MORE ON GROWTH CONTROL OF GREENHOUSE-GROWN PERENNIAL BEDDING PLANTS

by Joyce G. Latimer, Paul A. Thomas, and Pam Lewis

The growing popularity of perennials in the garden has pushed them into most grower's plant mixes and there is often very little information available on how to grow them. On top of that, they are some of the most vigorous plants in the house. After all, they are often just one short step away from the weeds from which they came. Even if the light, watering, and fertilizing are all managed perfectly, we need a little more to keep some of these crops down to a reasonable size for marketing and handling.

However, because of the large number of perennials on the market, we are just starting to make some progress in determining crop response to chemical growth regulators. We are currently screening popular perennials for response to several different plant growth regulators including B-Nine, Cycocel, tank mixes of B-Nine and Cycocel, Bonzi, and Sumagic. We evaluate several different rates to try to find the linear range of plant response. This approach helps us to narrow down the recommended application rate in fewer steps.

As in all of our research, we evaluate the persistent, or "carryover," effects of the plant growth reduction in the greenhouse on plant performance in the landscape. Our goal is to determine rates of application that result in sufficient growth regulation in the greenhouse, but permit growth recovery so that there are little or no differences in plant size after 4 weeks in the landscape and no persistence after 8 weeks.

Methods: The research reported here was conducted at the Coastal Gardens in Savannah Georgia. Perennial plugs of nine species were planted in 4" pots in Fall 1997. The plants were held in a cold frame over the winter and moved into the greenhouse in March 1998. After resumption of growth, the plants were treated with foliar spray applications of 5000 ppm B-Nine WSG* (applied every 2 weeks), a tank mix of 5000 ppm B-Nine and 1500 ppm Cycocel, or Sumagic at 0, 15, 30, 45, or 60 ppm. The tank mix and the Sumagic were only applied once. All treatments were applied at a volume of 2 qt./100 sq.ft.

Vegetative plant height was measured at 3 and 5 weeks after treatment (WAT). After the 5 WAT measurement, plants were planted in raised landscape beds in the Coastal Gardens. Plant height was measured at 4 and 8 weeks after planting (WAP) in a landscape bed.

Results and Discussion: Although our previous research has identified very few perennials that are responsive to B-Nine, plant height of eight of the nine species tested in Savannah was reduced by B-Nine during greenhouse production (Tables 1, 2, 3). Remember that the B-Nine was applied at 2-week intervals, resulting in three applications during greenhouse production. Height reductions, relative to untreated controls, ranged from 10% with *Lantana camara* to 38% with *Heliotropium arborescens* at 5 WAT. Only *Asclepias tuberosa* showed no significant response to B-Nine. Both *Gaura lindheimere* and *Heliotropium arborescens* showed persistent reductions in plant height at 4 WAP in the landscape, but these differences were not significant at 8 WAP.

A single application of a tank mix of 5000 ppm B-Nine and 1500 ppm Cycocel effectively reduced (18% to 38% shorter) the height of four species, *Salvia greggii*, *Gaillardia grandiflora*, *Heliotropium arborescens*, and *Perovskia atriplicifolia*, and gave moderate (10% shorter) height control of *Gaura lindheimeri* at 5 WAT (Tables 1, 2, 3). Only *Gaura lindheimere* showed persistent reductions in plant height after 4 WAP in the landscape, but these differences were not significant at 8 WAP.

