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IR-4 Ornamental Horticulture Program
PGR Herbaceous Branching Efficacy Study

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Acknowledgements
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Abstract

Three plant growth regulators, Augeo (dikegulac sodium), Configure (6-benzladenine) and Florel (ethephon), were tested to determine their potential for improving branching and quality of calibrachoa and verbena. Rates included Augeo at 400 and 800, Configure at 150 and 300 ppm and Florel at 500 and 1000 ppm. Shoot number, quality height and width were found to have a positive impact in several experiments but results were inconsistent. These benefits were offset by crop injury in the form of chlorisis and stunting. Bloom delay was found to be significant among certain varieties and may be unacceptable to growers. Applications of these three plant growth regulators have not been found to reliably replace the current practice of pinching. Further study is required in order to identify which treatments and rates will consistently improve quality for certain varieties of calibrachoa and verbena.

Introduction

A prolific pipeline for new ornamental varieties is flooding the floriculture trade. Ornamental growers and university extension researchers are continually tasked with mastering production practices that a yield high quality marketable crop. One common challenge reported among growers is managing vigorous species. An excessively vigorous, leggy plant is not only a problem in production and shipping but can be ineffective in the landscape. A well branched habit makes for ease in handling and an attractive full appearance in the garden.

In 2010, the IR-4 Project identified a need for further study on branching of herbaceous ornamentals. Two popular bedding plants, *Calibrachoa hybrida* and *Verbena hybrida* were selected for this research priority. Calibrachoa, known as seaside petunia, is in the nightshade family. The popular varietal series 'Can-Can' is covered with a profusion of small single flowers. Verbena is listed in the Verbenaceae family. 'Aztec', a popular variety, is a tender perennial commonly grown as an annual.

Calibrachoa 'Can-Can Terracotta'

Verbena 'Aztec Blue Velvet'

The size and shape of these plants can be managed in part by manipulating temperature, light and fertility. The practice of pinching in the liner stage or the rooted hanging basket is known to encourage lateral branching thus enhancing the finished product. B-Nine, Bonzi, Cycocel or Florel are sometimes used to maintain growth habit. Occasionally, Florel has been found to delay flowering.

The objective of this research is to evaluate the effects of three plant growth regulators, Augeo (dikegulac sodium), Configure (benzyladenine) and Florel (ethephon), on calibrachoa and verbena. Plant parameters evaluated include crop injury, quality, branch number, width/height, and bloom. By identifying the impact of these products on economically important crops such as calibrachoa and verbena, ornamental horticulture growers may safely and reliably utilize chemical applications to achieve an enhanced marketable crop which may possibly reduce the need for labor-intensive pinching and avoid costly application mistakes.

Materials and Methods

Three plant growth regulators (Table 1) were evaluated on container grown calibrachoa and annual verbena. A minimum of fifteen pots per treatment were used. Rooted cuttings were potted into soilless media in 4" or 6" pots. Rooted cuttings received a pinch. Treatments were sprayed over the top to wetness. Configure was applied twice although some researchers deviated from the protocol with only one application. Treatments included an unpinched and a pinched control for comparison.

Crop safety evaluations were taken at 2 and 6 weeks after application (WAT) on a scale of 0 to 10 (0= no efficacy; 10 = complete kill). Plant quality was rated on a subjective scale from 1 to 7 (1 = significantly worse than untreated, 4 = no difference from untreated, 7 = significantly better than untreated) when 50% of the plants developed buds. Days to first bloom, as well as, height and widths were taken.

Please visit http://ir4.rutgers.edu/ornamental/OrnamentalDrafts.cfm to view and download this protocol (11-002).

Products were supplied to researchers (See list of researchers in Appendix 1) by their respective manufacturers.

Table 1. List of Products and Rates Tested in 2011.

Product	**Active Ingredient(s)**	Rate (ppm)	**Manufacturer**
Augeo	Dikegulac sodium	400 & 800	OHP
Configure	6-benzyladenine	150 & 300	Fine Americas
Florel	ethephon	500 & 1000	Monterey AgResources

