SECTION 7

Growth Regulators

Joyce Latimer
Section Editor and Moderator

Section 1 and Section 13 may contain related titles.

The Use of Pistill for Garden Mum Production in South Alabama

Charles P. Hesselein, J. Raymond Kessler, Gary J. Keever and Laura G. Sanders
Auburn University Ornamental Horticulture Substation, Mobile, AL 36608

Nature of Work: Garden mums are a familiar sight in Alabama nurseries throughout the summer and fall. Traditionally, these crops require removal of growing tips (pinching) to stimulate lateral branching and thus the production of a fuller, more floriferous plant. Pinching garden mums is a time consuming, labor intensive procedure. Two recent developments have called into question the necessity of this practice. The first has been the improvement in the lateral branching of new garden mum cultivars through breeding. The second is the use of the growth regulator, Pistill (Lawn and Garden Products, Inc. Fresno, CA), which stimulates lateral branching of a number of ornamental crops, producing fuller, higher quality plants. We have examined the effects of Pistill on garden mums for the past two years and found that for many growers the practice of pinching or the use of Pistill may not be necessary to produce quality potted garden mums.

On July 9, 1996 we planted five commonly grown garden mum cultivars ('Bravo', 'Sarah', 'Tracy' and 'Valerie' from Yoder's Prophets series and 'Yellow Jacket') into trade gallon containers using an amended 3:1 (v:v) pine bark:peat potting mix. Our original plan was to include the following six treatments: a single pinch, two pinches, and a single pinch plus one or two applications of Pistill at the rate of 500 or 750 ppm of the active ingredient ethephon. We were able to use these treatments for the cultivar 'Yellow Jacket'. However, because the flower buds of 'Bravo', 'Sarah', 'Tracy' and 'Valerie' appeared to develop sooner we could only pinch these plants once. Thus the treatments for these cultivars consisted of no pinch, one pinch, and no pinch plus one or two applications of Pistill at the rate of 500 or 750 ppm. Plants were pinched or sprayed with Pistill when shoots had about 1-1/2 inches of new growth. After recording the flowering date, we measured and analyzed several characteristics of these garden mums including: the number of flowers, the date of flowering, the height of the plants and a growth index [(height + width + width) ÷ 3]. Flowering date was recorded when 3/4 of the flowers of any plant were fully open.

Results and Discussion: The effects of Pistill varied with cultivar and for each characteristic measured. For 'Bravo', 'Tracy' and 'Sarah', single Pistill applications increased flowering by 46%, 46% and 34%, respec-

tively, when compared to pinched plants (Table 1). For 'Tracy' and 'Sarah', two Pistill sprays increase flowering 19% and 16% over single sprayed plants. Flowering delay was noted in at least one cultivar for all treatments (Table 2). An extra pinch caused a 3 day delay for 'Yellow Jacket and a 2 day delay for 'Sarah'. Single applications of Pistill caused an average flowering delay of 2-5 days beyond the single pinch treatment for 'Yellow Jacket', 'Bravo', 'Tracy' and 'Sarah'. Two applications of Pistill caused an average flowering delay of 7-11 days beyond the single pinch treatment for 'Yellow Jacket', 'Bravo', 'Tracy' and 'Sarah' and only 4 days for 'Valerie'. Sprays of 750 ppm caused an additional 1-3 day delay in flowering for 'Yellow Jacket', 'Tracy' and 'Sarah' when compared with 500 ppm sprays. Two applications of Pistill delayed flowering an average of 3-6 days beyond single application treatments for all cultivars. Flowering delay could benefit the grower who wishes to sell a particular cultivar over a greater period of time or it may represent an unwanted delay in flowering. Pistill treatments increased growth index in 'Yellow Jacket', 'Bravo', 'Tracy' and 'Sarah' an average of 16%, 13%, 7% and 13%, respectively. Two sprays caused an increase in the growth index of 'Yellow Jacket' and 'Bravo' by 17% and 10%, respectively, over single sprayed treatments. Treatment related height differences were only noted in 'Tracy' and 'Sarah' with Pistill treatments causing a 7% and 13% increase in height, respectively, over unsprayed plants. We observed several shoots lacking flower buds in plants receiving 750 ppm. These non-flowering shoots detracted from the overall appearance of the plant.

