

# Effect of Ethylene on Rose Growth

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'Forever Yours' roses, grown in 11" plastic containers, in gravel, were cut back on Jan. 1, 1974. On Feb. 20, the plants were placed in the CSU pollution chambers (C.F.G.A. Bull. 277). Three plants were placed in each one of the four chambers, and exposed to ambient, 100 ppb, 300 ppb, and 500 ppb ethylene, for 12 days. Visual observations were taken during the treatment period, and cane height before and after treatment was taken from 3 canes per plant.

Table 1. Visual observations of the effect of ethylene on rose growth.

| Length of treatment (days) | Concentration (ppb) | Visual observations  |
|----------------------------|---------------------|--|
| 2                          | 100                 | No visual damage   |
|                            | 300                 | Curling of young leaflets  |
|                            | 500                 | Curling of young leaflets  |
| 3                          | 100                 | Slight curling of young leaflets   |
|                            | 300                 | Apparent terminal bud abortion   |
|                            | 500                 | Terminal bud abortion; curling of some mature leaves   |
| 5                          | 100                 | Yellowing along veins of some mature leaves  |
|                            | 300                 | Yellowing along veins of mature leaves; some leaves completely blanched; noticeable growth retardation; only 2 buds visible (probably initiated before treatment); leaf abscission |
|                            | 500                 | Leaf yellowing and drop more severe than 300; no buds; growth retardation; some leaves blanched  |
| 8                          | 100                 | Some leaf drop; canes noticeably shorter than control  |
|                            | 300                 | About 40% defoliation; lateral buds starting to swell  |
|                            | 500                 | About 75% defoliation; lateral buds along new and old growth swelling and elongating   |
| 12                         | 100                 | Only slight defoliation; definite growth reduction   |
|                            | 300                 | About 70% defoliation; canes shorter than 100  |
|                            | 500                 | About 97% defoliation; canes shorter than 300; some new lateral growth showing 2-3 leaves  |

Observations during ethylene treatment are described in Table 1. The earliest noticeable ethylene symptom was curling of the young leaflets at 300 and 500 ppb. With further exposure, at 300 and 500 ppb, the terminal buds aborted along with yellowing of the veins of mature leaves, leaf drop, and initiation of side breaks. At 100 ppb, the leaf yellowing and dropping was much less severe than at 300 and 500 ppb. There was no bud abortion at 100 ppb, but the canes were definitely shorter than the controls. Fig. 1 depicts typical ethylene symptoms on roses, although leaf yellowing is not well demonstrated. Table 2 shows the effect of ethylene on cane length.

Table 2. Average rose cane length before treatment and after ethylene treatment for 12 days.\*

| Concentration | Average length (cm) before treatment | Average length (cm) after treatment |
|---------------|--------------------------------------|-------------------------------------|
| Control       | 27.4                                 | 61.8                                |
| 100 ppb       | 28.4                                 | 51.3                                |
| 300 ppb       | 27.7                                 | 35.7                                |
| 500 ppb       | 24.4                                 | 26.5                                |

\*Three canes per plant were marked and measured. There were 3 plants per chamber giving an average of 9 canes per treatment.

<sup>1</sup>Graduate Research Assistant supported in part with funds provided by the Fred C. Glockner Foundation and the Colorado Flower Growers' Assoc.



Figure 1. Effect of ethylene on roses:

- Upper left:* Roses after 12 days in control chamber, exposed to ambient ethylene levels in outside air (10-30 ppb). Average height: 61.8 cm.
- Upper right:* Roses exposed to 100 ppb ethylene for 7 days. Leaflet at bottom center of photograph showing typical yellowing along the mid-vein, prior to leaf drop. Average height after 12 days: 51.3 cm. Note abnormal curling of leaves at top of canes.
- Lower left:* Roses exposed to 300 ppb ethylene for 7 days. Curling of young leaves very evident, some leaf drop and flower bud abortion. Average height after 12 days: 35.7 cm.
- Lower right:* Roses exposed to 500 ppb ethylene for 12 days. Almost complete defoliation and flower bud abortion. New lateral growths are visible on the lower canes to the left in the photograph. Average height after 12 days: 26.5 cm. Almost no elongation during the 12 day exposure period.

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OFFICE OF EDITOR  
W. D. Holley  
Colorado State University  
Fort Collins, Colorado 80521

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