More PGR Results With Achillea *'Coronation Gold'*

by J. Raymond Kessler, Jr and Gary J. Keever, Auburn University

Achillea x 'Coronation Gold' is a widely-grown garden perennial with yellow flowers that bloom in early summer at a height of about 21/2 feet. 'Coronation Gold' has an obligate requirement for 6 to 8 weeks of vernalization at 41°F followed by long photoperiods (>14 hours or night-break lighting) for complete flowering. Because control of flowering is know, 'Coronation Gold' has potential as a greenhouse pot crop, but flower peduncles grow too tall in small containers for market acceptance. Therefore, product quality may be improved by using plant growth retardants. Previously, we reported on results with B-Nine, Bonzi, Royal Slo-Gro, and Sumagic in controlling achillea plant height (Southeastern Floriculture 11 (3): 31-32). This investigation was conducted to investigate the rate and application timing of additional plant growth retardants to produce a marketable greenhouse pot plant of Archillea x 'Coronation Gold'.

Methods

Offsets of Achillea x 'Coronation Gold' were removed from vegetative stock plants and stuck in 6006-cell flats containing Fafard Germinating Mix. Offsets were rooted under intermitten mist in a shaded glass greenhouse under natural photoperiod with 85°F bottom heat. Rooted offsets were removed from mist after 19 days and placed in a plastic covered greenhouse with a heating set point temperature of 65°F and ventilation at 78°F. Offsets were transplanted to 4-inch round plastic pots containing Fafard 4-P 31 days after sticking and initially spaced pot-to-pot on a greenhouse bench for five weeks. Fertilization throughout the experiment was applied as a constant liquid fertilization consisting of 150 ppm nitrogen using a 20-10-20 with one clear water application per week to prevent soluble salts buildup. Plants were watered/fertilized when the medium appeared dry, but before plants wilted.

After eight weeks growth, all plants were placed in a walk-in cooler at 40°F for eight weeks of vernalization treatment. 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 vernalization, plants were placed in a glass covered greenhouse with a heating set point of 65°F and ventilation of 78°F. 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 10 foot candles from incandescent lamps (60-watt). Plant growth retardant treatments were applied as a spray one week after removal from vernalization as follows: B-Nine at 0, 2550, 5100, or 7650 ppm; B-Nine + Cycocel at 0+0, 1275+1534, 2550+1534 or 3825+1534 ppm, respectively; Bonzi at 0, 32, 64, 96, 128 or 160 ppm; Cutless at 0, 40, 80, or 120 ppm; Cycocel at 0, 767, 1534 or 2301 ppm; and Sumagic at 0, 11, 22, 33, 44 or 55 ppm. Plant growth retardants were applied with a pressurized C0˝ sprayer calibrated to 20 psi at a rate of 1/2 gallon per 100 square feet. After treatment, plants were spaced on 8-inch centers. Data recorded at the time of first open flower was flower date, shoot height, a market quality rating (1=very poor, unsalable; 2-poor, unsalable; 3=average, salable; 4=good, salable; 5=excellent, salable), and the length of the five longest lateral shoots.

Results

The highest rates of B-Nine, B-Nine+Cycocel, Bonzi, Cutless, Cycocel and Sumagic reduced peduncle length by 36%, 61%, 75%, 75%, 39% and 52% compared to untreated plants, respectively (Table 1). However, the highest rates of B-Nine, B-Nine+Cycocel and Bonzi increased time to flower by 5 days whereas Cutless, Cycocel and Sumagic did not have an appreciable effect. The high-

est rates of Bonzi, Cutless and Sumagic decreased flower size by 17%, 14% and 18%, respectively, whereas B-Nine, B-Nine+Cycocel and Cycocel did not have an appreciable effect, B-Nine and Cycocel had very little effect on market quality rating while increasing concentrations of B-Nine+Cycolcel increased market quality rating. Market quality rating increased with increasing concentration of Bonzi, Cutless, and Sumagic up to the middile of the treatment range and then declined at higher concentrations. Market quality ratings of 2.6 or higher were received by plants treated with B-Nine+Cycocel at 3825+1534 pm; Bonzi at 32, 64 and 96 ppm; Cutless at 40 ppm; and Sumagic at 11 and 22 ppm.

Bonzi and Sumagic at moderately high concentrations yielded adequate peduncle length control for acceptable quality 4-inch pots of Achillea x 'Coronation Gold'. However, the highest rates resulted in excessive stunting as indicated by the decrease in market quality ratings. B-Nine and Cycocel alone had only moderate effects on peduncle length and market quality rating but was considerably more effective in combination, indicating a synergistic effect. None of the treatments received market quality ratings greater that 3.0 because plants only had one to two flowering shoots and, therefore, were not full enough to warrant higher ratings. Further work needs to be done to increase the number of flowering shoot for a higher quality, 4-inch pot plant. A flowering delay of 3 to 5 days by several of the plant growth retardants would probably not be a significant problem in commercial application. These results provide growers with several choices of plant growth retardants for growing 'Coronation Gold' as a 4-inch pot crop in the greenhouse.

Table 1. Response of *Achillea* x 'Coronation Gold' to spray application of B-Nine, B-Nine+Cycocel, Bonzi, Cutless, Cycocel or Sumagic

Growth Retardant	Rate (ppm)	Shoot Height (cm)[1]	Flower Diameter (cm)1	Market Quality Rating[2]	Days to Flower
B-Nine	0	48.2	5.2	2.0	39
	2550	41.8	5.1	2.0	40
	5100	39.8	5.1	2.0	41
	7650	31.0	5.0	2.1	44
B-Nine+Cycocel	0	47.9	5.3	2.0	39
	1275+1534	32.3	5.2	2.1	40
	2550+1534	27.0	5.1	2.4	43
	3825+1534	18.8	4.9	2.8	44
Bonzi	0	47.6	5.4	2.0	39
	32	30.1	5.3	2.6	39
	64	20.5	4.7	3.0	42
	96	17.7	4.7	2.9	42
	128	12.3	4.6	2.3	42
	160	11.9	4.5	2.3	43
Cutless	0	45.2	5.0	2.0	40
	40	16.1	4.5	2.6	41
	80	13.4	4.5	2.4	42
	120	11.3	4.3	2.0	43
Cycocel	0	49.1	5.2	2.0	38
	767	40.8	5.1	2.0	40
	1534	37.6	5.0	2.2	41
	2301	30.0	4.9	2.3	41
Sumagic	0	48.4	5.6	2.0	40
	11	29.5	4.9	2.6	41
	22	26.0	4.7	2.9	41
	33	26.3	4.7	2.4	40
	44	25.6	4.6	2.3	41
	55	23.1	4.6	2.2	42

[1] English Conversion 2.54 cm = 1 inch.

[2] Quality Rating: 1=very poor, unsalable; 2=poor, unsalable; 3=average, salable; 4=good, salable; 5=excellent, salable.