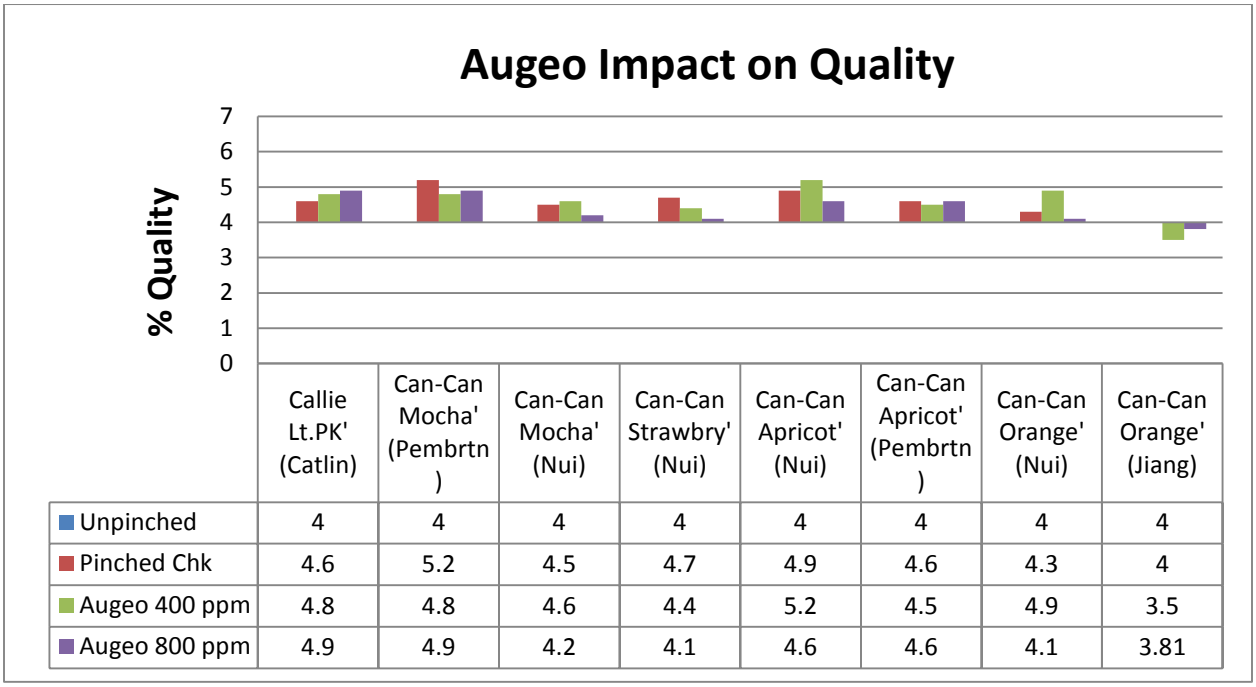
Results and Summary

Calibrachoa

Efficacy

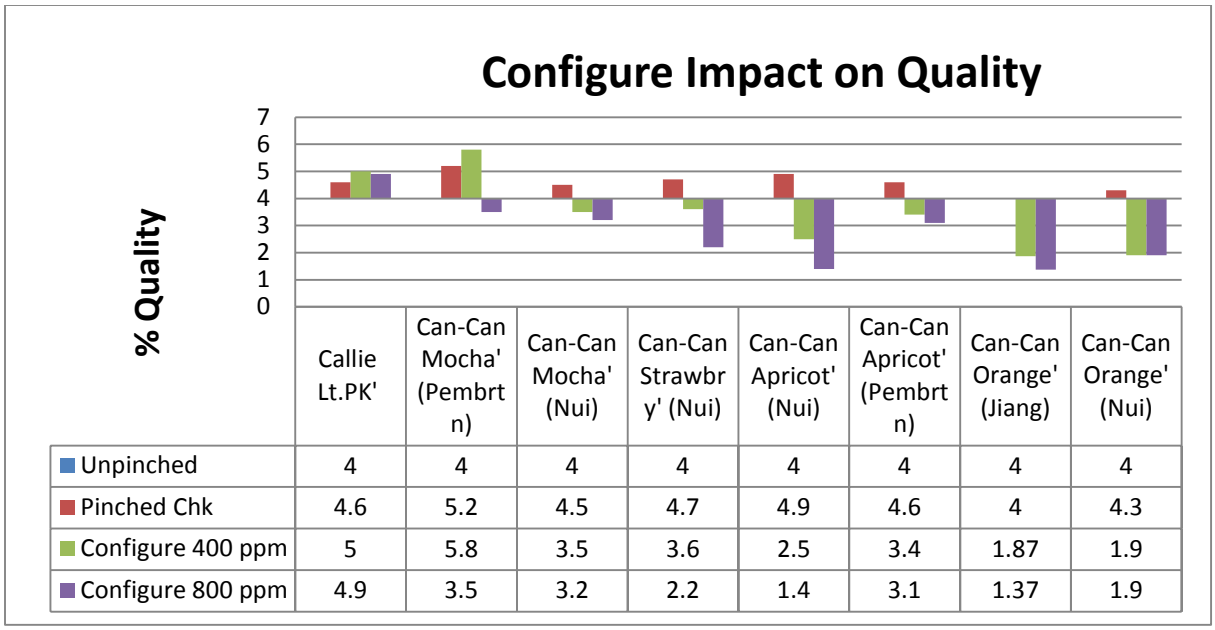
No consistent improvements in quality were observed with any plant growth regulator treatment on calibrachoa. Can-Can Apricot and Can-Can Orange treated with Augeo (400 ppm) had higher quality ratings than the pinched control in single experiments (Figure 1). Branch number was increased Can-Can Mocha treated with Augeo at 400 ppm (Table 6 &Table 9) and Configure at 150 (Table 9). Callie Light Pink plants treated with Configure (400 and 800 ppm) demonstrated improvement in quality (Figure 2). Florel at 500 ppm made a positive impact on quality for Can-Can Orange in a single experiment (Figure 3). However, in the majority of cases, quality was less for plants treated with Configure and Florel. Dramatic reduction in quality was observed in two experiments involving Can-Can Apricot treated with the high rate of Florel.

Bloom is thought to have been delayed by Can-Can Apricot, Mocha and Orange (Table 7 &Table 8) treated with Augeo and Florel (Table 5) and Augeo (400 and 800 ppm) for Can-Can Orange (Table 3).



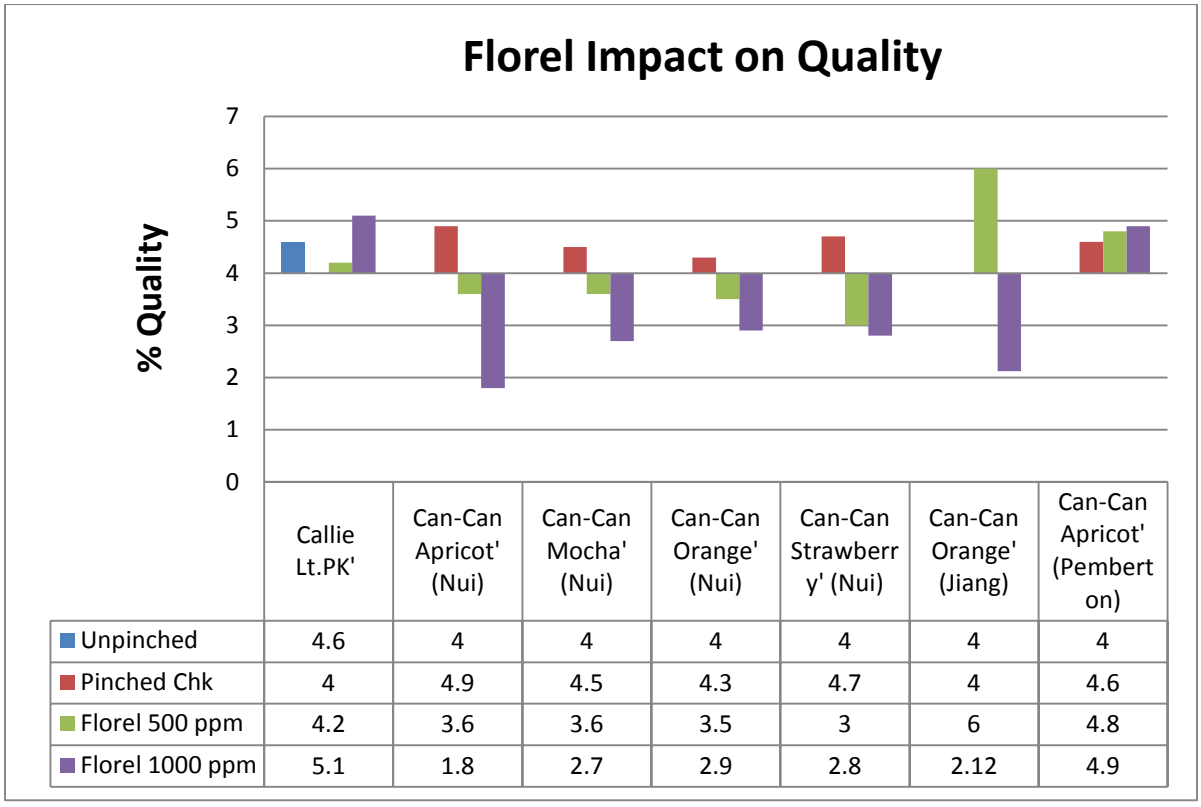
	Callie Lt.PK' (Catlin)	Can-Can Mocha' (Pembrtn)	Can-Can Mocha' (Nui)	Can-Can Strawbry' (Nui)	Can-Can Apricot' (Nui)	Can-Can Apricot' (Pembrtn)	Can-Can Orange' (Nui)	Can-Can Orange' (Jiang)
Unpinched	4	4	4	4	4	4	4	4
Pinched Chk	4.6	5.2	4.5	4.7	4.9	4.6	4.3	4
Augeo 400 ppm	4.8	4.8	4.6	4.4	5.2	4.5	4.9	3.5
Augeo 800 ppm	4.9	4.9	4.2	4.1	4.6	4.6	4.1	3.81

Figure 1. Impact of Augeo on quality for several calibrachoa varieties.



	Callie Lt.PK'	Can-Can Mocha' (Pembrtn)	Can-Can Mocha' (Nui)	Can-Can Strawbry' (Nui)	Can-Can Apricot' (Nui)	Can-Can Apricot' (Pembrtn)	Can-Can Orange' (Jiang)	Can-Can Orange' (Nui)
Unpinched	4	4	4	4	4	4	4	4
Pinched Chk	4.6	5.2	4.5	4.7	4.9	4.6	4	4.3
Configure 400 ppm	5	5.8	3.5	3.6	2.5	3.4	1.87	1.9
Configure 800 ppm	4.9	3.5	3.2	2.2	1.4	3.1	1.37	1.9

Figure 2. Impact of Configure on quality for several calibrochoa varieties.



	Callie Lt.PK'	Can-Can Apricot' (Nui)	Can-Can Mocha' (Nui)	Can-Can Orange' (Nui)	Can-Can Strawberry' (Nui)	Can-Can Orange' (Jiang)	Can-Can Apricot' (Pemberton)
Unpinched	4.6	4	4	4	4	4	4
Pinched Chk	4	4.9	4.5	4.3	4.7	4	4.6
Florel 500 ppm	4.2	3.6	3.6	3.5	3	6	4.8
Florel 1000 ppm	5.1	1.8	2.7	2.9	2.8	2.12	4.9

Figure 3. I impact of Florel on quality for several calibrochoa varieties.

