Effect of Ethylene on Carnation Growth: Part 11

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In CFGA Bull. 288, it was mentioned that ethylene produces a "shrubbiness" on carnation plants. This article gives further evidence of the cause of the "shrubby" effect, and an account of ethylene's effect on non-Sim carnation cultivars.

Methods

CSU Red carnation plants, at "rapid elongation" and "bud initiation," were treated with 100, 300, and 500 ppb ethylene from 1/22/74 to 1/25/74 (CFGA Bull. 277). Corsica, Caribe, and Capri carnation plants, at approximately "rapid elongation," were subjected to the same concentrations for one week (1/29/74-2/5/74). The following data was taken at harvest; 1) stem length (average of 3 stems/plant, from origin to middle of bud or flower); 2) number of laterals (between 4 and 20 inches from the stem origin), and;

3) lateral length (random selection of 3 breaks/plant, from origin to top of break).

Results

The "rapid elongation" stage showed an upward trend in the number of laterals at 300 ppb and 500 ppb C_2H_4 (Fig.1.) The increase in the number of laterals at the "bud initiation" stage was statistically different from the control at 300 ppb and 500 ppb (Fig. 1.) There was no significant effect on lateral length. It appears that low ethylene dosages causes node stacking. Thus, with an increased number of nodes in a given stem section there are more potential breaks. Ethylene causes growth initiation of all potential breaks at the nodes during treatment.

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Putting the concentrations used for 3 days on a dosage basis: 1) 100 ppb for 3 days = 300 ppb-days, 2) 300 ppb for 3 days = 900 ppb-days, and 3) 500 ppb for 3 days = 1500 ppb-days. With a constant ambient C_2H_4 level of 50 ppb, a dosage of 1500 ppb-days would be reached in 30 days.

The results of ethylene's effect on the non-Sim cultivars Corsica, Caribe, and Capri, were similar to those found with CSU Red (Bull. 288). A concentration of 500 ppb for 1 week was necessary to cause marked stem shortening with all three cultivars (Fig. 2). The fact that the stem reduction at 500 ppb with Capri appears to be less severe than with Corsica and Caribe is probably due to plant growth variation and to Capri's shorter growth habit. As was demonstrated with CSU Red (Fig.1), an upward trend in the number of laterals also occurred with the non-Sim varieties (Fig. 3).

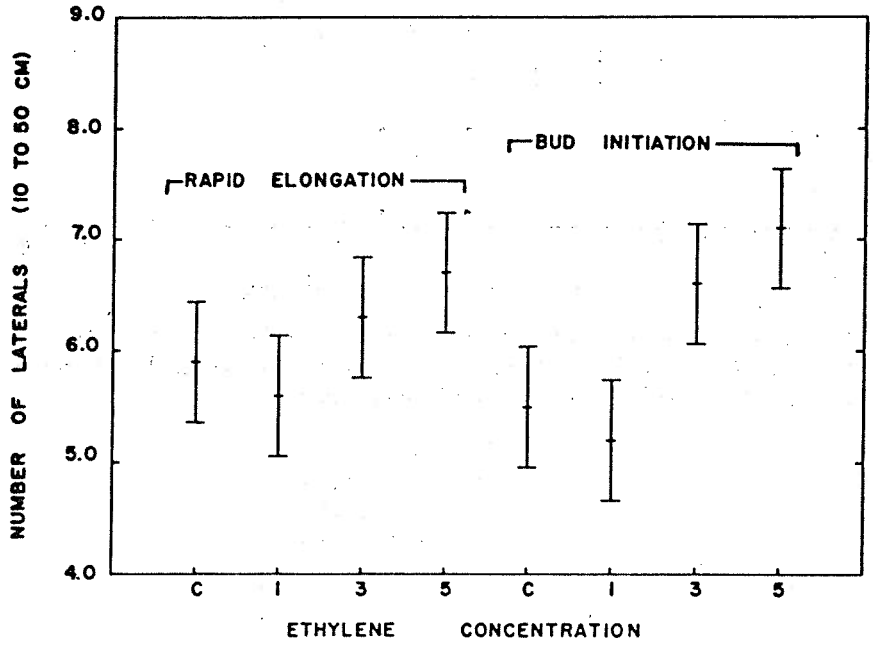

Figure 1. Effect of 3-day ethylene treatment (1/22/74-1/25/74) on the number of laterals between 4 and 20 inches from the stem origin. Red Sim plants were treated at: 1) "rapid elongation" and 2) "bud initiation." Means with an "honestly significant difference" (hsd) half confidence width are plotted. If half width bands do not overlap, the treatment means are significantly different at the 5% level.

