

# APPLICATION TIMING of B-NINE and CUTLESS AFTER SHEARING AFFECTS GROWTH and FLOWERING of *Coreopsis verticillata* 'Moonbeam'

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*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 night-break lighting) to flower. Because vegetative growth and flowering can be controlled using photoperiod, it may be possible to develop *Coreopsis* as a greenhouse pot crop. However, it grows too tall in small containers under

greenhouse conditions for market acceptance, and therefore may benefit from plant growth retardants (PGR).

In previous work (Southeastern Floriculture 10(1): 9-10), we reported that several PGRs were effective in reducing shoot height and improving market quality rating of *Coreopsis* grown in 4-inch pots when applied 10 days after shearing. In a second study (data not presented), a different series of PGRs were tested, some in common with the previously reported study, with very poor results. In the case of the second study, PGR application was made one day after shearing rather than 10 days after shearing. We hypothesized that the timing of PGR application after shearing may have an impact on the effectiveness of treatments. Therefore, the purpose of this study was to determine the effects of application timing after shearing and concentration of B-Nine or Cutless applied as a foliar spray on plant size and flowering of *Coreopsis verticillata* 'Moonbeam.'

## Methods

Terminal cuttings (2.5 inches long) of *Coreopsis verticillata* 'Moonbeam' were removed from vegetative plants and stuck in 72-celled flats containing Fafard 3B. Cuttings were rooted using intermittent mist in a shaded glass greenhouse under natural photoperiod. Rooted cuttings were removed from mist, given a soft terminal pinch after 26 days and placed in an unshaded glass greenhouse with a 65° F heat set point and ventilation at 78° F. Cuttings were transplanted 21 days after removal from propagation to 4-inch square pots containing Fafard 3B, and initially placed pot-to-pot on a greenhouse bench. All cuttings were sheared to 2.5 inches above the pot rim 20 days after transplanting. Natural short photoperiods were maintained from propagation up to when plants were sheared. Long photoperiods were provided beginning the day of shearing by lighting from 10:00 PM to 2:00 AM CST using a minimum 10 foot candles from incandescent lamps (60 Watt). 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.

PGR treatments were B-Nine at 0, 2550, 5100 or 7650 ppm and Cutless at 0, 50, 100 or 150 ppm. The PGR treatments were applied at 0, 3, 6, Southeastern Floriculture, March/April, 2000

9, 12, or 15 days after shearing. Foliar spray solutions of the PGR were applied at a rate of 1/2 gallon per 100 square feet using a pressurized CO<sub>2</sub> sprayer set at 20 psi. Data recorded at the time of first open flower was flower date, shoot height, and market quality rating (1=very poor, unsalable; 2=poor, unsalable; 3=average, salable; 4=good, salable; 5=excellent, salable).

## Results

Time to flower of *Coreopsis verticillata* 'Moonbeam' increased by seven days when B-Nine was applied at all concentrations compared to untreated plants over all application times (Table 1). All B-Nine concentrations reduced shoot height and increased market quality rating compared to untreated plants. The highest market quality rating, 3.2, was assigned to plants that received 5100 ppm B-Nine and these plants were 36% shorter than untreated plants. Shoot height declined from zero days after shearing to six or nine days and then increased up to 15 days after shearing over all B-Nine concentrations (Figure 1). A mathematical model of the relationship between shoot height and application timing predicted that a minimum shoot height could be achieved by applying B-Nine between six and eight days after shearing.

Market quality rating increased from zero days after shearing to six or nine days and then declined up to 15 days after shearing over all B-Nine concentrations (Figure 2). A mathematical model of the relationship between market quality rating and application timing predicted that a maximum quality rating could be achieved by applying B-Nine between six and eight days after shearing. Thus, the predicted application time frame after shearing for minimum shoot height also yielded the highest predicted market quality rating.

There was no effect of Cutless on time to flower compared to untreated plants (Table 1). All Cutless concentrations increased market quality rating compared to untreated plants over all application times. The highest market quality rating, 3.0, was assigned to plants that received 50 ppm Cutless and these plants were 48% shorter than untreated plants. There was no effect of application timing of Cutless on shoot height or market quality rating.