Phytotoxicity

Crop injury evaluations were taken on six varieties of calibrachoa. It appears little to no phytotoxic symptoms were observed on plants treated with Augeo and Florel at the final evaluation. Defoliation and stunting was noted with one trial (Figure 8). Plants treated with Configure at 150 and 300 ppm had minor injury, averaging 0.71 and 0.73 respectively. Injury was characterized predominately as chlorosis.

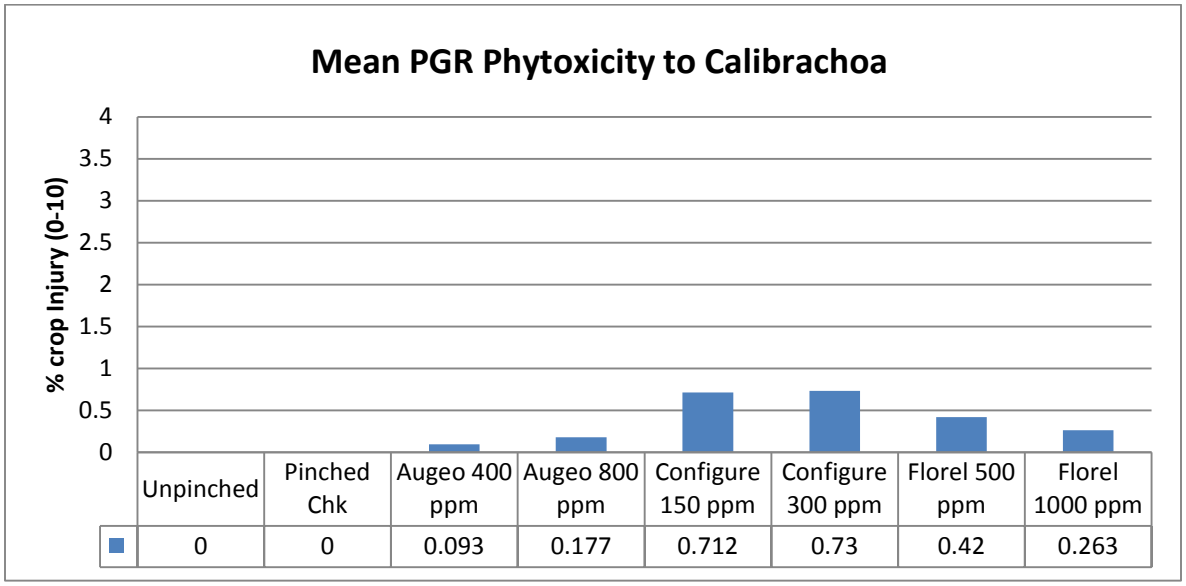


Figure 4. Mean Phytotoxicity ratings with Augeo, Configure and Florel applications to calibrochoa.

Experimental Results by Researcher

Catlin

Catlin evaluated Augeo, Configure and Florel effects on 'Callie Light Pink' calibrochoa in the greenhouse. Plants treated with Augeo (800 ppm), Configure (150 ppm) and Florel (1000 ppm) had better quality than the pinched control at the final evaluation. Width measurements were less for plants treated with Configure and Florel compared to the pinched control. Height ratings taken at the final evaluation showed no differences compared to the pinched control with the exception of Florel (500ppm) treated plants which were shorter. Days to bloom were significantly greater in plants treated with Configure and Florel compared to the pinched control.

Table 2. Effects of Augeo and Configure on Calibrachoa 'Callie Light Pink'. Catlin.

Treatment Rate	Quality			Height		Width		Days to Bloom
	9/23/11	10/14/11	10/28/11	10/14/11	10/28/11	10/14/11	10/28/11	# days
Augeo 400 ppm	4.2 a	3.9 abc	4.8 ab	6.4 a	5.8 ab	10.7 a	12.5 a	11.7 b
Augeo 800 ppm	4.1 ab	4.3 ab	4.9 a	6.5 a	5.8 ab	10.6 a	12.5 a	11.4 b
Configure 150 ppm	3.7 bc	4.6 a	5.0 a	6.1 abc	5.8 ab	8.5 bc	10.6 b	19.8 a
Configure 300 ppm	3.6 bc	4.5 ab	4.9 ab	6.1 abc	5.8 ab	8.4 bc	10.3 b	19.2 a
Florel 500 ppm	3.8 abc	3.3 c	4.2 ab	5.8 bc	5.4 b	7.3 c	9.3 c	19.0 a
Florel 1000 ppm	3.8 abc	4.5 ab	5.1 a	5.8 c	5.6 ab	9 b	10.6 b	20.5 a
Untreated not pinched	3.4 c	3.8 bc	4.6 ab	5.8 bc	5.4 ab	8.5 bc	10.7 b	20.2 a
Untreated pinched	4.0 ab	4.0 abc	4.0 b	6.3 ab	5.9 a	10.7 a	12.7 a	10.3 b

Jiang

The plant growth regulators Augeo, Configure and Florel were evaluated on container grown 'Can-Can' Calibrachoa grown in 4" pots in a greenhouse. Note: Trial for Florel was replicated in September 2011 due to phytotoxicity results caused by high dosage on treatment during the first trial.

Crop Injury: Little to no phytotoxicity was observed with Augeo treatments on calibrochoa. Minor injury from Configure was observed 1WAT (>2.0) increasing by 3WAT (3.87) for both rates. Minor phytotoxicity symptoms were observed following Florel treatments. See Table 3Table 5Table 6.

Efficacy: No treated plants exceed the control quality rating (4.0) with the exception of Florel 500 ppm at 3WAT. Treated plants in general produced more branches but crop quality varied from slightly to moderately worse among the treatments due to leaf yellowing. More compact growth was observed in terms of height and width with Augeo at 400 and 800 ppm (Table 3 and Figure 5) and Florel at 1000ppm

(Table 5and Figure 7). Taller plants were observed with Configure treatments and Florel at 500ppm. The exception for crop quality was Florel 500 ppm which received ratings moderately better than the control at 3WAT. Florel treated plants showed slight defoliation and stunting effects (Figure 8). Slight leaf yellowing and defoliation were noted with 2x applications of Configure. Bloom appeared to be significantly delayed with Augeo and Florel treatments.

Table 3. Effects of Augeo and Configure on Calibrachoa 'Can-Can Orange' treated 5/16/11. Jiang.

Treatment	Rate (ppm)	Crop Injury 1WAT	Crop Injury 3WAT	Quality 1WAT	Quality 3WAT	Days To Bloom	Height inches 9DAT	Width inches 9DAT
Augeo	400 ppm	0c	0.56cd	3.68b	3.50c	28.5a	3.05e	6.46ef
	800 ppm	0.31c	1.06c	3.81b	3.81c	30.0a	3.05e	4.66f
Control	pinched	0c	0.25cd	4.0a	4.0a	21.62c	6.83c	24.7a
	not pinched	0c	0.06d	4.0a	4.0a	21.37c	6.32c	21.73a

Table 4. Effects of Augeo and Configure on Calibrachoa 'Can-Can Orange' treated 5/16/11. Jiang.

Treatment	Rate (ppm)	Crop Injury 1WAT	Crop Injury 3WAT	Quality 1WAT	Quality 3WAT	Days To Bloom	Height Inches 9DAT	Width Inches 9DAT
Configure[1]	150 ppm	2.56a	3.87a	2.5d	1.87d	21.0c	10.47b	16.78c
	300 ppm	2.31a	3.87a	2.93c	1.37e	21.5c	12.03a	16.48c
Control	pinched	0c	0.25cd	4.0a	4.0a	21.62c	6.83c	24.7a
	not pinched	0c	0.06d	4.0a	4.0a	21.37c	6.32c	21.73a

[1]Two applications of Configure one week apart.

Table 5. Effects of Florel on Calibrachoa 'Can-Can Apricot' treated 9/2/11. Jiang.