Significance to Industry: Depending on the grower's market, the increase in flowering and plant size provided by Pistill sprays may prove cost effective. In addition, the flowering delay demonstrated by the use of Pistill may be a useful tool for manipulating the timing of the final product. However, all treatments produced good quality, salable plants. Thus pinches or applications of Pistill may not be necessary for the production of quality potted garden mums.

Table 1. The influence of Pistill and pinching on the number of flowers of five garden mum cultivars.

	Number of Flowers				
Orthogonal Contrasts	Bravo	Sarah	Tracy	Valerie	Yellow Jacket
No pinch vs. 1 pinch	ns	ns	ns	ns	NA
1 vs. 2 pinches	NA	NA	NA	NA	ns
1 pinch vs. 1 pistill application	***	**	***	ns	ns
500 vs, 750 ppm ai pistill	ns	ns	ns	ns	ns
1 vs. 2 applications	ns	***	***	ns	ns

ns,*,**,*** Contrasts nonsignificant or significant at $P<0.05$, $P<0.01$, or $P<0.001$, respectively

Table 2. The influence of pistill and pinching on five garden mum cultivars' flowering date.

	Delay in Flowering				
Orthogonal Contrasts	Bravo	Sarah	Tracy	Valerie	Yellow Jacket
No pinch vs. 1 pinch	ns	**	ns	ns	NA
1 vs. 2 pinches	NA	NA	NA	NA	***
1 pinch vs. 1 pistill application	***	***	**	ns	ns
500 vs, 750 ppm ai pistill	ns	**	**	ns	***
1 vs. 2 applications	***	***	***	***	***

ns,*,**,***Contrasts nonsignificant or significant at $P\leq0.05$, $P\leq0.01$, or $P\leq0.001$, respectively

Plant Growth Retardants Affect Growth and Flowering of *Coreopsis verticillata* 'Moonbeam'

J. Raymond Kessler, Jr. and Gary J. Keever
Auburn University, Auburn, AL 36849

Nature of Work: *Coreopsis verticillata* 'Moonbeam' is a herbaceous perennial with no vernalization requirement, but an obligate requirement for long photoperiods (>14 hours or night-break lighting) to flower (2). Because vegetative growth and flowering can be controlled using photoperiod, researchers have investigated *Coreopsis* as a possible greenhouse pot crop (1). However, *Coreopsis* may grow too tall in small 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, application method, and rate required to produce a marketable greenhouse pot plant of *Coreopsis verticillata* 'Moonbeam' in 4- inch pots.

Terminal cuttings (≈2.5 inches long) of *Coreopsis verticillata* 'Moonbeam' were removed from vegetative plants on 12 December, 1996 and stuck in 72-celled flats containing Fafard Germinating Mix. Cuttings were rooted using intermittent mist in a shaded glass greenhouse under natural photoperiod. Bottom heat was provided at 85°F during propagation. Rooted cuttings were removed from mist on 8 January, 1997 and placed in an unshaded glass greenhouse with a heat set point temperature of 65°F and ventilation at 78°F. All cutting received a soft terminal pinch on 10 January, 1997. Cuttings were transplanted on 29 January, 1997 to 4-inch square pots containing Sunshine Mix 1, 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. All cuttings were sheared to 2.5 inches above the pot rim on 11 February, 1997.

Plant growth retardant treatments were applied on 21 February, 1997. 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. 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 0.5 gallon per 100 square feet using a pressurized CO_2 sprayer calibrated at 20 psi. Medium drench solutions were applied at two fluid ounces per pot. After

treatment, plants were spaced on 8-inch centers. The experiment was a randomized complete block design with nine single-pot replications per treatment. 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 $width_1$], and a market quality rating (1-5).

Results and Discussion: All growth retardants resulted in decreased shoot height and growth index with increasing concentration except for Bonzi and Royal Slo-Gro sprays (Table 1). The highest rate of A-rest, Bonzi drench, B-Nine, and Cutless decreased shoot height compared to controls by 36%, 30%, 21%, and 36%, respectively. Bonzi spray did not affect any of the parameters measured while the highest rate of Royal Slo-Gro increased shoot height by 30% compared to controls, 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 shoot height reductions similar those treatments receiving average or good ratings because of distorted lateral shoots with an unacceptable increase in branch angle. The increase in branch angles was reflected in a 19.2% decrease in growth index by Bonzi drench compared to a 29.2% decrease in growth index by A-Rest. None of the growth retardants affected time to flower except B-Nine and Royal Slo-Gro. The highest rate of B-Nine and Royal Slo-Gro delayed flowering by an average of 5.4 and 15.7 days, respectively, compared to controls. The increase in shoot height with increasing concentration of Royal Slo-Gro was possibly due to delayed flowering resulting in more time for vegetative growth.

