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Effects of Carbon Dioxide During Growth on Vase Life of Greenhouse Roses *(Rosa hybrida)*[1]

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Abstract. Vase life and floral characteristics were studied for *Rosa hybrida* (cvs. Forever Yours, Briarcliff Supreme, Red Garnette, and Rose Elf) flowers grown in atmospheres containing 300 ± 200, 1000 ± 300, and 2000 ± 500 ppm CO_2 for at least half of the daylight hours. Only 'Red Garnette' flowers grown in CO_2-supplemented air had significantly longer vase life (one-half day) than those produced in normal atmospheres.

Rosa hybrida plants grown in CO_2-supplemented atmospheres have produced more and higher quality flowers (1,2,3,4,) with no reported increases in vase life. Shaw and Rogers (4) found that vase life of 'Red Bird' roses was reduced by one-half day when flowers were produced in CO_2-enriched atmospheres ranging from 650 to 1100 ppm. This study examined the influence of CO_2-enriched atmospheres during growth on vase life and other characteristics of four rose cultivars.

Two-year-old plants of 'Forever Yours', 'Briarcliff Supreme', 'Red Garnette', and 'Rose Elf' were grown in 300 ± 200, 1000 ± 300, and 2000 ± 500 ppm CO_2 atmospheres maintained for at least half the daylight hours throughout the study period. Temperatures of 60°F nights and 70 to 75° days were maintained. Recommended cultural practices were followed.

Cut flower samples of each cultivar were randomly selected from each atmospheric CO_2 level on 11 biweekly dates extending from January to May, 1968. Each sample of ten cut flowers was randomly selected from the production of 36 plants.

Flower stems were cut in the morning, placed in tap water containing no floral preservatives, and held overnight at 40 ± 2°F. The following morning hybrid tea stems were shortened to 18 inches measuring from the top of the bud; floribunda stems were shortened to nine inches. Vase life was determined at 70 ± 5°F in 25 ft-c of incandescent light for 14 hours per day. Data, including dry weights, were recorded after fully opened flowers began to wilt.

Vase life of 'Red Garnette' flowers produceed in CO_2-enriched atmospheres was significantly longer (one-half day) than that of flowers grown in normal atmospheres (Table 1). Vase life of 'Forever Yours', 'Briarcliff Supreme', and 'Rose Elf' flowers was not altered by production in CO_2 supplemented atmospheres.

Dry weight of 'Forever Yours' flowers grown in 2000 ± 500 ppm CO_2 was significantly greater than that of flowers produced in normal CO_2 atmospheres (Table 1). Dry weights of the other cultivars were not altered.

Petal numbers, leaf types, and other floral characteristics were also studied to determine if CO_2-enriched atmospheres induced morphological changes in roses. Modifications which did occur, such as leaflet types (Table 1), were usually not correlated with vase life. Genotype and other endogenous factors appear to be of greater significance in determining vase life.

Table 1. Vase life and characteristics of greenhouse rose cultivars grown in normal and CO_2-enriched atmospheres. Each mean is based on a sample size of 110 cut flowers.

Daytime greenhouse CO_2 level (ppm)	Hybrid tea		Floribunda	
	Forever Yours	Briarcliff Supreme	Red Garnette	Rose Elf
Vase life (days)				
300 ± 200	6.58a[z]	5.60a	6.94b	5.72a
1000 ± 300	6.76a	5.50a	7.41a	5.94a
2000 ± 500	6.88a	5.57a	7.47a	5.99a
Total dry weight (g)				
300 ± 200	56.8 b	40.8 a	18.4 a	17.4 a
1000 ± 300	63.5 ab	41.6 a	18.4 a	17.7 a
2000 ± 500	66.6 a	42.4 a	18.7 a	18.0 a
Single and trifoliolate leaves (no. per stem)				
300 ± 200	2.22 b	2.42 bc	2.85 a	1.21 b
1000 ± 300	2.44 a	2.61 b	3.01 b	1.56 a
2000 ± 500	2.51 a	2.83 a	2.96 b	1.49 a
Five- and 7-leaflet leaves (no. per stem)				
300 ± 200	4.68a	3.74a	3.74a	2.39a
1000 ± 300	4.44b	3.52b	3.18b	1.80b
2000 ± 500	4.46b	3.26c	3.27b	1.85b

[z]Means in columns not having letters in common are significantly different at 5% level. (Duncan's Multiple Range Test).

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