Treatment	Rate (ppm)	Phytotoxicity 1WAT	Phytoxicity 3WAT	Quality 1WAT	Quality 3WAT	Days To Bloom	Height Inches 9DAT	Width Inches 9DAT
Florel	500 ppm	0c	2.31b	2.5d	6.0b	25.93b	7.21c	13.23d
	1000ppm	1.06b	1.18c	2.0e	2.12d	28.75a	4.69d	8.82e
Control	pinched	0c	0.25cd	4.0a	4.0a	21.62c	6.83c	24.7a
	not pinched	0c	0.06d	4.0a	4.0a	21.37c	6.32c	21.73a

Control (pinched) **Augeo 400ppm** **Augeo 800ppm**

Figure 5. Augeo at 400 and 800ppm 3WAT on Calibrochoa ‘Can-Can Orange’. Jiang

Control **Configure 150ppm** **Control** **Configure 300ppm**

Figure 6. Configure at 150 and 300ppm 3WAT on Calibrochoa ‘Can-Can Orange’. Jiang

Control **Florel 500ppm** **Florel 1000ppm**

Figure 7. Florel at 500 and 1000ppm 5WAT on Calibrochoa 'Can-Can Apricot'. Jiang

Control **Florel 500ppm** **Control** **Florel 1000ppm**

Figure 8. Florel at 500 and 1000ppm 13WAT on Calibrochoa 'Can-Can Apricot'. Jiang

Nui

Nui examined the effects of Augeo, Configure and Florel on four varieties of calibrachoa. Cuttings were transplanted into 4" pots and grown in the greenhouse. Can-Can Mocha and Can-Can Apricot had four plants per replicate while Can-Can Orange and Can-Can Strawberry had 2 plants per replicate.

Phytotoxicity: Little phytotoxicity in calibrachoa cultivars was observed, regardless of treatment (Table 6).

Efficacy: Overall, Augeo (400 and 800 ppm) treated plants had similar or slightly better branching than untreated and pinched plants, while all other treatments did not improve branching and visual quality. Can-Can Apricot plants treated with either rate of Augeo had significantly more branches than the untreated control. Can-Can Mocha treated with 400 ppm Augeo had significantly more branching than the pinched control. Regardless of concentration, Configure and Florel did not improve branching of any calibrachoa cultivars. Augeo 400 ppm treated plants had best visual quality, followed by Augeo 800 ppm for all calibrachoa cultivars. Configure (300 ppm) and Florel (1000 ppm) treated plants tended to have the lowest quality ratings.

Augeo 400 and 800 ppm treated plants had similar number of blooming shoots compared to untreated and pinched plants for all cultivars. Florel 500 and 1000 ppm also had similar blooming shoots in Can-Can Orange and Can-Can Strawberry compared to untreated and pinched plants. Plants treated with Configure had the lowest number of blooming shoots suggesting a significant delay in flowering. All plants treated

with Configure or Florel had significantly small width measurements. Can-Can Apricot treated with either rate of Augeo had significantly greater width measurements.

Table 6. Effects of Augeo and Configure on Calibrachoa 'Can-Can' varieties. Nui.

Treatment	Rate (ppm)	Can-Can Apricot	Can-Can Mocha	Can-Can Orange	Can-Can Strawberry
	Phytoxicity 22DAT				
Augeo	400	0.0	0.0	0.0	0.0
	800	0.0	0.0	0.0	0.0
Configure[1]	150	0.1	0.0	0.1	0.2
	300	0.3	0.0	0.1	0.2
Florel	500	0.0	0.0	0.1	0.1
	1000	0.1	0.1	0.1	0.1
Check	pinched	0.0	0.0	0.0	0.0
	untreated	0.0	0.0	0.0	0.0
	Quality 33DAT				
Augeo	400	5.2	4.6	4.9	4.4
	800	4.6	4.2	4.1	4.1
Configure	150	2.5	3.5	1.9	3.6
	300	1.4	3.2	1.9	2.2
Florel	500	3.6	3.6	3.5	3.0
	1000	1.8	2.7	2.9	2.8
Check	pinched	4.9	4.5	43	4.7
	untreated	4.0	4.0	4.0	4.0
	Branch Number 33DAT				
Augeo	400	76.3 a	72.3 a	86.8 a	102.8 a
	800	77.8 a	58.1 abc	76.4 ab	98.0 a
Configure	150	45.6 cd	56.3 abc	48.0 cd	74.2 abc
	300	29.3 e	69.0 ab	36.0 d	62.9 c
Florel	500	57.3 bc	58.6 abc	57.5 bc	63.9 bc
	1000	39.2 de	45.4 c	47.9 cd	58.3 c
Check	pinched	68.7 ab	52.3 bc	76.3 ab	99.6 a
	Untreated	58.5 bc	64.4 ab	74.7 ab	90.2 ab

[1]Two applications of Configure applied one week apart.

Table 7. Effects of Augeo and Configure on Calibrachoa 'Can-Can varieties. Nui.

Treatment	Rate (ppm)	Can-Can Apricot	Can-Can Mocha	Can-Can Orange	Can-Can Strawberry
	No. of Bloom Shoots 33DAT				
Augeo	400	87.5 a	67.2 ab	77.5 a	85.0 a
	800	75.0 ab	84.4 a	87.5 a	87.5 a
Configure[1]	150	7.8 c	32.8 c	55.0 b	62.5 a
	300	5.0 c	25.0 c	7.5 c	8.3 b
Florel	500	79.7 ab	59.b	87.5 a	62.5 a
	1000	60.7 b	38.3 c	87.5 a	67.5 a
Check	pinched	79.2 ab	68.3 ab	75.0 ab	67.5 a
	untreated	70.3 ab	68.8 ab	75.0 ab	80.0 a
	Width 33DAT				
Augeo	400	44.2 a	27.8 abc	33.9 ab	33.6 a
	800	37.0 a	25.3 bcd	28.6 cd	29.2 a
Configure	150	20.9 d	24.8 cd	24.6 d	24.5 b
	300	15.4	22.4 de	19.3 e	21.3 b
Florel	500	31.2 c	22.7 de	29.6 bcd	24.5 b
	1000	18.1 de	20.9 e	26.5 d	21.7 b
Check	pinched	37.9 b	28.7 ab	33.0 ab	31.1 a
	untreated	36.7 b	29.8 a	35.6 a	30.8 a

[1]Two applications of Configure applied one week apart.

Pemberton

Pemberton conducted an experiment to evaluate the impact of three plant growth regulators on branching for 'Can-Can Apricot' and 'Can-Can Mocha" calibrachoa. Augeo, Configure and Florel were applied to transplants grown in 4" pots in the greenhouse. Note: Only the pinched controls received a pinch while the treated plants remained unpinched.

Phytotoxicity: No phytotoxicity was evident among any treatment therefore no results are presented.

Efficacy: At the 9DAT quality evaluation none of the treatments were better than the unpinched control. By 23DAT both Augeo and both Florel treatments resulted in higher quality ratings than for the control plants for Can-Can Mocha (Table 9). At this same time, significant stunting became evident for both Configure treatments on each variety and significant chlorosis was observed on Can-Can Apricot (Table 8). At 33DAT, all treated 'Can-Can Apricot plants except Augeo (400 ppm) had quality ratings greater than the untreated control. For the Mocha variety, quality ratings for all of the treatments except Configure (300 ppm) were better than the control 33DAT. Shoot numbers for 'Can-Can Mocha' were greater than the unpinched control for all treatments except the high rate of Configure and Florel. No differences in shoot numbers were found for 'Can-Can Apricot' at this time. A significant reduction in flowering was demonstrated 33DAT by 'Can-Can Apricot' plants treated with Configure and 'Can-Can Mocha' plants treated with Configure at 300 ppm. Overall, growth regulator treatments produced results equal to pinching for both cultivars.

Table 8. Effects of Augeo, Configure and Florel on Calibrachoa 'Can-Can Apricot'. Pemberton.