Significance to Industry: 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 lower concentration may be a better choice because it resulted in less flower delay (2.8 days compared to 5.4 days).

Literature Cited

1. Hamaker, C.K, R.D. Heins, A. Cameron, and W. Carlson. 1996. Forcing perennials - crop by crop. Greenhouse Grower 14(8): 43-46.

2. Iversen, R.R. and T.C. Weiler. 1994. Strategies to force flowering of six herbaceous garden perennials. HortTech. 4(1):61-65.

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 Rating[3]		Shoot	Growth Index[2]	Quality
Retardant	Rate	Height (cm)[1]		
		Drench (mg a.i. per pot)		
A-Rest	0	35.1	43.7	2.0
	0.125	27.8	41.6	2.0
	0.25	26.1	37.1	2.6
	0.375	22.4	31.0	3.1
		L***[4]	L***	L***Q**
Bonzi	0	34.4	48.1	2.0
	0.125	27.6	45.3	2.0
	0.25	24.9	40.4	2.0
	0.375	24.0	38.9	2.0
		L***Q*	L***	ns
			Spray (ppm)	
B-Nine	0	32.7	43.7	2.0
	2550	28.2	33.6	3.4
	5100	25.9	29.4	4.1
	7650	25.9	29.0	4.1
		L***Q**	L***Q***	L***Q***
Cutless	0	33.9	48.0	2.0
	25	30.7	41.5	2.1
	50	27.9	38.1	2.3
	75	25.9	32.1	3.0
	100	23.8	31.5	3.4
	150	23.3	31.7	4.0
	200	21.7	29.7	4.1
		L***	L***Q***	L***
Royal Slo-Gro	0	33.7	46.8	2.0
	360	39.2	44.0	2.0
	720	40.1	43.7	2.0
	1080	42.3	45.6	2.0
	1440	42.2	44.2	2.0
	1800	43.7	44.0	2.0
		L ***Q*	ns	ns

[1]English Conversion 2.54 cm _ 1 inch.

[2]Growth Index = (height + $width_1$ + $widt_{h2}$)/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.

[4]L=linear trend, Q=quadratic trend: ns, *, **, or *** not significant or significant at

Effect of Plant Growth Regulators on Growth and Landscape Performance of Perennial Bedding Plants

Joyce G. Latimer, Paul A. Thomas, and Sherrod A. Baden
University of Georgia Experiment Station, Griffin, GA 30223

Nature of Work: The wide variety of perennial species being produced for the bedding plant market has taxed our ability to evaluate their responsiveness to the plant growth regulators (PGRs) available for ornamentals. This report presents some of the results of a survey study of the response of eight bedding plant species to three PGRs.

The following species were donated as precooled plugs by Green Leaf Enterprises, Inc.: coreopsis (*Coreopsis grandiflora* 'Sunray'), purple coneflower (*Echinacea purpurea*), blanket flower (*Gaillardia grandiflora* 'Goblin'), perennial phlox (*Phlox paniculata* 'Joliet'), cone flower (*Rudbeckia fulgida* var. sullivantii 'Goldsturm'), hollyhock (*Alcea rosea* mix), speedwell (*Veronica alpina* 'Goodness Grows'), and bee balm (*Monarda didyma* 'Blue Stocking'). The plugs were planted in 4" pots in April 1996 and treated with PGRs about 2 weeks later. PGR treatments included a single foliar spray (at label recommended volume of 2 qt/100 sq.ft.) of 240 ppm Bonzi or 40 ppm Sumagic. B-Nine was also applied twice at 5000 ppm. Plant height was measured at 2 and 4 weeks after treatment (WAT). Then, the plants were planted into landscape beds, mulched and measured at 4 and 8 weeks after planting (WAP). Plant flowering also was noted.

Results and Discussion: *Gaillardia* and *Phlox* were not responsive to any of the PGR applications and the data are not shown. The other species were responsive to at least one of the PGR treatments (Table 1). Only *Echinacea purpurea* was responsive to B- Nine, with treated plants 20% shorter than untreated plants at 4 WAT. The effects of B-Nine did not persist in the landscape. *E. purpurea* also was very responsive to Bonzi (almost 50% shorter than controls) and Sumagic (70% shorter than controls) at 4 WAT, with significant height reductions persisting after 8 weeks in the landscape.

