

# Decreasing Water Loss of Cut Roses with Abscisic Acid<sup>1</sup>

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**Abstract.** Abscisic acid (ABA) concn as low as 1 ppm, when added to the vase water, effective by reduced water loss of cut roses.

The vase life of roses often is reduced by water stress characterized by wilting of leaves and flowers, neck droop, and incomplete bud opening (3, 4). Such water stress represents the difference between the rate of water uptake and the rate of water loss. Data of several workers, but particularly Durkin (1), have shown that the resistance of stems of cut roses to water flow rises markedly soon after they are cut. However, roses can cope with this increased resistance (4) if water loss, most of which occurs through the leaves (Table 1), is minimized.

Recognized ways to reduce water loss of cut roses are minimization of leaf surface, maintaining flowers in an environment conducive to low water loss, and use of sugar in the vase water. Attempts to reduce transpiration by wax and plastic coatings have not proved practical. Preliminary trials using phenyl mercuric acetate, a stomate-closing chemical, were unsuccessful since leaf injury was caused at concn below that effective in closing stomates. More recently it has been reported that ABA closed stomates (2).

In Oct. 1971 studies were started to determine if ABA added to the vase water would lower the rate of water loss of roses. Experiments were carried out in an air conditioned laboratory at 22°C with continuous lighting (140 ft-c as measured on a Weston uncorrected light meter) from cool white fluorescent lamps.

In the initial experiment where water uptake of individual leaves was measured ABA effectively decreased water use (Table 2). Further, wilting of the untreated leaves after 24 hr and

**Table 1.** Water use of cut rose 'Forever Yours' for 5 days when treated to reduce water loss.

Treatment <sup>z</sup>	Water use <sup>y</sup> (ml/flower)
Control	114.8
Leaves removed	19.1
Covered with plastic bag	13.4

<sup>z</sup>Vase water was deionized water containing 25 ppm silver nitrate.

<sup>y</sup>Avg of 4 replications.

**Table 2.** Water use in 24 hrs by individual rose leaves receiving ABA in deionized vase water.

ABA treatment (ppm)	Water use <sup>z</sup> (ml/leaf)
0	2.36
10	0.66
100	0.30

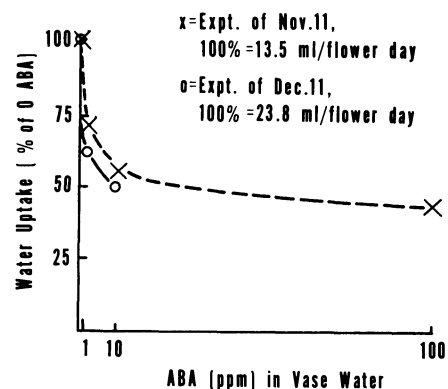
<sup>z</sup>Avg of 3 replications.

delayed wilting of the treated leaves until 72 hr indicated that the reduced uptake was due to lowered water loss rather than increased resistance to water movement.

On Nov. 11, ABA in the vase water of cut 'Forever Yours' roses reduced water uptake by up to 50% (Fig. 1). It was observed that: flowers receiving no ABA (controls) opened partially or not at all and became purplish; flowers receiving 1 ppm ABA opened fully (except for 1 flower which opened partially), did not become as purplish as the controls, and lasted about 2 days longer than the controls; flowers receiving 10 ppm opened fully, had a light purplish cast throughout and lasted no longer than the controls; flowers receiving 100 ppm were the first to open and opened fully, wilted 1 day sooner than the controls, and were severely purplish.

A similar trial on Dec. 11 substantiated these findings (Fig. 1). In this latter trial, however, the flowers were harvested after 5 days and degree of hydration was measured as a ratio of fresh wt to dry wt. Ratios were 7.8/1.2=6.5 (control), 8.2/1.1=7.6 (1 ppm ABA), and 8.6/1.2=7.1 (10 ppm ABA) indicating superior water status of the flowers receiving 1 ppm ABA.

We conclude that: 1) ABA can be a useful material for reducing water loss of rose leaves; 2) the concn in the vase water should be ca. 1 ppm; 3) the material is immediately effective and, hence, is promising as a treatment by growers. A finding that 10 ppm in the vase water for 24 hr gave results similar to those of 10 ppm ABA continuously (respectively 64% water use of the control compared with 50%) suggests that a grower treatment which would carry through the life of the flower is possible.



**Fig. 1.** Water use of cut 'Forever Yours' roses for 5 days as a function of ABA in deionized vase water containing 25 ppm silver nitrate. Each point is the average of 4 replications.

## Literature Cited

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