Treatment Rate	Shoot[1] number		Quality			Flower[2]		Stunting	Chlorosis
	2 DAT	33 DAT	9 DAT	23 DAT	33 DAT	23 DAT	33 DAT	23 DAT	23 DAT
Augeo 400 ppm	3.4	67.3	3.2 cd	4.3 a	4.5 ab	3.6 a	4.6 a	0.0 b	1.3 c
Augeo 800 ppm	4.3	74.3	4.8 a	4.7 a	4.6 a	4.1 a	5.3 a	0.0 b	2.1 bc
Configure 150 ppm	3.8	65.3	2.9 d	2.3 b	3.4 cd	1.0 c	1.1 b	10.0 a	2.8 ab
Configure 300 ppm	4.3	57.6	2.8 d	2.1 b	3.1 d	1.0 c	1.0 b	10.0 a	3.6 a
Florel 500 ppm	3.9	60.8	3.6 bc	4.2 a	4.8 a	3.8 a	5.1 a	0.0 b	0.8 c
Florel 1000 ppm	4.1	65.4	3.0 cd	4.7 a	4.9 a	3.1 ab	5.3 a	0.0 b	1.1 c
Untreated pinched	4.1	64.9	3.0 cd	4.4 a	4.6 ab	2.4 b	4.4 a	0.0 b	1.5 bc
Untreated not pinched	4.1	52.5	4.0 ab	4.0 a	4.0 bc	3.5 a	5.1 a	0.0 b	1.1 c
ANOVA	NS	NS	**	**	**	**	**	**	**

[1]Number of shoots greater than 3 cm.
[2]Flower rating was the percent of the canopy in flower with 0 = no flowering, 10 = 100% flowering.
[3] Stunting, and Chlorosis ratings were on a scale of 0 to 10 with 0 being the least stunting/chlorosis and 10 being the most.

Table 9. Effects of Augeo, Configure and Florel on Calibrachoa 'Can-Can Mocha'. Pemberton.

Treatment Rate	Shoot[1] number		Quality			Flower[2]		Stunting	Chlorosis
	2 DAT	33 DAT	9 DAT	23 DAT	33 DAT	23 DAT	33 DAT	23 DAT	23 DAT
Augeo 400 ppm	7.1 a	80.9 abc	4.8 a	5.1 a	4.8 c	4.3 a	4.4 a	0.0 b	1.0 a
Augeo 800 ppm	4.9 de	74.3 abc	4.0 ab	5.0 a	4.9 bc	3.6 ab	4.4 a	0.0 b	0.3 b
Configure 150 ppm	6.0 bc	84.6 a	4.4 ab	3.8 bc	5.8 a	1.2 c	3.4 b	3.3 a	0.0 b
Configure 300 ppm	4.4 e	66.5 bcd	2.9 c	2.9 c	3.5 d	1.0 c	1.0 c	5.7 a	0.2 b
Florel 500 ppm	4.9 cde	83.0 ab	3.9 ab	5.7 a	5.3 abc	3.7 ab	4.7 a	0.0 b	0.0 b
Florel 1000 ppm	5.6 bcd	71.6 abcd	4.1 ab	5.3 a	5.6 ab	3.2 b	4.5 a	0.0 b	0.3 b
Untreated pinched	5.6 bcd	65.9 cd	3.8 bc	5.2 a	5.2 abc	3.4 b	3.7 ab	0.0 b	0.0 b
Untreated not pinched	6.1 ab	57.1 d	4.0 ab	4.0 b	4.0 d	3.5 ab	4.3 ab	0.0 b	0.0 b
ANOVA	**	*	*	**	**	**	**	**	*

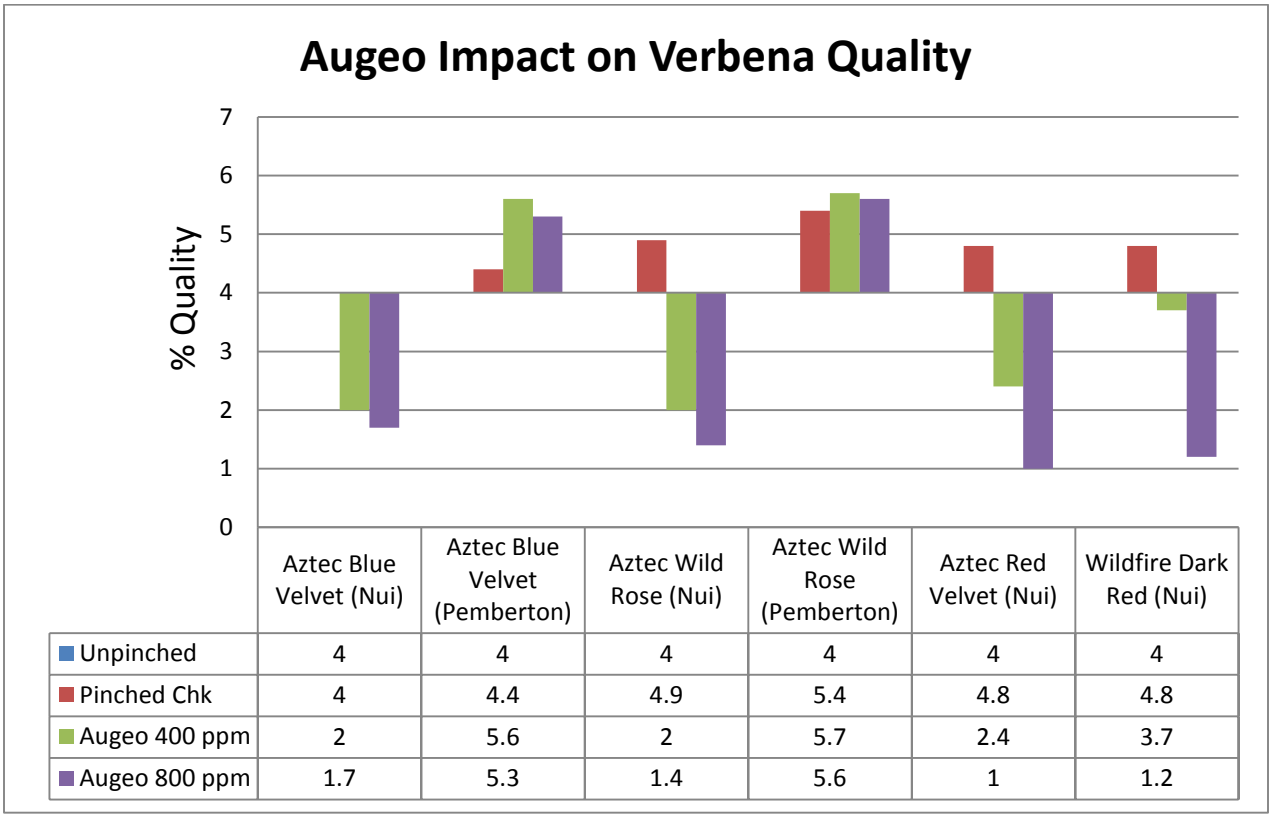
[1]Number of shoots greater than 3 cm.
[2]Flower, stunting, and chlorosis ratings were on a scale of 0 to 10 with 0 being the least and 10 being the most.