Plant height of *Coreopsis grandiflora* was moderately reduced by Bonzi (20%) and Sumagic (32%) with no persistent effects of either PGR in the landscape. Plant height of *Monarda didyma* and *Rudbeckia fulgida* was reduced comparably by Bonzi (about 30%) and Sumagic (about 40%) at 4 WAT, but only slight effects of Sumagic persisted through 4 WAP. Plant height of Alcea rosea was severely reduced by both Bonzi (62%) and Sumagic (71%) at 4 WAT, but the effects did not persist in the landscape. Veronica alpina was the only species to show significant persistence of the effects of Bonzi and Sumagic in the landscape through 8 WAP.

Plant flowering did not appear to be affected except with *Rudbeckia*, where both Bonzi and Sumagic appeared to delay flowering in the greenhouse, but most of the plants treated with these PGR rates were flowering at 2 weeks after planting in the landscape.

The PGR application rates selected were based on previous experience with Bonzi on perennial species and are much higher than normally used on bedding plants. The rates of Bonzi and Sumagic selected for this study are not comparable. Based on previous research results where perennials were not responsive to Bonzi, we selected the highest rate of Bonzi considered to be economically acceptable as a foliar spray (240 ppm). The rate of Sumagic for which data are presented was the lowest of four rates applied in the full study. Sumagic is considered to be up to 10 times as active as Bonzi.

Significance to Industry: The results indicate that Bonzi and Sumagic may have commercial application for species not responsive to B-Nine. The application rates necessary for height control may be very high. Growers may want to test additional rates, lower than those reported here, to define the actual linear range of each PGR on the more important perennial crop species. However, the rates used here caused very little persistence of growth reduction in the landscape, and therefore, give growers a good starting point for evaluation of these chemicals in their own production systems.

Acknowledgement: This work was funded in part by Valent USA, Inc.

Table 1. Plant height of six perennial bedding plant species at 4 weeks after treatment (WAT) with foliar sprays of 5000 ppm B-Nine (applied twice), 240 ppm Bonzi, or 40ppm Sumagic and 4 and 8 weeks after planting (WAP) in the landscape.

	Plant height (cm)			Plant height (cm)			Plant height (cm)		
Treatment	4 WAT	4 WAP	8 WAP	4 WAT	4 WAP	8 WAT	4 WAT	4 WAP	8 WAP
	Echinacea purpurea			*Coreopsis* 'Sunray'			*Monarda* 'Blue Stocking'		
Untreated	35 a	44 a	44 a	25 a	26 b	30 a	23 b	33 a	46 a
B-Nine	28 b	43 a	49 a	27 a	30 ab	35 a	25 a	35 a	49 a
Bonzi	18 c	27 b	33 b	20 b	32 a	36 a	16 c	32 ab	49 a
Sumagic	11 c	20 b	25 b	17 b	28 b	33 a	14 c	29 b	45 a
	*Veronic*a 'Goodness Grows'			*Alcea* mix			*Rudbeckia* 'Goldsturm'		
Untreated	17 a	29 a	30 a	31 a	30 a	31 a	22 a	35 a	38 a
B-Nine	18 a	27 a	26 b	28 a	29 a	25 a	23 a	37 a	40 a
Bonzi	12 b	21 b	26 b	12 b	32 a	31 a	16 b	34 a	42 a
Sumagic	12 b	21 b	24 b	9 b	32 a	31 a	13 c	19 b	40 a

Influence of Paclobutrazol Drenches on the Growth of 'Albury Purple' Hypericum

John M. Ruter
University of Georgia Coastal Plain Experiment Station,
Tifton, GA 31793

Nature of Work: *Hypericum androsaemum* 'Albury Purple' is an attractive small shrub with purple-tinted new foliage and numerous small yellow flowers during the summer months. When grown in containers, 'Albury Purple' hypericum requires frequent pruning to maintain plant shape and marketability.

Paclobutrazol (Bonzi) is labelled for application as a foliar spray or as a root-medium drench (Uniroyal Chemical Co., Middlebury, Conn.). The purpose of this study was to evaluate the effectiveness of paclobutrazol applied as a root-medium drench on the growth control of 'Albury Purple' hypericum.

