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THE OPTIMUM GROWTH STAGE OF DWARF CARNATION FOR EFFECTIVE SUMAGIC APPLICATION

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Spray applications of 5, 15 and 30 ppm a.i. Sumagic® significantly inhibited elongation of the dwarf carnation 'Lindsey' when applied at any time from pinch to 13 weeks later. The best treatment was 15 ppm sprayed during weeks 4 through 9 following the pinch when lateral shoots were 2 to 4 inches long. Treated plants were visually more compact with darker foliage than untreated carnations.

Introduction

A dwarf type *Dianthus caryophyllus L.*, Colorado Majestic Mountain carnation series (CMMS), was introduced in 1987. Even though the CMMS carnations are naturally dwarf, several experiments have been conducted to determine if the application of plant growth retardants will provide shorter, more compact plants and thus satisfy the requirements of a mini pot plant having a height ranging from 6 to 7 inches (10). Sumagic@, an experimental growth retardant developed by Sumitomo Chemical Company and marketed in the United States by Valent, a Chevron/Sumitomo Corporation, was one of the growth regulators evaluated. Sumagic@ when applied as foliar spray or soil drench has been found to be very effective in inhibiting shoot growth and promoting compactness of several plant species grown in low light conditions. Researchers recently reported that Sumagic@ significantly restrained the growth of many bedding plant species (2, 4, 6, 7). It also has been used to control shoot growth of some flowering pot plant species including *Euphorbia pulcherrima* (5, 7), *Pelargonium hortorum* (7, 8, 9), *Dendrothema morifolium* (1, 9) and *Eustoma grandiflorum* (3).

An experiment was designed to determine the best stage of plant development for a single application of Sumagic in order to achieve an aesthetically pleasing dwarf carnation pot plant.

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Materials and Methods

Rooted cuttings of dwarf carnation 'Lindsey' were planted in 4 inch azalea pots containing a 1 soil, 3 sphagnum peat, 2 No. 6 perlite (v:v:v) medium and spaced at a density of 4 plants per sq.ft. on 21 December 1987. They were grown in a fiberglass covered greenhouse heated to 54 F at night, 60 F day, and cooled at 65 F, and watered with a continuous feed (11) program. One week after planting, 29 December 1987, the upper six nodes of the main vegetative shoot of each plant was removed (pinched) leaving three to four leaf pair on the remaining plant. Following the pinch, the plants with developing vegetative shoots were divided into 42 groups of five pots each in a design for retardant applications by concentration and date. A single foliar application of 5, 15, or 30 ppm a.i. Sumagic@ was made to three groups per week. The first application was one week after the pinch, and subsequent applications followed at weekly intervals. Control (0 Sumagic@) plants were sprayed with pure water. All the treatments were sprayed until plants were thoroughly covered with the spray solution.

The length of lateral shoots, flower diameter and time to flowering were recorded on week 16 when the first flower was fully open and at least two buds were showing color.

The responses were analyzed as a two factor (concentration-by-week) randomized design, although the arrangement of pots on the bench was, for ease of treatment application, systematic. The bench was 3.5 ft by 16 ft. The environment appeared uniform. The concentration-by-week interactions were compared using LSD (Least

Significant Difference). The trend due to weekly applications was described by a three-week moving mean.

Results

Sumagic@ spray application of 5, 15 and 30 ppm a.i. significantly reduced the height of the dwarf carnation 'Lindsey' when applied during any week in its growth stage from the pinch to 13 weeks later (**Fig. 1**).

There were differences in height due to concentration and week. The degree of difference due to concentration depended on the week of application.

Applications of 5 ppm a.i. Sumagic@ did not achieve the desired restriction in plant height for any treatment week. The greatest reduction in plant height was achieved with 30 ppm a.i. applications during week 4 through 8, however, the plants were shorter than the desired. Application of 30 ppm a.i. during week 2, 3, 9 and 10 following the pinch, provided plants within the desirable height range of 6 to 7 inches. Application of 30 ppm a.i. Sumagic@ during week 11, 12 and 13 were not effective in achieving the desired plant height. The most effective concentration for controlling the height of 'Lindsey' was 15 ppm a.i. sprayed during week 4 through 9 of plant development following the pinch (**Fig. 2**). Earlier or later applications did not provide a desirable height. Flower diameter and number of nodes on all Sumagic treated plants did not differ from the control. The foliage of Sumagic treated plants was visually darker than the untreated plants.

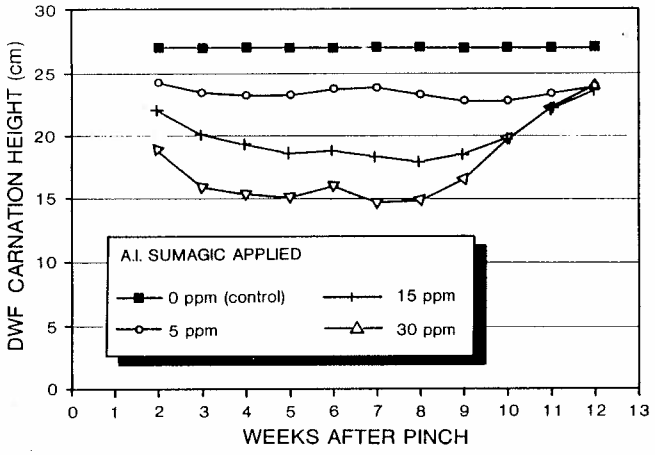

Fig. 1: Smoothed curves of final heights of dwarf carnation 'Lindsey' treated with a single application, involving three Sumagic concentrations, applied at weekly plant growth stages.

Fig. 2: Fully flowered Colorado Majestic Mountain™ carnation 'Lindsey' treated with 15 ppm a.i. Sumagic 10 weeks following the pinch (R) compared to an untreated plant (L).

Conclusion

Sumagic was an effective growth retardant for dwarf *Dianthus caryophyllus* 'Lindsey' when applications were applied at higher concentrations than 5 ppm a.i. but lower than 30 ppm a.i. The developmental stage of the plants at the time of the foliar application of growth retardant had a substantial influence on the efficacy of the treatment. Carnation plants sprayed when lateral shoots were 2 to 4 inches long, following the pinch, provided the greatest response to Sumagic@ for height reduction. The reduction of internodes (**Fig. 3**), darker foliage and resulting plant symmetry, due to proper Sumagic@ applications, provided a very aesthetically pleasing plant. Further studies are being conducted to determine the optimum amount of Sumagic to apply on dwarf carnations.

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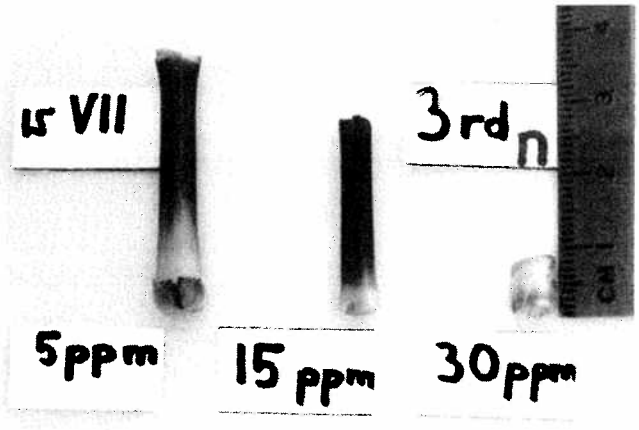

Fig. 3: Example of internode retardation (third internode below terminal flower) on comparable plants of dwarf carnation 'Lindsey' treated with three different Sumagic concentrations, seven weeks after being pinched.

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