Verbena

Efficacy

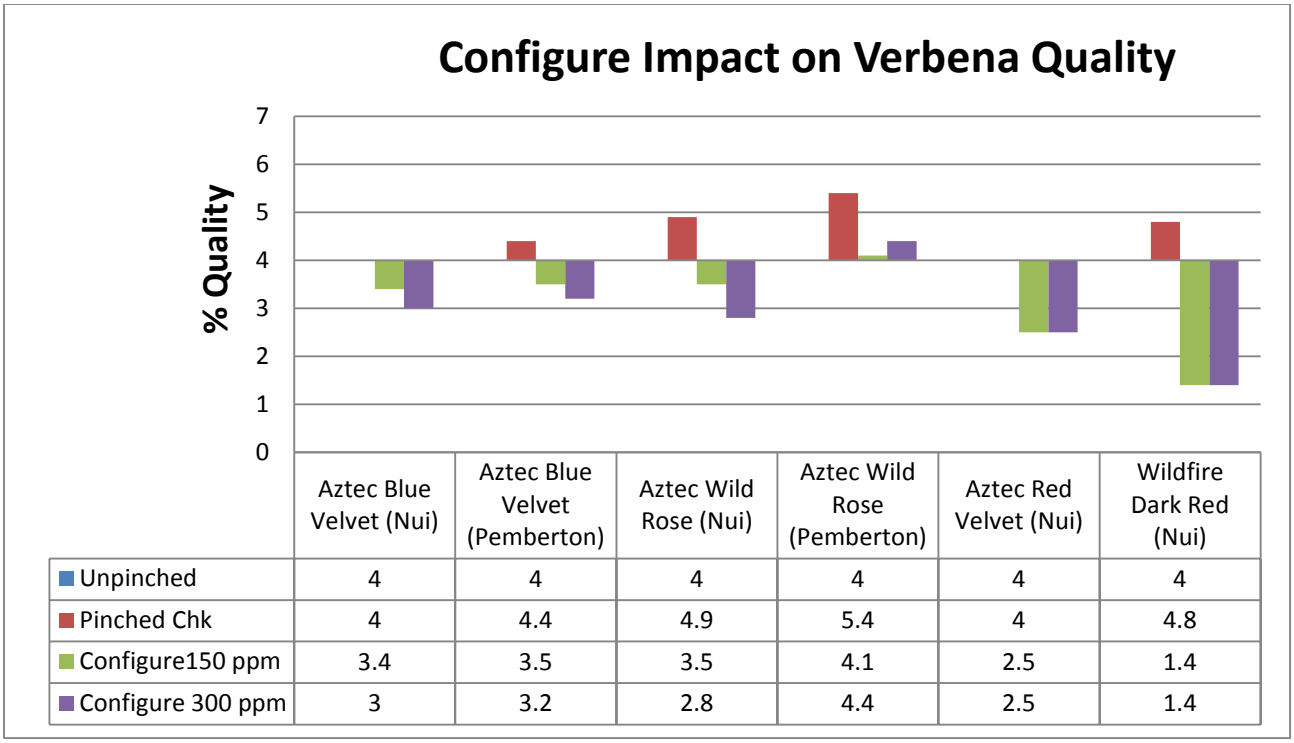
In general, none of the plant growth regulators tested consistently improved the quality of verbena. In four of six trials Augeo (400 and 800 ppm) did not exceed quality ratings compared to the controls (

Figure **9**). One trial involving Aztec Blue and one trial with Aztec Wild Rose (both at the same location) a benefit was observed with the Augeo treatment over the controls. In the remaining four experiments, Augeo treated plants had markedly lower quality. In Configure treated (150 and 300 ppm) plants had quality ratings significantly lower than the pinched controls (Figure 10). In one of the six experiments testing Florel (500 and 1000 ppm) Aztec Blue Velvet plants treated with Florel had higher quality ratings than the unpinched control, however, this data was not statistically different. All other tests comparing Florel to the controls demonstrated no improvement and in three cases the high rate dramatically decreased quality.



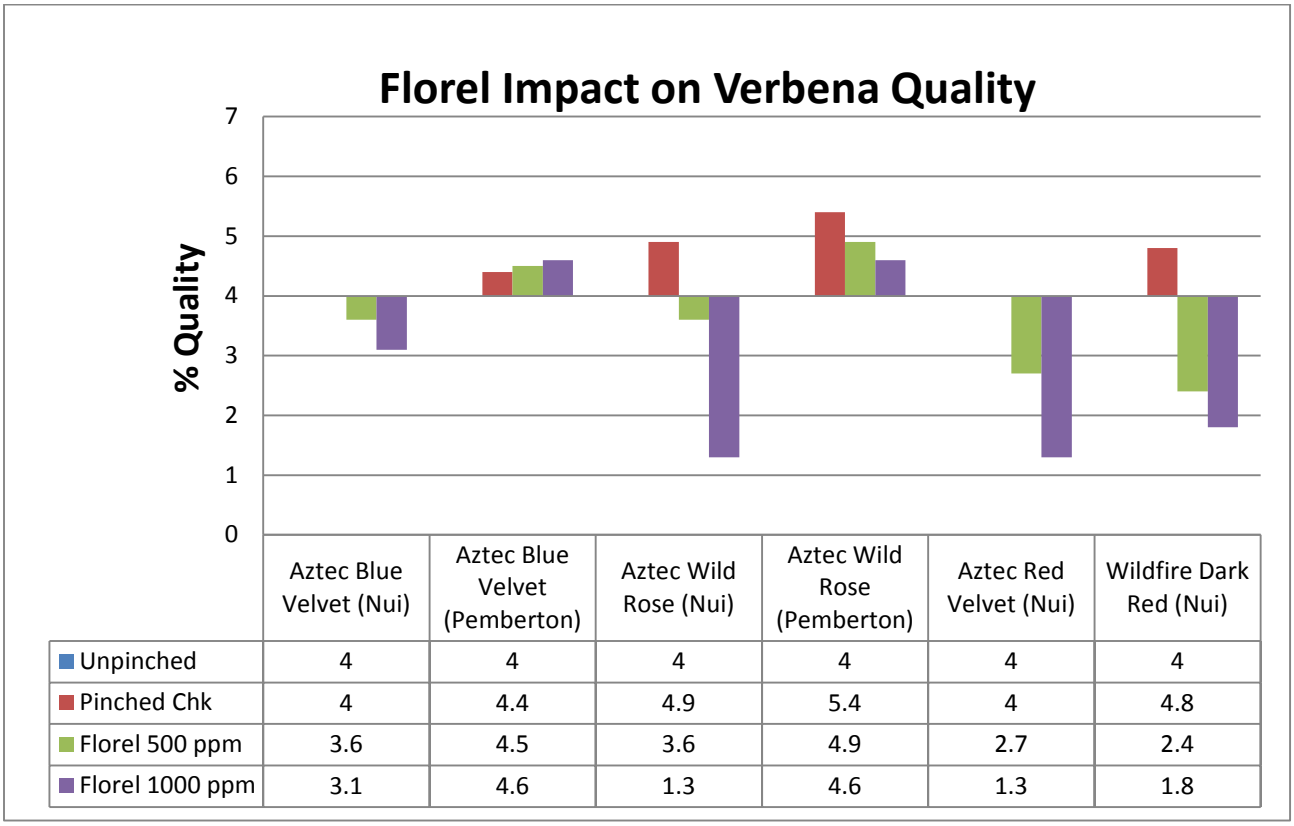
	Aztec Blue Velvet (Nui)	Aztec Blue Velvet (Pemberton)	Aztec Wild Rose (Nui)	Aztec Wild Rose (Pemberton)	Aztec Red Velvet (Nui)	Wildfire Dark Red (Nui)
Unpinched	4	4	4	4	4	4
Pinched Chk	4	4.4	4.9	5.4	4.8	4.8
Augeo 400 ppm	2	5.6	2	5.7	2.4	3.7
Augeo 800 ppm	1.7	5.3	1.4	5.6	1	1.2

Figure 9. Augeo Impact on Verbena quality.



	Aztec Blue Velvet (Nui)	Aztec Blue Velvet (Pemberton)	Aztec Wild Rose (Nui)	Aztec Wild Rose (Pemberton)	Aztec Red Velvet (Nui)	Wildfire Dark Red (Nui)
Unpinched	4	4	4	4	4	4
Pinched Chk	4	4.4	4.9	5.4	4	4.8
Configure150 ppm	3.4	3.5	3.5	4.1	2.5	1.4
Configure 300 ppm	3	3.2	2.8	4.4	2.5	1.4

Figure 10. Configure Impact on Verbena quality.