C = control
1 = 100 ppb ethylene
3 = 300 ppb ethylene
5 = 500 ppb ethylene

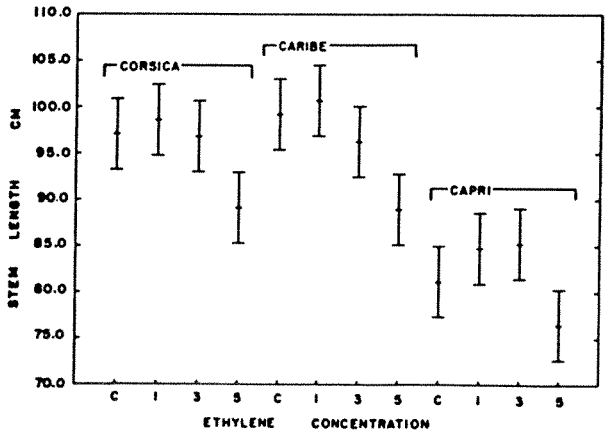

Figure 2. Effect of 1-week ethylene treatment (1/29/74-2/5/74) on carnation stem length using the non-Sim cultivars: 1) Corsica, 2) Caribe, and 3) Capri. Capri is a shorter variety. The plants were treated at approximately "rapid elongation."

C = control
1 = 100 ppb ethylene
3 = 300 ppb ethylene
5 = ppb ethylene

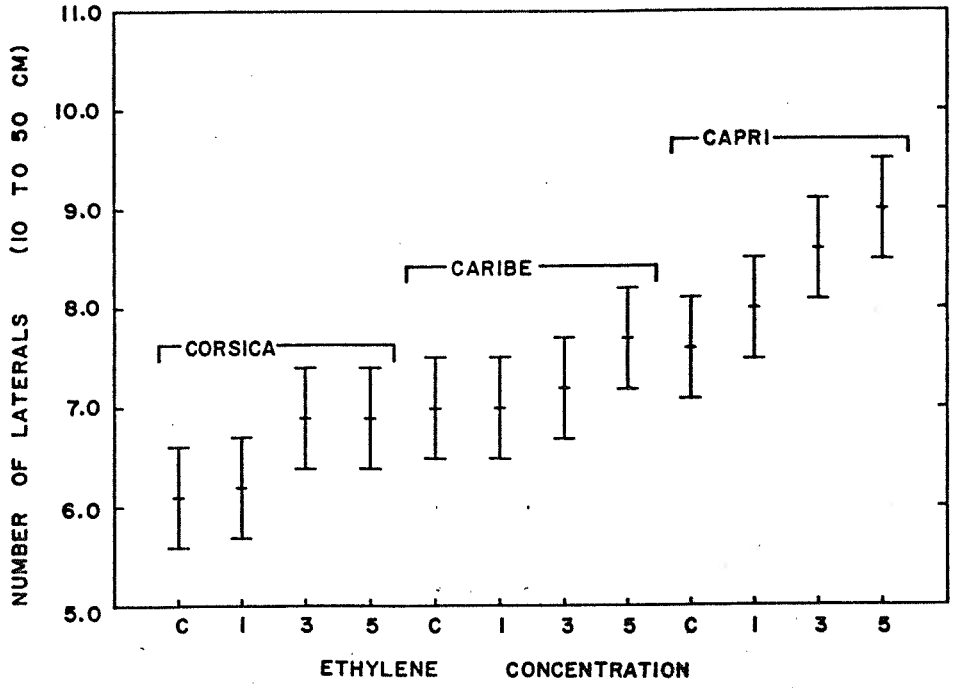

Figure 3. Effect of 1-week ethylene treatment (1/29/74-2/5/74) on the number of laterals between 4 and 20 inches from the carnation stem origin. The non-Sim cultivars, 1) Corsica, 2) Caribe, and 3) Capri, were used.

C = control
1 = 100 ppb ethylene
3 = 300 ppb ethylene
5 = 500 ppb ethylene

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