



# Colorado Flower Growers Association

IN COOPERATION WITH COLORADO STATE UNIVERSITY

Dorothy Conroy, Executive Secretary

Bulletin 177

901 Sherman St., Denver, Colorado 80203

December 1964

## Effect of Age of Stock Plant on Growth of Carnation Cuttings

by Ralph A. Altstadt<sup>1</sup>

The effects of stock plant age on subsequent growth of cuttings has been investigated for several plants. Chronological age of cuttings influenced the flower formation of pompon chrysanthemums (1). All stock plant shoots that had grown 8 weeks from the time of origination contained initiated flower buds while those grown for 5 weeks or less remained vegetative. As age of stock plant shoots increased, the height of the crown bud of the resulting unpinched plant decreased.

The ability of cuttings to form roots is affected by the age of the propagative material from which it is taken. O'Rourke (3) studied the rooting ability of hardwood cuttings taken from different positions on blueberry shoots. He noted that cuttings containing vegetative buds rooted better than those containing flower buds. He also noted that percent of rooting and growth of the cutting thereafter were related to the position on the shoot from which the cutting was taken. Cuttings taken from the base of the shoot were the most desirable in terms of rooting and subsequent growth. Gardner (2) observed that one-year-old cuttings from a number of different hardwood species outperformed cuttings from trees 2 years old, or older. When 1-year-old seedlings were cut back to the ground, the resultant sprouts were equal or superior in rooting ability.

O'Rourke (4) has reviewed the literature on juvenility of various hardwood and evergreen species. He concludes that cuttings taken from juvenile plants, or juvenile portions of plants, consistently root better and grow better after planting than those from adult plant material. He points out that the processes which take place in the transformation from the juvenile to the adult form are closely associated with development, but not growth, and that these processes are not chronological, but purely physiological.

To investigate possible effects of stock plant juvenility on the subsequent growth and performance of carnation cuttings, the cuttings were removed from young and old stock plants and sized by 1) numbers of expanded leaves, and 2) by fresh weight.

### Sized by Expanded Leaves

An equal number of cuttings were removed from young and old stock plants of 3 clones each of varieties White Pikes Peak and Red Gayety. The stock plant ages were 4 and 18 months, respectively. All cuttings were removed at a position that allowed 3 pairs of leaves to remain on the stock plants. Each cutting contained 6 pairs of expanded leaves. On July 25, 1963, the cuttings were placed in perlite for rooting. On August 17, all cuttings were planted in twice replicated blocks, each containing the same arrangement of clones. Each treatment was an individual clone containing 5 plants spaced evenly in a row across

<sup>1</sup>This is a part of the work done by the author in completing the requirements for the Master of Science Degree at Colorado State University.

a greenhouse bench, giving a plant spacing of 6 X 8 inches throughout a block. A total of 60 plants each from young and old stock plants were compared in the experiment. Methods of handling the young plants and measurements of first and second crop production were the same as in the production trials described in a previous experiment (CFGA Bulletin 176).

Cuttings sized in this manner from young stock plants had higher mean fresh and dry weights per cutting, and lower percent dry matter than those from old stock plants.

Age	Fresh weight	Dry weight	% dry matter
4 months	9.2	1.5	16.3
18 months	6.7	1.2	18.3

Highly significant differences were observed in growth and performance of cuttings due to age of stock plants. Cuttings from young stock plants produced 1) more lateral shoots in a shorter period of time (Figure 4), 2) more cut flowers plus remaining buds after harvest, 3) higher mean grade of flowers, 4) greater number of axillary shoots in the second growth, 5) more fresh weight per residual plant, and 6) required less time for maturation of first-crop flowers than cuttings from old stock plants (Table 1). Similar differences were observed between varieties. Red Gayety consistently out performed White Pikes Peak; moreover stock plant age appeared to effect the growth of cuttings of both varieties in the same way.

The appearance of young and old stock plants and cuttings from these is shown in Figures 1 and 2. Cuttings from the young stock plants were larger in diameter and contained more advanced axillary shoot development than cuttings from the older stock plants.

Such large differences in performance developed from the two groups of cuttings that it was difficult to attribute these effects to age of stock plant alone. Cuttings from young stock plants weighed considerably more than those from old stock plants. The following experiment was designed to eliminate the effect of differences in fresh weight of cuttings and to more accurately test the effects of juvenility.



Figure 1--Average appearance of old Red Gayety and White Pikes Peak stock plants (on left) and young stock plants. Picture taken October 24, 1963.

Table 1.--Effects of stock plant age on speed, quality, and quantity of growth of carnation cuttings. Planting date, August 17, 1963, final harvest date, March 29, 1964. Part I, Experiment II.

