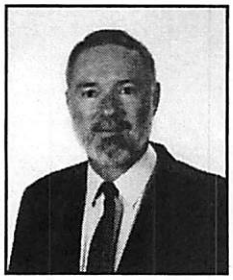
USING PLANT GROWTH RETARDANTS TO PRODUCE *COREOPIS VERTICILLATE* 'MOONBEAM' AS A GREENHOUSE CROP

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



Coreopsis verticillata 'Moonbeam' is a late spring to early summer blooming herbaceous perennial with no vernalization requirement, but an obligate requirement for long photoperiods (>14 hours or nightbreak lighting) to flower. Because vegetative growth and flowering can be controlled using photoperiod, it may be possible to develop the plant as a greenhouse pot crop. However, *Coreopsis* may grow too tall in small containers under greenhouse conditions for market acceptance, and therefore may benefit from plant growth retardants. This study was conducted to determine the plant growth retardant type, application method, and rate required to produce a marketable greenhouse pot plant of *Coreopsis verticillata* 'Moonbeam' in 4-inch pots.

Methods

Terminal cuttings (.2.5 inches long) of *Coreopsis verticillata* 'Moonbeam' were removed from vegetative plants and stuck in 72-celled flats containing Fafard Germinating Mix. Cuttings were rooted using intermittent mist in a shaded glass greenhouse under natural photoperiod with 85EF bottom heat. Rooted cuttings were removed from mist after 27 days and placed in an unshaded glass greenhouse with a heat set point temperature of 65EF and ventilation at 78EF. All cuttings received a soft terminal pinch two days after removal from propagation. Cuttings were transplanted to 4-inch square pots containing Sunshine Mix 1 19 days after pinching, and initially placed pot-to-pot on a greenhouse bench. Fertilization throughout the experiment was applied as a constant liquid feed 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. All cuttings were sheared to 2.5 inches above the pot rim 13 days after transplanting.

Plant growth retardant treatments were applied 10 days after shearing. Long photoperiods were started the same day by lighting from 10:00 PM to 2:00 AM CST using a minimum 10 foot candles from incandescent lamps (60 Watt). Growth retardant treatments consisted of A-Rest drench at 0, 0.125, 0.25, or 0.375 mg a.i./pot; Bonzi drench at 0, 0.125, 0.25, or 0.375 mg a.i./pot; B-Nine spray at 0, 2550, 5100, or 7650 ppm; Bonzi spray at 0, 12, 24, 36, 48, or 60 ppm; Cutless spray at 0, 25, 50, 75, 100, 150, or 200 ppm; and Royal Slo-Gro at 0, 360, 720, 1080, 1440, or 1800 ppm. Foliar spray solutions were applied at a rate of ° gallon per 100 square feet using a pressurized CO_2 sprayer calibrated at 20 psi. Soil drench solutions were applied at two fluid ounces per pot. After treatment, plants were spaced on 8-inch centers. Data recorded at the time of first open flower was flower date, shoot height, growth index [(height + $width_1$ + $width_2$)/3 where $width_1$ was at the widest point, and $width_2$ perpendicular to $width_1$], 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

All growth retardants resulted in decreased shoot height, growth index, and lateral shoot length with increasing concentration except for Bonzi and Royal Slo-Gro sprays (Table 1, page 10). The highest rate of A-rest, Bonzi drench, B-Nine, and Cutless decreased shoot height compared to untreated plants by 36%, 30%, 21%, and 36%, respectively. Bonzi spray did not affect shoot height, growth index, or lateral shoot length while the highest rate of Royal Slo-Gro increased shoot height by 30% and lateral shoot length by 19% compared to untreated plants, but had no effect on growth index. A market quality rating of four or higher (good, salable) was given to plants treated with B-Nine at 5100 or 7650 ppm or Cutless at 150 or 200 ppm. Plants given a Bonzi drench received poor market quality ratings despite plant size reductions similar to those treatments receiving average or good ratings because of distorted lateral shoots with an unacceptable increase in branch angle. The highest rate of B-Nine and Royal Slo-Gro delayed flowering by an average of 5 and 16 days, respectively, compared to untreated plants. The increase in shoot height and lateral shoot length with increasing concentration of Royal Slo-Gro was possibly due to delayed flowering resulting in more time for vegetative growth.

When applied as a foliar spray both B-Nine and Cutless resulted in acceptable market quality plants of *Coreopsis verticillata* 'Moonbeam' when grown in 4-inch pots in the greenhouse. However, Cutless is not currently labeled for application to ornamentals. B-Nine was equally effective when applied at 5100 or 7650 ppm. However, the former concentration may be a better choice because it resulted in less flower delay (3 days compared to 5 days).

Table 1. (page 10) shows response to drench/spray application.

Table 1. Response of *Coreopsis verticillata* 'Moonbeam' to drench application of A-Rest or Bonzi or spray application of B-Nine, Bonzi, Cutless, or Royal Slo-Gro.

Growth retardant	Rate	Shoot height (cm)[1]	Growth index[2]	Lateral shoot length (cm)[1]	Quality rating[3]	Days to flower
			Drench (mg a.i. per pot)			
A-Rest	0	35.1	43.7	34.3	2.0	33
	0.125	27.8	71.6	27.9	2.0	33
	0.25	26.1	37.1	23.5	2.6	32
	0.375	22.4	31.0	19.7	3.1	33
Bonzi	0	34.4	48.1	34.4	2.0	33
	0.125	27.6	45.3	31.1	2.0	33
	0.25	24.9	40.4	29.4	2.0	33
	0.375	24.0	38.9	26.9	2.0	33
			Spray (ppm)			
B-Nine	0	32.7	43.7	30.5	2.0	34
	2550	28.2	33.6	23.3	3.4	37
	5100	25.9	29.4	20.6	4.1	37
	7650	25.9	29.0	20.4	4.1	40
Bonzi	0	33.0	46.1	33.1	2.0	33
	12	33.9	45.0	30.6	2.0	31
	24	33.6	45.7	30.3	2.0	32
	36	33.8	47.0	32.3	1.9	32
	48	30.7	45.7	32.3	2.0	33
	60	30.4	43.7	31.1	2.0	32
Cutless	0	33.9	48.0	33.4	2.0	33
	25	30.7	41.5	30.0	2.1	33
	50	27.9	38.1	24.1	2.3	32
	75	25.9	32.1	20.8	3.0	32
	100	23.8	31.5	20.6	3.4	32
	150	23.3	31.7	20.5	4.0	32
	200	21.7	29.7	16.8	4.1	32
Royal Slo-Gro	0	33.7	46.8	34.0	2.0	32
	360	39.2	44.0	34.3	2.0	42
	720	40.1	43.7	37.1	2.0	45
	1080	42.3	45.6	39.6	2.0	45
	1440	42.2	44.2	39.2	2.0	47
	1800	43.7	44.0	40.4	2.0	48

[1] English Conversion 2.54 cm = 1 inch.
[2] Growth Index = (height + $width_1$ + $width_2$)/3 in centimeters. $Width_1$ was at the widest point, and $width_2$ perpendicular to $width_1$.
[3] Quality Rating: 1=very poor, unsalable; 2=poor, unsalable; 3=average, salable; 4=good, salable; 5=excellent, salable.