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. The highest market quality rating and greatest control of shoot height was achieved when B-Nine was applied from 2550 to 7650 ppm, six to eight days after shearing. The highest market quality rating and greatest control of shoot height was achieved when Cutless was applied from 50 ppm, but Cutless was more flexible than B-Nine in application timing. However, B-Nine is the better choice for greenhouse application because Cutless is not currently labeled for application to greenhouse or nursery crops. (Figures 1., 2. and Table 1. on pages 8-9)

Table 1. Response of *Coreopsis verticillata* 'Moonbeam' to spray applications of B-Nine and Cutless across all application times.

Growth retardant	Rate (ppm)	Days to flower	Shoot height (cm) <sup>1</sup>	Market quality rating <sup>2</sup>
B-Nine	0	42	32.9	2.1
	2550	51	22.8	3.0
	5100	51	21.2	3.2
	7650	49	24.5	3.1
Cutless	0	43	30.5	2.1
	50	44	15.8	3.0
	100	44	17.8	2.9
	150	45	17.2	2.8

<sup>1</sup> English Conversion 2.54 cm = 1 inch.

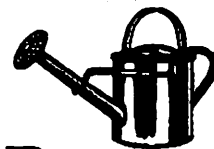
<sup>2</sup> Market Quality Rating: 1=very poor, unsalable; 2=poor, unsalable; 3=average, salable; 4=good, salable; 5=excellent, salable.

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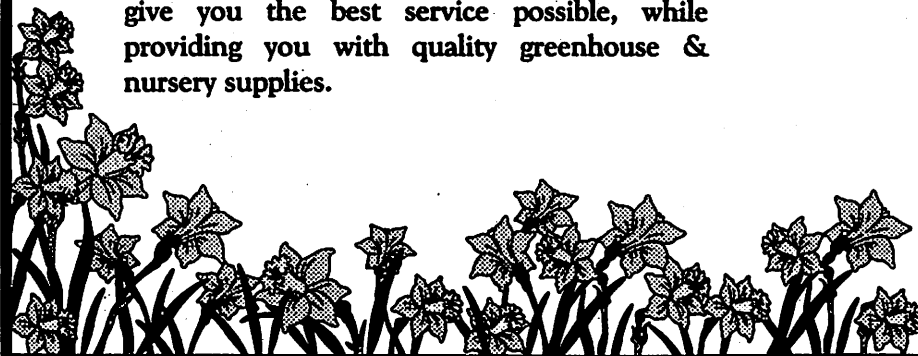
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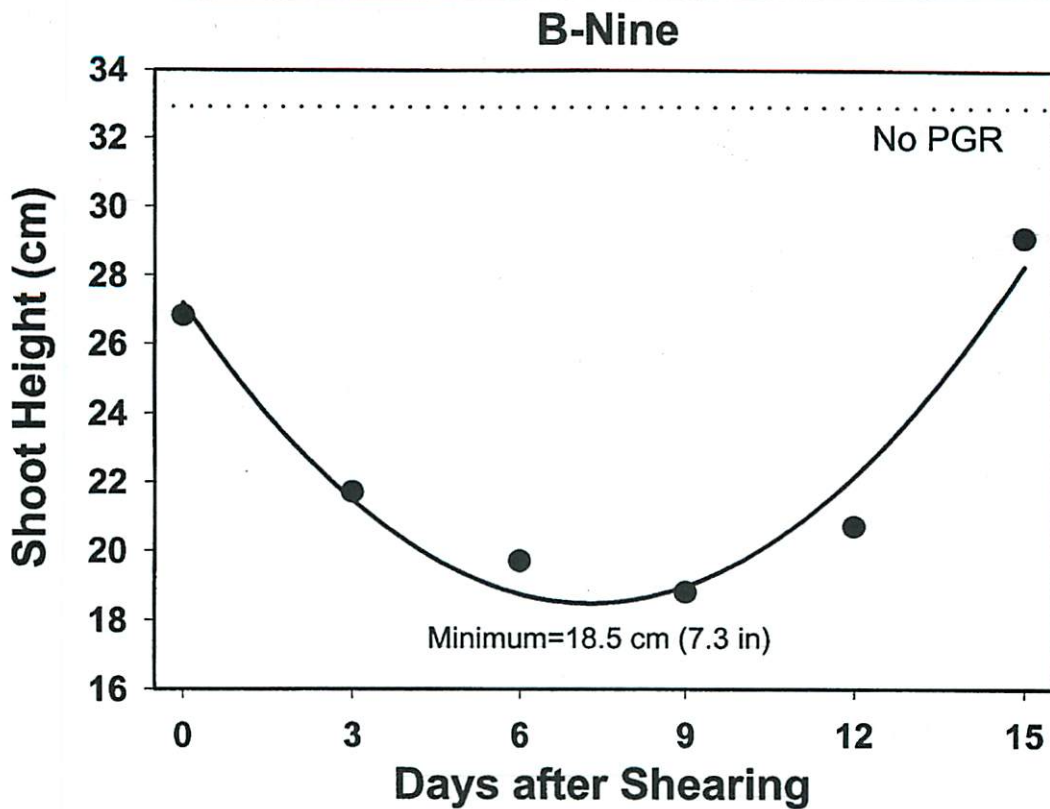