	Aztec Blue Velvet (Nui)	Aztec Blue Velvet (Pemberton)	Aztec Wild Rose (Nui)	Aztec Wild Rose (Pemberton)	Aztec Red Velvet (Nui)	Wildfire Dark Red (Nui)
Unpinched	4	4	4	4	4	4
Pinched Chk	4	4.4	4.9	5.4	4	4.8
Florel 500 ppm	3.6	4.5	3.6	4.9	2.7	2.4
Florel 1000 ppm	3.1	4.6	1.3	4.6	1.3	1.8

Figure 11. Florel Impact on Verbena quality.

Phytotoxicity

On average none of the treatments demonstrated unacceptable injury to verbena. Configure at 300 ppm had a mean crop injury rating of 1.8 while Florel at 1000 ppm had a mean rating of 1.55. The varieties with the highest injury ratings were Aztec Red Velvet, and Aztec Wild Rose. In a single study, Aztec Red Velvet demonstrated injury at 4.2 from Augeo 800 ppm and 3.4 from Florel at 1000 ppm 21DAT (Table 10). Aztec Wild Rose had injury ratings of 2.3 for Augeo at 800 ppm and 3.4 for Florel at 1000 ppm 21DAT.

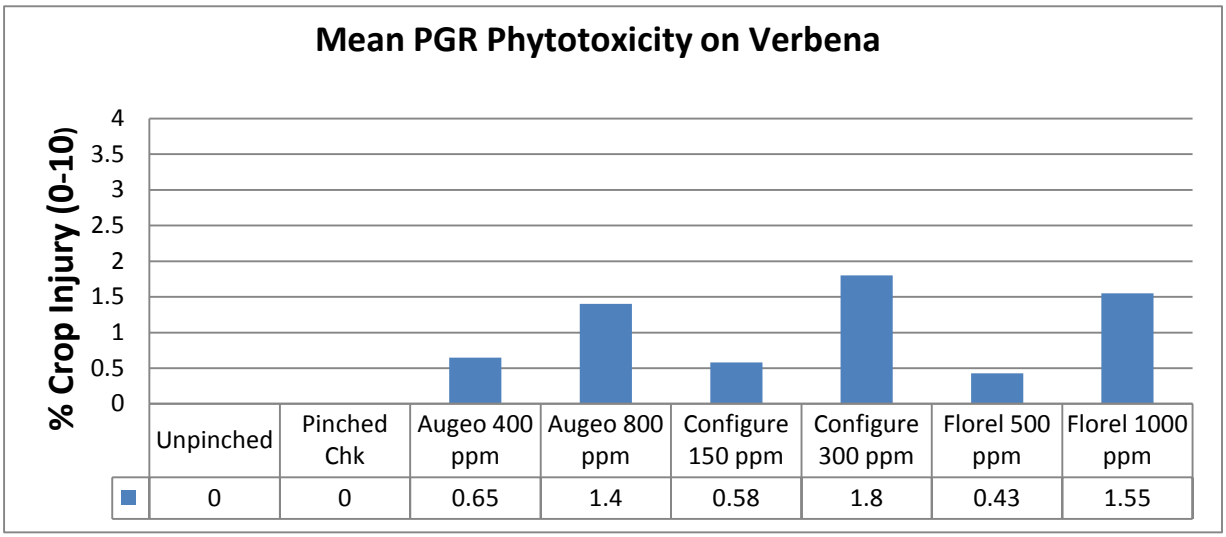


Figure 12. Mean Crop Injury ratings of Augeo, Configure and Florel on verbena.

Experimental Results by Researcher

Nui

Augeo, Configure and Florel were evaluated for branching and crop injury on four verbena varieties grown in 4" pots in the greenhouse. The varieties 'Aztec Blue Velvet' and 'Aztec Wild Rose' had four plants per rep while 'Aztec Red Velvet' and 'Aztec Wildfire Dark Red'.

Phytotoxicity: All verbena cultivars had phytotoxicity (Table 10) although the degree of damage varied with cultivar and treatment. The greatest level of crop injury seen in 'Aztec Red Velvet' (4.2) was from Augeo (800 ppm) while crop injury on 'Aztec Blue Velvet' (2.2) was observed with Configure (300ppm).

Efficacy: No improvement in branching was seen with any treatment compared to the controls (Table 11). For 'Aztec Blue Velvet' plants treated with Configure 300 ppm and Florel 500 ppm had similar total shoot numbers as the untreated and pinched plants. All other PGR treatments reduced shoot number. For 'Aztec Wild Rose' plants treated with Configure at 150 ppm and 300 ppm had shoot numbers comparable to the untreated and pinched plants while all other pgr treated plants had fewer shoots. For the remaining cultivars, Aztec Red Velvet and Wildfire Dark Red, all pgr treated plants had fewer shoots than the untreated and pinched plants.

By 33DAT the pinched plants demonstrated the best visual quality compared to the treated plants regardless of cultivar. The effect of pgr treatment on visual quality varied by cultivar but none equaled or exceeded the pinched control rating. Height and/or width measurements were less compared to the control for all varieties treated with all products (not all rates) with the exception of Florel on ' Blue Velvet'.

The number of plants with blooms was significantly less for all treated 'Aztec Red Velvet' plants at 33DAT. This was also the case for 'Aztec Blue Velvet' with the exception of Florel (500ppm) and 'Wildfire Dark Red' with the exception of Augeo at 400 ppm. 'Aztec Wild Rose' treated with either rate of Augeo and the high rate of Florel had bloom shoot numbers significantly less than the controls. Results suggest that pgr treatments may produce a more compact plant with considerable bloom delay.

Table 10. Crop Injury from Augeo, Configure and Florel on verbena. Nui.

Treatment	Rate (ppm)	Aztec Blue Velvet	Aztec Red Velvet	Aztec Wild Rose	Wildfire Dark Red
		Phytoxicity 21DAT			
Augeo	400	1.5	1.0	1.1	0.3
	800	1.5	4.2	2.3	0.8
Configure	150	0.4	1.2	0.9	0.7
	300	2.2	2.4	2.0	0.8
Florel	500	0.4	0.8	0.8	0.6
	1000	0.7	3.4	3.4	1.8
Check	pinched	0	0	0	0
	untreated	0	0	0	0

Table 11. Effects of Augeo, Configure and Florel on verbena growth. Nui

Treatment	Rate (ppm)	Aztec Blue Velvet	Aztec Red Velvet	Aztec Wild Rose	Wildfire Dark Red
		Quality33DAT			
Augeo	400	2.0	2.4	2.0	3.7
	800	1.7	1.0	1.4	1.2
Configure	150	3.4	2.5	3.5	1.4
	300	3.0	2.5	2.8	1.4
Florel	500	3.6	2.7	3.6	2.4
	1000	3.1	1.3	1.3	1.8
Check	pinched	4.0	4.8	4.9	4.8
	untreated	4	4	4	4
		Branch Number33DAT			
Augeo	400	6.6 c	7.5 b	2.9 b	12.1 ab
	800	4.0 d	2.3 c	2.3 b	1.7 c
Configure	150	8.2 bc	8.4 b	10.6 a	4.2 c
	300	9.7 ab	6.7 b	9.4 a	1.6 c
Florel	500	11.1 a	9.3 b	11 a	10.2 b
	1000	7.8 bc	2.6 c	2.5 b	4.7 c
Check	pinched	9.5 ab	14.5 a	9.3 a	11.8 ab
	untreated	11.7 a	16.2 a	9.6 a	13.7 a
		No. of Shoots with Blooms 33DAT			
Augeo	400	4.9 de	4.4 c	2.3 c	8.5 b
	800	3.5 e	0.9 d	1.4 c	1.1 d
Configure	150	6.3 bcd	4.8 c	8.9 a	1.6 d
	300	6.8 abcd	3.8 c	6.6 b	0.9 d
Florel	500	8.3 ab	7.1 b	6.6 b	5.7 c
	1000	5.9 cd	0.6 d	0.7 c	2.3 d
Check	pinched	7.8 abc	11.0 a	7.6 ab	8.6 b
	untreated	8.8 a	12.4 a	7.2 ab	11.9 a

