Growth and Flowering Responses of *Matthiola incana* L. R. BR. to Paclobutrazol

Ron Ecker, Amalia Barzilay, Levy Afgin, and
Abd-elrahem A. Watah

Department of Ornamental Horticulture, Agricultural Research
Organization, The Volcani Center, POB 6, Bet-Dagan, 50 250, Israel

Additional index words. growth retardants, flower senescence

Matthiola incana is an annual-biennial ornamental crop, widely used throughout the world for fresh flowers and gardens. None of the cultivars is compact enough for use as a flowering potted plant. The objective of this study was to determine the effect of substrate drench with 1-(4-chlorophenyl)-4,4-dimethyl-2(1*H*-1,2,4-triazol-1-yl)pentan-3-ol (paclobutrazol) on the growth and flowering of potted *M. incana* seedlings.

We used 'Midget-red' (Takii's, Kyoto, Japan), an early flowering, short cultivar and 'Lavender' (Van-Egmond's, Leiderdorp, Holland), a late-flowering, medium-stature cultivar.

Seeds were sown in a plastic greenhouse on 18 Jan. 1991. Seedlings (20 days old) were potted in 12-cm-diameter (1.2-liter) pots, containing 2 coarse sand : 1 peat substrate (v/v). Plants were grown outdoors and fertigated daily with 50 mg N/liter from 20N-9P-16K. Both cultivars were treated with paclobutrazol 20 days after potting. 'Midget-Red' was at first-bud-appearance stage when treated, while 'Lavender' was vegetative. Paclobutrazol solutions were applied as a substrate drench, using 50 ml/pot that supplied 0.25, 0.5, or 2.0 mg paclobutrazol/pot. Control plants were not treated. Data taken included stem (below inflorescence) and inflorescence lengths and flowering date. The percentage of flowers senesced within each inflorescence (one inflorescence per plant) of 'Midget-Red' was recorded 30 days after the beginning of anthesis. The design included four replicates (single potted plants) for each treatment and four replicates for the control (untreated plants), arranged in four randomized blocks. Data were subjected to linear, quadratic, and cubic regression analyses (control plants were included as 0.0 mg paclobutrazol/pot).

Received for publication 3 Apr. 1992. Accepted for publication 17 Aug. 1992. Contribution from the Agricultural Research Organization, The Volcani Center, Bet-Dagan, Israel. No. 3370-E. 1991 series. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

The time from potting to flowering of 'Lavender' was prolonged by increasing the level of paclobutrazol (Table 1). The time of flowering of 'Midget-Red' was not influenced by paclobutrazol, apparently because treatments were applied after the appearance of flower buds. Paclobutrazol did not delay flowering of other plants (Cox and Keever, 1988; Hamada et al., 1990).

Increasing the dose of paclobutrazol reduced the stem length of 'Lavender' but not of 'Midget-Red' (Table 1). However, inflorescence length of both cultivars was reduced with increasing paclobutrazol doses (Table 1). A substrate drench of 0.5 or 2.0 mg/pot altered the entire plant morphology and structure (foliage and inflorescence) to a thicker and more compact plant (Fig. 1). Similar growth-retarding effects of paclobutrazol were reported for other plant species (Gilbertz, 1992; Hamada et al., 1990). Increasing the paclobutrazol level caused a decrease in the percentage of senesced flowers of 'Midget-Red' recorded 30 days after the onset of flowering (Table 1). A similar response was observed in 'Lavender' (data not shown). Halevy and Wittwer (1966) reported

Fig. 1. Representative potted plants of *Matthiola incana* 'Lavender' at full flowering stage, 53 days after treatment, with paclobutrazol applied by substrate drench: control (right), 0.50 mg/pot (center), 2.00 mg/pot (left).

that chloromequat and daminozide growth retardants delayed senescence in other flowers.

The present results indicate that paclobutrazol-treated *M. incana* potted plants with a compact inflorescence and prolonged post-production life are a potential new marketable product. A medium drench treatment of 0.5 mg/pot seems to produce the most commercially desirable plants.

Literature cited

- Cox, D.A. and G.J. Keever. 1988. Paclobutrazol inhibits growth of zinnia and geranium. *HortScience* 23:1029-1030.
Gilbertz, D.A. 1992. Chrysanthemum response to timing of paclobutrazol and uniconazole sprays. *HortScience* 27:322-323.
Halevy, H.A. and S.H. Wittwer. 1966. The effect of growth retardants on longevity of vegetables, mushrooms and cut flowers. *Proc. Amer. Soc. Hort. Sci.* 66:582-590.
Hamada, M., T. Hosoki, and T. Maeda. 1990. Shoot length control of tree-peony (*Paeonia suffruticosa*) with uniconazole and paclobutrazol. *HortScience* 25:198-200.

Table 1. Effects of substrate drench of paclobutrazol on growth and flowering of an early flowering ('Midget-Red') and late-flowering ('Lavender') cultivar of *Matthiola incana*.

Cultivar and paclobutrazol applied (mg/pot)	Days from potting to flowering	Stem length (cm)	Inflorescence length (cm)	Flowers senesced after 30 days (%)
Lavender				
0.00	47.5	21.8	16.5	
0.25	47.2	8.0	17.0	
0.50	56.3	5.4	9.3	
2.00	70.8	4.2	1.5	
Linear reg.	***	***	***	
Quadratic reg.	NS	***	NS	
Cubic reg.	NS	**	NS	
Midget-Red				
0.00	31.7	10.5	14.7	67.0
0.25	31.2	12.0	6.5	12.5
0.50	32.5	12.4	5.6	8.7
2.00	32.0	11.5	2.7	0.0
Linear reg.	NS	NS	***	*
Quadratic reg.	NS	NS	**	NS
Cubic reg.	NS	NS	NS	NS

NS, *, **, ***Nonsignificant ($P > 0.05$) or significant at $P < 0.05$, 0.01, or 0.001, respectively.