Figure 1. Effect of all spray concentrations of B-Nine applied 0, 3, 6, 9, 12 or 15 days after shearing on shoot height of *C oreopsis verticillata* 'Moonbeam'.

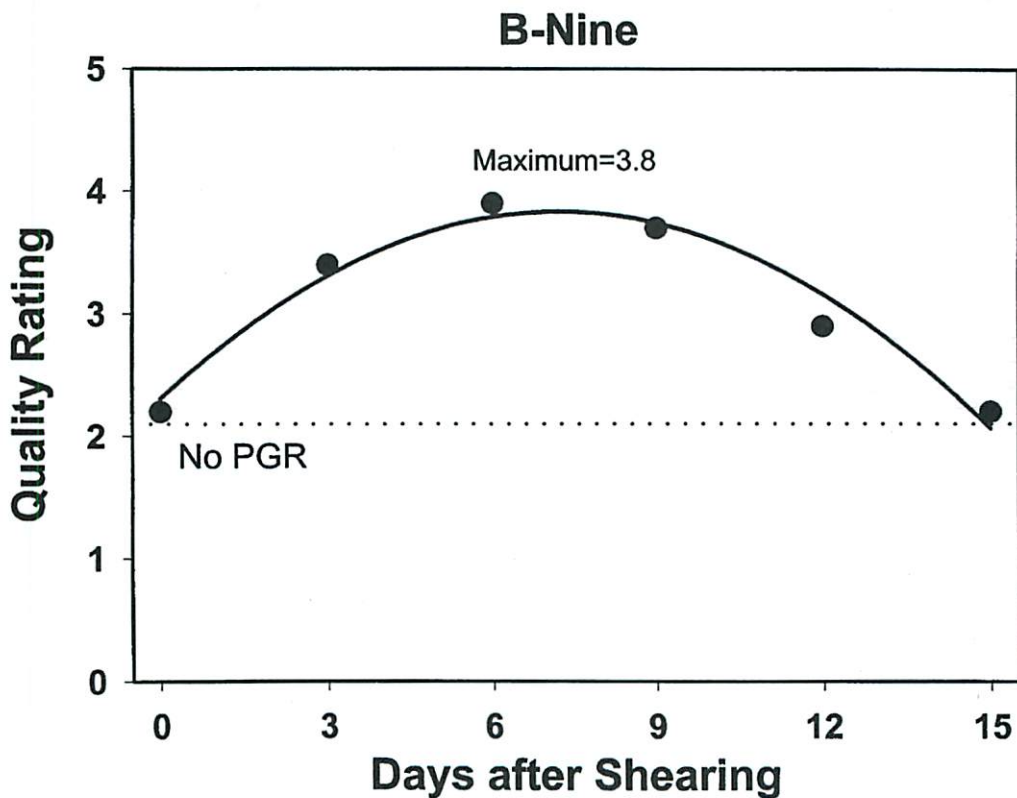


Figure 2. Effect of all spray concentrations of B-Nine applied 0, 3, 6, 9, 12 or 15 days after shearing on market quality rating of *Coreopsis verticillata* 'Moonbeam'.