value have a 95% chance of being right.

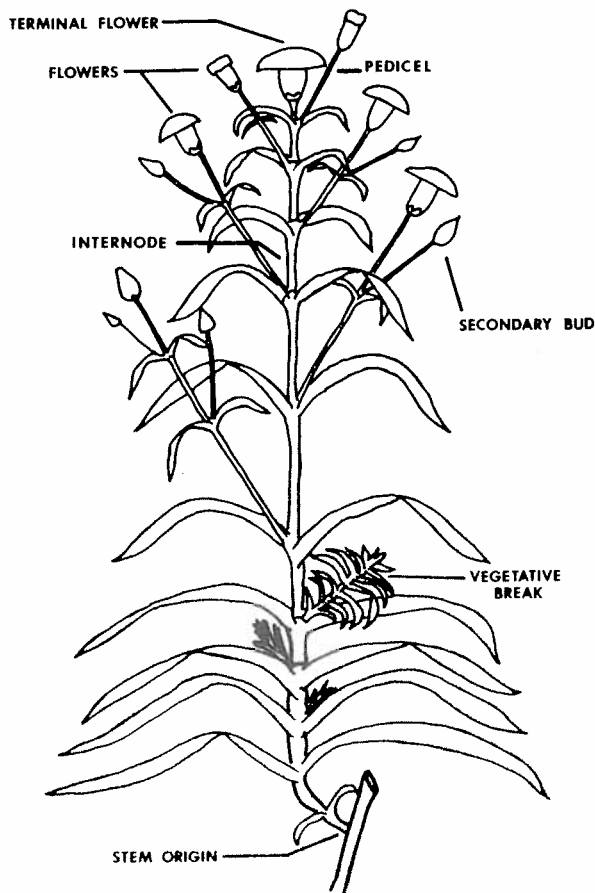


Figure 1: Diagram of a miniature or spray carnation.

20-24 flowers per square foot for the fall crop alone (Table 2).

### Observations

Terminal buds 1/4"-1/2" in diameter (treatment 2) were the most difficult to disbud. At this stage the lateral buds were also developing and the terminal buds were difficult to distinguish from the laterals.

The easiest bud to remove was the fully opened terminal flower.

### Conclusions

While flower production, flower grade and stem length were essentially unchanged by disbudding practices, pedicel and internode lengths were enhanced by early terminal bud removal. Although the quality differences could not be easily measured by our present grading systems, longer pedicels and internodes did form more desirable and useful sprays of miniature carnation flowers.

It is generally agreed that removal of the terminal flower from a carnation spray is desirable even if it occurs as late as flower harvest. The terminal flower normally matures several days before the lateral flowers. The overall quality is thus enhanced by removing these premature flowers.

Perhaps disbudding is easiest after the terminal bud shows color. It is relatively simple to remove these buds, even if one disbuds while cutting the more advanced, marketable flowers. However, our data indicate that the best quality sprays result from the earliest feasible removal of the terminal flower bud.

Table 2. Fall flower production and grade of 4 miniature carnations after disbudding at four stages, (1) bud first visible (2) ¼"-½" diameter (3) first showing color (4) flower fully open.

Cultivar	Disbudding Treatment	Flower Stems Per Plot	Flower Stems Per Plant	Flower Stems Per Sq. Ft.	Ave. <sup>a</sup> Grade
'White Elegance'	1	280	5.0	20.0	1.9
	2	299	5.3	21.4	2.2
	3	309	5.5	22.0	2.5
	4	284	5.1	20.3	2.5
'Toni'	1	318	5.7	22.7	3.0
	2	312	5.6	22.3	3.2
	3	327	5.8	23.4	3.1
	4	314	5.6	22.4	3.0
'Twinkle'	1	332	5.9	23.7	2.3
	2	334	6.0	23.9	2.4
	3	311	5.6	22.2	2.6
	4	336	6.0	24.0	2.8
'Red Baron'	1	302	5.4	21.6	2.5
	2	309	5.5	22.1	2.5
	3	288	5.1	20.6	2.7
	4	316	5.6	22.6	2.6

<sup>a</sup>Ave. Grade — Blue grade=4, Red grade=3, Green grade=2, Design grade=1.