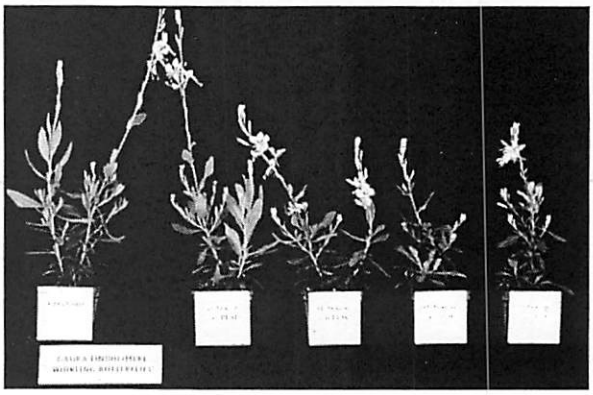
Three species, *Salvia greggii*, *Gaura lindheimere*, and *Perovskia atriplicifolia* had the appearance of excessive reductions in plant height after a single application of the higher rates of Sumagic. The 60 ppm treatment with Sumagic resulted in about a 45% height reduction in each case. *Salvia leucantha* control plants reached their maximum vegetative height at 3 WAT where treatment with 60 ppm Sumagic reduced plant height by 44%. Over the next two weeks, the linear response of plant height to Sumagic persisted (results not shown). The linear response of the plant height over the rate of Sumagic application shows promise for rate selection. Growth of *Buddleia davidii*, *Gaillardia grandiflora* and *Lantana camara* was only slightly to moderately controlled by Sumagic. Carryover effects of Sumagic on vegetative plant height in the landscape were observed at 4 WAP in *Salvia greggii*, *Gaura*, *Lantana*, *Asclepias*, and *Perovskia*, but only *Gaura* treated with high rates of Sumagic exhibited persistent growth delays at 8 WAP.

The lack of information available on the wide variety of perennial plants being commercially grown makes the use of chemical growth regulators very difficult. This study provides initial information on plant response to several plant growth regulators during greenhouse production and the potential carryover effects in the landscape. The rates used in this study provide a starting ground for growers wishing to apply these plant growth regulators in their own production systems.

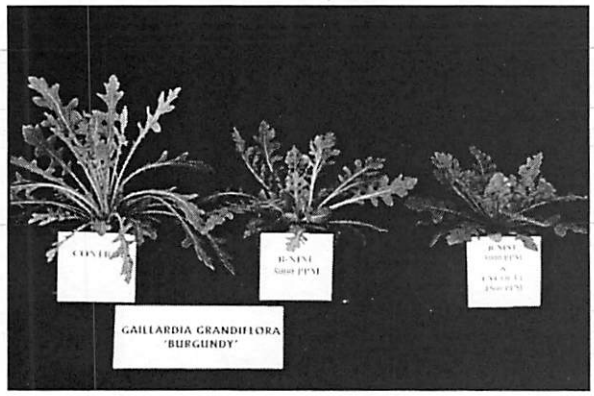
Joyce G. Latimer, associate professor of horticulture, University of Georgia , Griffin. GA. Paul A. Thomas, associate professor of horticulture, University of Georgia , Athens, GA. Pam Lewis, extension horticulturist, Coastal Gardens, University of Georgia, Savannah, GA.

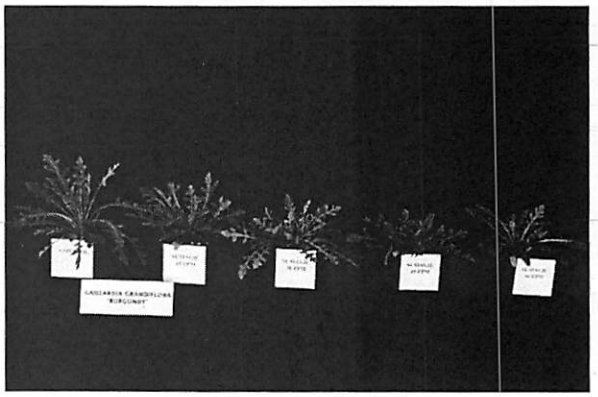
Footnote:

* A new Water Soluble Granule formulation of B-Nine was used in this study.



1. *Gaura lindheimere* at 5 weeks after treatment with PGRs in the greenhouse; A. untreated (left), treated every two weeks with 5000 ppm B-Nine (center) or treated once with a tank mix of 5000 ppm B-Nine plus 1500 ppm Cycocel (right). B. Untreated (left) or treated once with 15, 30, 45 or 60 ppm Sumagic (left to right).





