

PGR's FOR PLANT HEIGHT OF *ACHILLEA* X 'CORONATION GOLD'

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Achillea ∞ 'Coronation Gold' is a widely-grown garden perennial with yellow flowers that bloom in early summer at a height of about 2 to 2° feet. *A. filipendulina*, one of the parents of this cultivar, has an obligate requirement for eight weeks of vernalization at 41EF followed by long photoperiods (>14 hours or night-break lighting) for complete flowering. *Achillea* ∞ 'Coronation Gold' responds in much the same way, but flower stems grow too tall in containers under greenhouse conditions for market acceptance, and therefore may benefit from plant growth retardants. This investigation was conducted to determine the plant growth retardant type, rate, and application timing required to produce a marketable greenhouse pot plant of *Achillea* ∞ 'Coronation Gold' grown in 6-inch pots in a greenhouse.

Methods

Vegetatively propagated offsets of *Achillea* ∞ 'Coronation Gold' grown in 72-celled flats were transplanted into 6-inch plastic pots containing Fafard 4-P potting mix. Plants were placed pot-to-pot in a plastic covered greenhouse with a heating set point of 62EF and ventilation at 78EF. Fertilization throughout the experiment was applied weekly at 150 parts per million (ppm) nitrogen using a 20-10-20 fertilizer. Plants were watered/fertilized when the medium appears dry, but before plants wilted. After seven weeks growth, all plants were placed in a walk-in cooler at 40EF for nine weeks. Incandescent light (60-Watt) was provided at a minimum of 10 foot candles for 24 hours per day and clear water was applied as needed while in the cooler.

After cooler treatment, plants were placed in a glass-covered greenhouse with a heating set point of 65EF, and ventilation at 76EF. Plants were provided long photoperiods beginning one week after removal from the cooler until the end of the experiment by lighting from 10:00 PM to 2:00 AM CST using a minimum of 10 foot candles from incandescent lamps (60-Watt). Plant growth regulator treatments were applied with a pressurized sprayer at a rate of 1 gallon per 100 square feet. B-Nine at 0, 2550, 5100, or 7650 ppm, Bonzi at 0, 32, 64, or 96 ppm, Royal Slo-Gro at 0, 450, 900, or 1350 ppm, or Sumagic at 0, 10, 20, or 30 ppm were applied two or four weeks at full concentration or two and four weeks using half concentration after removal from the cooler. After treatment, plants

were spaced on 12-inch centers on greenhouse benches.

Data recorded at the time of first open flower was flower date and the length of the five longest flower shoots. A flower head was defined as open when 90% of the florets had expanded yellow petals. Once all the flowering shoots on a plant were open, numbers of flowering and non-flowering shoots were recorded and a market quality rating (1=very poor; 2=poor; 3=average; 4=above average; 5=excellent) was assigned.

Results

There was no effect of application timing. All growth retardants resulted in decreased shoot length with increasing concentration except Royal Slo-Gro (Table 1). Applications of Royal Slo-Gro resulted in delayed flowering, highly variable shoot lengths and low market quality ratings. In addition, Royal Slo-Gro reduced the number of flowering shoots (data not shown), produced foliar chlorosis, and distorted flower heads. The highest rate of B-Nine, Bonzi, and Sumagic decreased shoot length by 32%, 19%, and 22% compared to untreated plants, respectively. The highest rate of B-Nine, Bonzi and Sumagic increased the time to flower by about four days compared to untreated plants while Royal Slo-Gro delayed flowering by more than 22 days. Market quality rating for plants treated with Royal Slo-Gro was low, averaging 2.0. Market quality rating increased with increasing concentration for B-Nine, Bonzi, and Sumagic with the highest rating, 3.6, given to Sumagic at 30 ppm.

B-Nine, Bonzi, and Sumagic at the highest rates resulted in sufficient shoot length control in *Achillea* ∞ 'Coronation Gold' to receive an average market quality ratings of 3.0 or higher (average and salable). A flowering delay of about four days would probably not be a significant problem in commercial application. However, labeled rates for Bonzi and Sumagic are well below the rates found effective in this study. It is probable that the cost of applying Bonzi or Sumagic at these high rates may be prohibitive. Therefore, B-Nine at 7650 ppm may be the most cost effective plant growth retardant to use for greenhouse production of *Achillea* ∞ 'Coronation Gold' grown in 6-inch pots in a greenhouse.

... Table 1 on next page.

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Table 1. Response of *Achillea* ∞ 'Coronation Gold' to spray applications of B-Nine, Bonzi, Royal Slo-Gro and Sumagic.

Growth retardant	Rate (ppm)	Days to flower	Flower shoot length (cm) ¹	Market quality rating ²
B-Nine	0	43	46.7	2.0
	2550	44	41.1	2.0
	5100	46	36.8	2.7
	7650	47	31.7	3.3
Bonzi	0	42	46.2	2.2
	32	43	43.7	2.3
	64	43	40.9	2.9
	96	46	37.4	3.0
Royal Slo-Gro	0	43	47.1	2.0
	450	58	44.2	2.0
	900	63	43.6	2.0
	1350	65	46.8	2.0
Sumagic	0	42	46.9	2.1
	10	44	42.7	2.3
	20	45	42.1	2.8
	30	46	36.4	3.6

¹ English Conversion 2.54 cm = 1 inch.

² Market quality Rating: 1=very poor; 2=poor; 3=average; 4=above average or 5=excellent.

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