Research was conducted at Wight Nurseries in Cairo, Ga. Twenty-five plants were grown in #3 pots and pruned to a height of 30 cm on 3 July 1996. The potting medium consisted of a 4 pine bark : 1 gravel (v/v) mixture amended with 5 lbs./cu. yd. dolomitic limestone and micronutrients. Fertilization was as needed using a 15-1-6 liquid feed at 150 ppm N. Plants were grown in a shade house with 55% light exclusion and irrigated as needed at 1/2 in. per irrigation using solid set sprinklers.

Paclobutrazol was applied on 8 July 1996 at the rates of 0, 0.5, 1.0, 2.0, and 4.0 mg a.i./pot as a medium drench. Medium drenches (4 oz./plant applied to the surface of the container medium) were applied using Bonzi (0.128%, Uniroyal Chemical Co.). The experiment was arranged as a completely randomized design with five replicate plants per treatment.

The experiment was terminated on 10 September 1996 when untreated control plants required pruning to remain marketable. Measurements taken at the termination of the study were plant height, growth index [(height + width 1 + width 2 (perpendicular to width 1))/3], shoot dry weight, and root dry weight. Data were evaluated by analysis of variance and regression analysis.

Results and Discussion: Plant height, growth indices, and shoot dry weight all decreased linearly as rate of paclobutrazol increased (Table 1). The root:shoot ratio (root dry weight/shoot dry weight) increased linearly as rate of paclobutrazol increased (Table 1). At the highest rate of application (4.0 mg a.i./pot), plant heights were reduced 29% and the growth indices were reduced 21% compared to non-treated plants.

Plants treated with 1.0 mg a.i./pot of Bonzi resulted in commercially acceptable control of plant growth based on observations of nursery personnel. At 1.0 mg a.i./pot, plant heights were reduced 19% and growth indices were reduced 10% compared with non-treated plants. Bonzi applied as a root medium drench at the rate of 0.5 mg a.i./pot did not provide adequate control of plant growth.

Bonzi reduced shoot dry weight by 11% and 33%, respectively, for plants treated at the rates of 1.0 and 4.0 mg a.i./pot compared to control plants. Bonzi application had no effect on root dry weight; however, the root:shoot ratio increased from 1.5 (control) to 2.5 (4.0 mg a.i./plant) which indicated a preferential partitioning to the root system of photoassimilates as rate of Bonzi increased.

Significance to Industry: Bonzi was applied as a root-medium drench to 'Albury Purple' hypericum grown in #3 pots. Plant height, growth indices and shoot dry weight were reduced by applications of Bonzi at rates greater than 0.5 mg a.i./pot. The root:shoot ratio of plants increased as rate of Bonzi increased. The results of this study indicate that a Bonzi treatment of 1.0 mg a.i./pot applied as a root medium drench may effectively control vegetative growth and reduce the required pruning necessary to produce a salable #3 container of 'Albury Purple' hypericum.

Table 1. Influence of Bonzi drenches on the growth of `Albury Purple' Hypericum.

Bonzi (mg a.i./pot)	Height (in.)	Growth index (in.)	Shoot dry weight (oz.)	Root: shoot ratio
0	22.2	31.9	5.3	1.5
0.5	23.1	32.2	4.9	1.6
1.0	18.7	29.1	4.7	1.6
2.0	19.0	27.1	4.3	1.9
4.0	17.2	26.3	4.0	2.5
Linear regression				
P > F	0.01	0.01	0.01	0.03

Growth Regulators Enhance Branching of Portulaca

T.J. Banko and M.A. Stefani
Virginia Tech Hampton Roads AREC, Virginia Beach, VA 23455

Nature of Work: During container production of Portulaca, the plants grow long, prostrate stems that make movement of the containers difficult. In this study, spray treatments of chemical growth regulators were applied to *Portulaca grandiflora* 'Sundial' to evaluate their effectiveness in stimulating lateral branching, and in inhibiting growth of major shoots during container production.

The plants, growing in 6 inch diameter pots, were approximately 8 inches in diameter when treatments were applied on May 20, 1996. The spray treatments of 62.5, 125, or 250 ppm ProShear (BA), 125, 250, 500 ppm Promalin (BA + GA), 250, 500, or 750 ppm Atrimmec (dikegulac), and 250, 500, or 750 ppm Florel (ethephon) were compared with untreated controls in a randomized complete block design with 4 replications of 2 plants per replication per treatment. Main shoot lengths were measured at 16, 31, and 51 days after treatment (DAT) and, numbers of new shoot breaks along the main stems were counted at 16 DAT.