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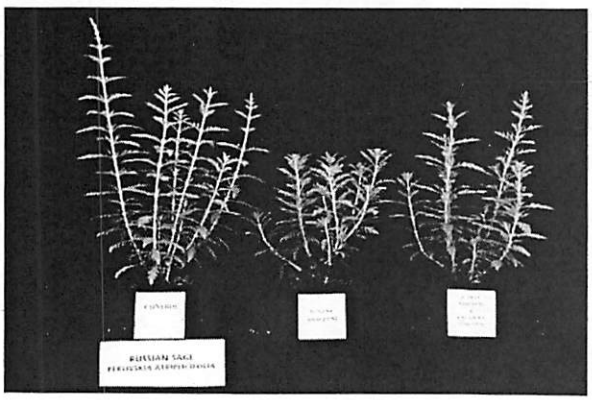

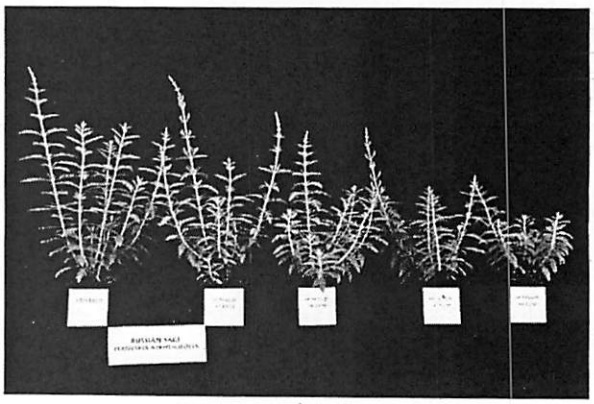

3. *Perovskia atriplicifolia* at 5 weeks after treatment with PGRs in the greenhouse; A. untreated (left), treated every two weeks with 5000 ppm B-Nine (center) or treated once with a tank mix of 5000 ppm B-Nine plus 1500 ppm Cycocel (right). B. Untreated (left) or treated once with 15, 30, 45 or 60 ppm Sumagic (left to right).

Table 1. Vegetative height of perennials in the greenhouse at 3 and 5 weeks after treatment (WAT) with growth regulators and at 4 and 8 weeks after planting (WAP) in the landscape.

Treatment	Rate	Plant height (cm) *Buddelia davidii* 'Royal Red'		*Salvia greggii*		*Gaura lindheimeri* 'Whirling Butterflies'	
Greenhouse:		*3 WAT*	*5 WAT*	*3 WAT*	*5 WAT*	*3 WAT*	*5 WAT*
B-Nine	5000 ppm	11 a[z]	19 b	16 a	18 b	10 c	19 c
B-Nine/ Cycocel	5000 ppm/ 1500 ppm	13 a	25 a	14 b	16 b	15 ab	24 b
Control	0 ppm	13 a	27 a	17 a	26 a	17 a	26 a
Sumagic	15 ppm	13 a	25 a	16 a	15 b	14 b	20 bc
	30 ppm	14 a	30 a	13 bc	17 b	11 c	18 c
	45 ppm	11 a	25 a	12 c	16 b	9 c	15 d
	60 ppm	12 a	23 ab	12 c	14 b	9 c	14 d
Landscape:		*4 WAP*	*8 WAP*	*4 WAP*	*8 WAP*	*4 WAP*	*8 WAP*
B-Nine	5000 ppm	33 a	53 a	43 ab	58 a	20 c	21 ab
B-Nine/ Cycocel	5000 ppm/ 1500 ppm	25 a	42 a	48 a	54 a	23 b	21 ab
Control	0 ppm	27 a	51 a	38 bc	50 a	29 a	23 a
Sumagic	15 ppm	27 a	49 a	40 bc	59 a	23 b	20 ab
	30 ppm	30 a	53 a	40 bc	52 a	19 cd	19 bc
	45 ppm	27 a	45 a	40 bc	56 a	17 d	18 c
	60 ppm	30 a	55 a	37 c	55 a	17 d	18 c

[z]Mean separation by LSD ($P < 0.05$) across all growth regulator treatments within a species at each date.

Table 2. Vegetative height of perennials in the greenhouse at 3 and 5 weeks after treatment (WAT) with growth regulators and at 4 and 8 weeks after planting (WAP) in the landscape.

