Spray Carrier Volume Effects on XE-1019 and Chrysanthemums

D. A. Bailey

ABSTRACT

Plants of Chrysanthemum morifolium Ramat. 'Ovaro' received 0, 102, 204, 306, or 408 ml·m^{-2} of 0, 40, 20, 13.3, and 10 mg·liter^{-1} XE-1019, respectively. No treatment affected time from start of short days to bloom or inflorescence display diameter. All XE-1019 treatments resulted in shorter plants than controls did. No carrier volume effect on plant height was observed. The inflorescence height range per pot decreased with increasing carrier volume. The greater inflorescence height uniformity achieved with the high carrier volume is beneficial and warrants further investigation.

INTRODUCTION

Height control is a crucial part of potted chrysanthemum production. Producers differ in application techniques for chemical growth retardants. With most chemicals currently used, little variability in plant response is observed with differences in application volumes. However, XE-1019 is a highly active chemical, applied at relatively low doses. Therefore, this experiment was conducted to examine the possible effects of spray carrier volume on the efficacy of XE-1019.

MATERIALS AND METHODS

Rooted cuttings of Chrysanthemum morifolium Ramat. 'Ovaro' were potted 5 per 15.2 cm diameter pot on 5 April 1988. The growth medium consisted of a 1 soil: 2 sphagnum peat: 2 perlite (by volume) mixture amended with 890g treble superphosphate, 593 g potassium nitrate, 593 g magnesium sulfate, 4.75 kg ground dolomitic limestone, and 74 g Frit Industries Trace Elements No. 555 (Peters Fertilizer Products, W.R. Grace & Co., Fogelsville, Pa.) per cubic meter. The plants were fertilized at each watering with 300 mg·liter^{-1} each of N and K supplied from 776 and 550 mg·liter^{-1} of potassium nitrate and ammonium nitrate, respectively. Fertilizer solution was maintained at 6.0 pH by injecting 75% (w:w) technical grade phosphoric acid into the system, supplying 37 mg·liter^{-1} P at every watering.

Plants were maintained vegetative by the use of incandescent lights from 2200 to 0200 HR daily from 5 April 1988 to 12 April 1988 at which time photoperiods were reduced to 8 hours per day. All plants received a soft pinch, removing the apex and surrounding immature leaves on 17 April 1988. The newly arising shoots were allowed to develop to 4 cm in length prior to growth retardant applications.

Foliar sprays of XE-1019 were applied 2 May 1988. Plant canopies (per pot) averaged (± SD) 16.7 ± 1.1 cm in height and 32.9 ± 1.6 cm in diameter at time of spray. The canopy height was measured from the soil surface to the average tallest point per pot. Canopy diameter was the average diameter for each pot. Spray treatments used were 102, 204, 306, and 408 ml·m^{-2} of 40, 20, 13.3, and 10 mg·liter^{-1} XE-1019, respectively. Each treatment was applied to 10 pots; 10 pots received no growth retardant and served as a control for XE-1019 effectiveness.

The dose of XE-1019 received by each pot was calculated using the following equation:

dose received (μg per pot) = [area per pot receiving spray (cm^2)] X [spray treatment applied ($ml \cdot m^{-2}$)] X [spray concentration ($mg \cdot liter^{-1}$)] X [units conversion (0.0001)]

The area per pot receiving spray was calculated from the canopy diameter. Therefore, the each pot received approximately 347 μg a.i. XE-1019, regardless of the spray volume applied. The carrier volumes employed were derived from commercial recommendations that suggest applying chemical growth regulator sprays at 204 $ml \cdot m^{-2}$ (0.5 gal per 100 ft^2).

The plants were grown according to recommended commercial procedures as laterally disbudded plants. Data recorded included: days from start of 8 hour photoperiods to bloom; inflorescence height at bloom; inflorescence display diameter; and the inflorescence height range per pot. Pots were considered in bloom when more than 80% of the inflorescences were open and fully expanded. Inflorescence display diameter was taken as the average per pot. Inflorescence height at bloom was the average height from the soil surface to the inflorescence canopy. The inflorescence height range was calculated as the highest inflorescence per pot minus the lowest inflorescence per pot that was included in the primary inflorescence canopy.

RESULTS AND DISCUSSION

Treatments did not affect time from start of short days to bloom, and pots averaged (± SD) 49 ± 2 days to flowering. Carrier volume employed did not affect inflorescence height per pot, and plants receiving XE-1019 averaged 23.5 ± 1.3 cm in height at bloom. However, all XE-1019 treatments resulted in plants significantly shorter than controls (Figure 1). Inflorescence display diameter was not affected by XE-1019 or spray volume treatment, and pots averaged 38.0 ± 2.4 cm in diameter. The inflorescence height range per pot decreased linearly as carrier volume increased (linear effect significant at $\alpha \leq 0.001$) (Figure 2).

The lowest carrier volume resulted in a larger height range than pots receiving no XE-1019, while the highest carrier volume treatment resulted in a smaller height range than the controls (Figure 2). The greater uniformity achieved with the 408 $ml \cdot m^{-2}$ carrier volume warrants further investigation. If this effect is real, it may be desirable to apply XE-1019 in a larger carrier volume to decrease height variability within pots.

Fig. 1. Inflorescence height.

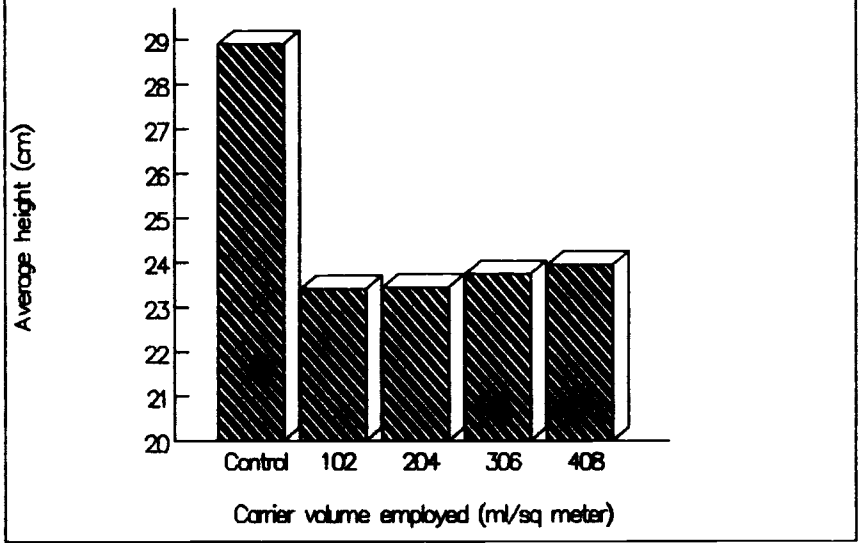

Fig. 2. Inflorescence display diameter.