Results and Discussion: ProShear was the most effective material for retarding main shoot growth of Portulaca. At 16 DAT the higher rate of ProShear (250 ppm) reduced shoot lengths by 25% compared to the control plants. At 51 DAT, shoot lengths were still reduced by 20% with the 250 ppm ProShear. The second most effective treatment, Florel (750 ppm), reduced shoot length by 17% at 16 DAT. By 51 DAT, the 750 ppm Florel reduced shoot length by only 8% compared with the control plants.

ProShear was also the most effective treatment for promotion of new shoot breaks along the main shoots. With the 250 ppm ProShear treatment, the number of new breaks was increased by 143%. The 250 ppm Promalin treatment increased new breaks by 55% while increasing the length of the new shoot breaks. However, the length of the main shoots was also increased. Florel and Atrimmec did not increase the number of new breaks.

The growth habit of Portulaca was also effected by some of these treatments. The high rates of Florel and Promalin caused all shoots to grow predominantly upright rather than prostrate. ProShear had the opposite effect, causing more prostrate growth as the rate increased.

Significance to Industry: ProShear was effective in reducing the growth of main shoots on Portulaca, and in promoting new shoot breaks. However, ProShear is not labeled for this use at this time. Florel may be used to reduce main shoot elongation but it did not significantly increase the number of new shoot breaks in this study.

Acknowledgments: We would like to thank Lancaster Farms Wholesale Nursery, Suffolk, VA, for providing the plants used in this study.

Growth Control in Container Production of Verbena 'Homestead Purple'

T.J. Banko and M.A. Stefani
Virginia Tech Hampton Roads AREC, Virginia Beach, VA 23455

Nature of Work: *Verbena canadensis* 'Homestead Purple' is a low-growing, long-flowering groundcover perennial that has become very popular for home and commercial landscapes. It produces rapidly-growing, trailing shoots that require frequent pruning during container production. The purpose of this study was to evaluate spray applications of a number of chemical growth regulators for effectiveness in controlling shoot growth of V. 'Homestead Purple'.

The plants were grown in 1-gallon containers in a pine bark medium amended with 6 lb./cu. yd. Osmocote 18-6-12 (Grace-Sierra, Milpitas, Ca.) and 8 lbs./cu. yd. dolomitic limestone. On May 30, 1996 the plants were pruned back even with the edge of the containers (7 1/4 inch dia.). On May 31, spray treatments of 10, 20 or 40 ppm Sumagic (uniconazole), 250, 500 or 1000 ppm Florel (ethephon), 250, 500 or 1000 ppm ProShear (BA), 5000 ppm B-Nine (daminozide), or 2500 ppm B-Nine + 1500 ppm Cycocel (chlormequat) were applied using a CO_2-pressurized sprayer set at 35 psi. These treatments were compared with untreated control plants. A randomized complete block experimental design was used with 5 replications of 3 plants per replication per treatment. On June 21 (21 days after treatment (DAT)), The longest shoot from each plant was measured. On July 3 (33 DAT), the longest shoot from each plant was again measured, the length of the longest internode was determined, and the number of internodes was counted.

Results and Discussion: At 21 DAT, the 1000 ppm Florel treatment was the most effective, controlling shoot elongation by 33%. The second-most effective treatment was the 1000 ppm ProShear which controlled shoot elongation by 19%. The 500 ppm Florel also provided commercially acceptable control, reducing elongation by 16%.

At 33 DAT, only the 500 ppm and 1000 ppm Florel treatments were still providing significant growth control. The 1000 ppm Florel reduced shoot growth by 40% (6.3 in. vs. 10.6 in.); the 500 ppm Florel by 19% (8.6 in. vs. 10.6 in.). The internode lengths also decreased linearly with increasing Florel concentration when measured at 33 DAT.

Significance to the Industry: This study shows that Florel at 500 to 1000 ppm may be used to control the growth of elongating shoots of *Verbena* 'Homestead Purple' during container production. The appearance of the Florel-treated plants was symmetrical, compact and very commercially acceptable.

Acknowledgments: We would like to thank Lancaster Farms Wholesale Nursery, Suffolk, Va., for providing the plants used in this study.