Treatment	Rate	Plant height (cm) *Gaillardia grandiflora* 'Burgundy'		*Heliotropium arborescens* 'Fragrant Blue'		*Lantana camara* 'Confetti'	
Greenhouse:		*3 WAT*	*5 WAT*	*3 WAT*	*5 WAT*	*3 WAT*	*5 WAT*
B-Nine	5000 ppm	6.4 bc[z]	10 b	9.2 bcd	13 d	8.2 c	11 b
B-Nine/ Cycocel	5000 ppm/ 1500 ppm	5.8 c	11 b	9.3 bc	14 d	9.2 ab	14 a
Control	0 ppm	9.0 a	14 a	10.1 ab	20 ab	9.4 ab	13 a
Sumagic	15 ppm	8.3 a	12 ab	10.8 a	21 a	8.4 bc	11 b
	30 ppm	7.8 ab	12 ab	8.6 cd	19 bc	7.6 c	10 b
	45 ppm	5.9 c	12 ab	9.8 ab	20 ab	7.5 c	12 b
	60 ppm	6.6 bc	11 b	8.2 d	16 c	9.6 a	13 a
Landscape:		*4 WAP*	*8 WAP*	*4 WAP*	*8 WAP*	*4 WAP*	*8 WAP*
B-Nine	5000 ppm	17 a	21 a	22 c	24 a	18 bc	22 a
B-Nine/ Cycocel	5000 ppm/ 1500 ppm	17 a	22 a	26 ab	25 a	21 a	26 a
Control	0 ppm	16 a	23 a	29 a	27 a	16 c	20 a
Sumagic	15 ppm	17 a	21 a	23 bc	22 a	18 c	21 a
	30 ppm	17 a	23 a	24 bc	24 a	17 c	24 a
	45 ppm	17 a	21 a	25 bc	25 a	17 c	22 a
	60 ppm	16 a	23 a	25 bc	27 a	21 ab	27 a

[z]Mean separation by LSD ($P < 0.05$) across all growth regulator treatments within a species at each date.

Table 3. Vegetative height of perennials in the greenhouse at 3 and 5 weeks after treatment (WAT) with growth regulators and at 4 and 8 weeks after planting (WAP) in the landscape.

Treatment	Rate	Plant height (cm) *Asclepias tuberosa*		*Salvia leucantha*		*Perovskia atriplicifolia*	
Greenhouse:		*3 WAT*	*5 WAT*	*3 WAT*	*5 WAT*	*3 WAT*	*5 WAT*
B-Nine	5000 ppm	15 a[z]	16 a	16 bc	17 b	19 c	20 b
B-Nine/ Cycocel	5000 ppm/ 1500 ppm	15 a	16 a	17 bc	21 abc	21 c	22 b
Control	0 ppm	18 a	18 a	26 a26 a	28 a	29 a	
Sumagic	15 ppm	17 a	18 a	19 b23 ab	25 b	29 a	
	30 ppm	14 ab	15 a	18 b18 bc	18 c	21 b	
	45 ppm	13 b	12 a	16 bc	17 bc	17 cd	21 b
	60 ppm	14 ab	14 a	15 c	16 c	15 d	16 c
Landscape:		*4 WAP*	*8 WAP*	*4 WAP*	*8 WAP*	*4 WAP*	*8 WAP*
B-Nine	5000 ppm	18 abc	21 a	25 a 40 a	38 bc	57 a	
B-Nine/ Cycocel	5000 ppm/ 1500 ppm	18 abcd	20 a	31 a 49 a	52 a	67 a	
Control	0 ppm	20 ab	24 a	28 a 42 a	46 ab	64 a	
Sumagic	15 ppm	21 a	20 a	33 a 49 a	36 bc	56 a	
	30 ppm	17 bcd	14 a	26 a 44 a	37 bc	55 a	
	45 ppm	14 d	19 a	25 a	43 a	34 c	58 a
	60 ppm	16 cd	18 a	29 a	49 a	35 c	50 a

[z]Mean separation by LSD ($P < 0.05$) across all growth regulator treatments within a species at each date.