Age of stock plants	Number of plants in average	Number of days from planting to pinching	Number of axillary shoots per plant after pinching	Number of cut flowers per plant	Mean grade of cut flowers	Fresh weight per residual plant (g)
4 months	60	27.3**	6.47	5.91**	4.38	458.8**
18 months	60	34.8	6.37	4.95	4.23	340.4

Treatment	Number of plants in average	Number of buds per plant	Number of cut flowers plus buds per plant	Number of days to midpoint of crop	Number of axillary shoots per residual plant
<u>Age of stock plants</u> <sup>2/</sup>					
4 months	60	5.58**	11.50**	32.5**	15.30**
18 months	60	2.97	7.91	44.0	11.67
<u>Varieties</u> <sup>3/</sup>					
Red Gayety	60	5.28**	10.77**	38.8	13.67
White Pikes Peak	60	3.27	8.64	37.8	13.35

\*\*Significant at the 1 per cent level, analyses of variance used.

<sup>1/</sup> Each value represents combined means of Red Gayety and White Pikes Peak for 2 blocks.

<sup>2/</sup> Combined means of Red Gayety and White Pikes Peak for 2 blocks.

<sup>3/</sup> Combined means of cuttings from 4 and 18 month-old stock plants.

## Cuttings Sized by Weight

Cuttings of equal weight (Figure 3) were taken from 2 clones each of Red Gayety and White Pikes Peak and from 7 and 21-month-old stock plants on October 22, 1963. Due to space limitations, only 28 cuttings from young stock plants and a like sample from old stock plants were planted in a single block on November 12. Rows of cuttings from old and young stock plants of each clone were planted side by side for comparison. Each row contained 7 plants, giving a plant spacing of 6 X 6 inches. With this method of sizing, cuttings from old stock plants had higher dry weight per cutting and a greater number of expanded leaves than those from young stock plants (Table 2).

Sample size was too small for statistical analysis; however cuttings from young stock plants matured earlier and produced more first-crop flowers of higher quality than cuttings from old stock plants (Table 2). By the end of the first crop, performance of cuttings from old stock plants sur-



Figure 2--From left to right, cuttings taken from young and old stock plants (each cutting contains 6 pairs of expanded leaves).



Figure 3--From left to right, cuttings taken from young and old stock plants (each contains the same fresh weight).

passed that of juvenile cuttings as indicated by the greater number of buds and axillary growths remaining after first-crop flowers were cut, and fresh weight per residual plant. This was due to the fact that all first-crop flowers from juvenile cuttings were removed at the arbitrary point when first-crop flower production was considered finished: whereas, at this time, cuttings from old



Figure 4--Growth of cuttings from young and old stock plants after 9 weeks of growth. Plants on outside rows are from young stock plants.

Table 2.--Effects of stock plant age on size of cuttings and performance of these cuttings after planting. Planting date, November 12, 1963, final harvest date, June 7, 1964. Part II, Experiment II.

Measurements on cuttings	Age of stock plants		Varieties	
	7 months	21 months	Red Gayety	White Pikes Peak
Fresh weight per cutting (grams)	7.20	7.12	6.96	7.35
Dry weight per cutting (grams)	1.18	1.29	---	---
Per cent dry matter	16.40	18.10	---	---
Number of expanded leaves per cutting	5.04	6.78	5.76	6.06
<u>Growth of cuttings after planting</u>				
Number of cut flowers per plant	4.28	3.28	4.32	3.25
Mean grade of cut flowers	4.55	4.48	4.47	4.56
Number of buds per residual plant	2.75	3.25	3.24	2.75
Number of flowers produced plus buds after harvest	7.03	6.53	7.56	6.00
Number of days to midpoint of crop	27.50	31.30	26.80	32.00
Number of axillary shoots per residual plant	6.78	7.64	6.68	6.74
Fresh weight per residual plant (grams)	259.20	266.10	279.20	245.10

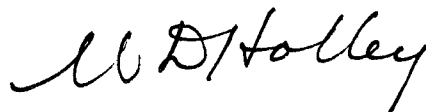
stock plants were only partially harvested. Probably the most accurate, single measurement of growth that occurred up to the time the first crop of flowers was cut was the number of buds remaining after harvest. It is apparent from Table 2 that, although cuttings from old stock plants had higher dry weight and percent dry matter, there was 7.1 percent decrease in the number of buds and flowers when compared to juvenile cuttings.

Varietal differences found in this part of the study were similar to those found in the previous experiment. Red Gayety grew faster, even though initial fresh weight and number of expanded leaves were greater for White Pikes Peak cuttings, indicating differences in growth potential for the two varieties.

## Literature Cited

1. Furuta, T. and D. C. Kiplinger. 1955. Chronological age of cuttings, a factor influencing the spray formation of pompon chrysanthemums. Proc. Am. Soc. Hort. Sci. 66:383-385.
2. Gardner, F. E. 1929. The relationship of tree age and the rooting of cuttings. Proc. Am. Soc. Hort. Sci. 26:101-104.
3. O'Rourke, F. L. 1944. Wood type and original position on shoot with reference to rooting in hardwood cuttings of blueberry. Proc. Am. Soc. Hort. Sci. 45:195-197.
4. O'Rourke, F. L. 1951. The effect of juvenility on plant propagation. Proc. Plant Propagators Soc. 1:33-37.

Your editor,



COLORADO FLOWER GROWERS ASSOCIATION, INC.  
OFFICE OF EDITOR  
W. D. HOLLEY  
Colorado State University  
Fort Collins, Colorado 80521

FIRST CLASS