Table 12. Effects of Augeo, Configure and Florel on verbena width and height. Nui

Treatment	Rate (ppm)	Aztec Blue Velvet	Aztec Red Velvet	Aztec Wild Rose	Wildfire Dark Red
		Width 33DAT			
Augeo	400	13.7 cd	14.0 cd	14.9 cd	21.2 b
	800	12.4 d	9.8 d	10.7 e	9.0 d
Configure	150	15.7 bcd	16 bc	19 b	15.6 bc
	300	16.8 bc	9.8 d	18.4 bc	10.5 cd
Florel	500	18.6 ab	19.4 b	24.1 a	20.8 b
	1000	15.9 bc	11.1 d	13.7 de	14.5 cd
Check	pinched	20.3 a	28.2 a	27.1 a	36.6 a
	untreated	20.5 a	31.5 a	23.7 a	33.9 a
		Height 33DAT			
Augeo	400	13.2 a	8.0 c	9.0 c	14.3 ab
	800	11.2 a	5.8 c	9.5 bc	8.0 d
Configure	150	11.2 a	11.9 b	12.1 a	9.8 cd
	300	11.7 a	10.8 b	12.1 a	7.7 d
Florel	500	13.8 a	11.9 b	11.3 ab	12.3 abc
	1000	13.7 a	6.9 c	8.5 c	10.7 cd
Check	pinched	13.2 a	15.1 a	10.5 abc	11.4 bc
	untreated	19.8 a	15.4 a	12.0 a	15.2 a

Pemberton

Pemberton evaluated the effects of Augeo, Configure and Florel on branching of 'Aztec Blue Velvet' and 'Aztec Wild Rose' verbena. Transplants were potted into 4" pots and grown in the greenhouse. Note: Only pinched controls received a pinch while the treated plants remained unpinched.

Phytotoxicity: No injury to verbena was observed at 23DAT except for minor injury from the high rate of Configure on 'Aztec Blue Velvet' and both rates on 'Aztec Wild Rose', with the Configure 300 treated plants showing the most symptoms. See Figure 13.

Efficacy: Nine days after treatment, the quality rating was lower than the untreated-not-pinched (control) for all of the treatments except Configure 150, but the differences were small. Twenty three days after treatment, the quality rating was higher than the untreated-not-pinched for all of the treatments except Augeo 800 and Configure 300. Both Florel treatments were better than the control. At this time, phytotoxicity was noted only on the Configure treatments, with the Configure 300 treated plants showing the most symptoms. This correlated with a poor quality rating noted on the Configure 300 treated plants as well. Thirty three days after treatment, the quality rating, flower number, and shoot number was best on plants treated with both rates of Augeo. Augeo 400 treated plants had better quality ratings than the untreated-pinched plants. There were no significant interactions between cultivar and treatment for any of the variables measured.

Table 13. Effects of Augeo, Configure, and Florel on Verbena 'Aztec Blue Velvet'. Pemberton

Treatment	Phytotoxicity	Shoot number		Quality			Flower number[1]	
	23DAT	2DAT	33DAT	9DAT	23DAT	33DAT	23DAT	33DAT
Augeo 400 ppm	0.0 b	2.2	18.9	3.8 abc	5.2 ab	5.6 a	6.6 ab	13.5 a
Augeo 800 ppm	0.0 b	2.8	19.2	3.3 cd	2.9 e	5.3 ab	0.9 e	14.1 a
Configure 150 ppm	0.0 b	2.4	13.2	4.1 a	4.5 bc	3.5 de	5.0 bc	6.4 c
Configure 300 ppm	1.7 a	2.8	15.4	3.1 d	3.4 de	3.2 e	3.8 cd	7.1 c
Florel 500 ppm	0.0 b	2.3	18.1	3.4 bcd	5.1 ab	4.5 bc	7.6 a	8.6 bc
Florel 1000 ppm	0.0 b	2.3	17.6	3.0 d	5.4 a	4.6 bc	5.0 bc	11.2 ab
Untreated pinched	0.0 b	2.4	16.5	2.9 d	4.5 abc	4.4 c	3.4 d	9.3 bc
Untreated not pinched	0.0 b	2.7	17.4	4.0 ab	4.0 cd	4.0 cd	7.6 a	8.0 bc
ANOVA	**	NS	NS	**	**	**	**	**

[1]Number of infloresences.

Table 14. Effects of Augeo, Configure, and Florel on Verbena 'Aztec Wild Rose'. Pemberton

Treatment	Phytotoxicity rating	Shoot number		Quality			Flower number	
	23DAT	2DAT	33DAT	9DAT	23DAT	33DAT	23DAT	33DAT
Augeo 400 ppm	0.0 c	2.6	19.6	3.1 bc	5.1 a	5.7 a	6.9 ab	16.1 a
Augeo 800 ppm	0.0 c	3.1	19.4	2.8 c	3.0 c	5.6 a	0.6 d	14.1 ab
Configure 150 ppm	0.5 b	2.2	15.3	3.3 b	5.2 a	4.1 d	7.5 a	8.3 c
Configure 300 ppm	1.7 a	2.7	16.6	2.9 bc	4.0 b	4.4 cd	4.4 c	9.4 c
Florel 500 ppm	0.0 c	2.6	18.3	2.9 bc	5.3 a	4.9 bc	7.6 a	11.3 bc
Florel 1000 ppm	0.0 c	2.4	16.0	2.8 c	5.5 a	4.6 cd	5.1 bc	11.4 bc
Untreated pinched	0.0 c	2.5	16.8	2.9 bc	4.9 a	5.4 ab	5.0 bc	14.9 a
Untreated not pinched	0.0 c	2.8	18.1	4.0 a	4.0 b	4.0 d	8.9 a	11.2 bc
ANOVA	**	NS	NS	**	**	**	**	**

Figure 13. Phytoxicity effects on Verbena 'Aztec Blue Velvet' with Configure at 300 ppm. Pemberton.

Table 15. Summary of product efficacy.

Product	Common Name	Latin Name	Researcher	Trial Year	Results	Data Link
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. C. 'Callie Light Pink'	Catlin	2011	No differences in quality or dry weight for plants treated with 400 and 800 ppm compared to pinched control. Fewer days to bloom. Minor crop injury (not rated).	
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Apriciot'	Niu	2011	Number of shoots not significantly different than pinched untreated. Greater width and higher quality with 400 ppm and 800 ppm. No crop injury.	20120130a.pdf
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Apricot'	Pemberton	2011	No differences at 33 DAT in quality, flower or shoot number compared to pinched or unpinched untreated. No crop injury.	20120202a.pdf
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Mocha'	Niu	2011	Pots treated with 400 ppm had significantly higher branch count 33DAT than pinched untreated; 800 ppm more narrow than untreated control; little to crop injury or differences in quality to controls.	20120130a.pdf
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Mocha'	Pemberton	2011	No significant differences in quality or shoot number for plants treated with 400 and 800 ppm compared to pinched control. No crop injury other than chlorosis at low rate.	20120202a.pdf
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Orange'	Niu	2011	Pots treated with low rate had quality slightly better than untreated control. No crop injury or differences in shoot numbers, or width with 400 or 800 ppm.	20120130a.pdf
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Strawberry'	Niu	2011	Quality did not exceed pinched control; no crop injury or differences in shoot numbers or width for 400 or 800ppm.	20120130a.pdf
Augeo (Dikegulac sodium)	Calibrachoa	Calibrachoa sp. Can-Can Orange	Jiang	2011	Tested in June 2011: No difference in quality with 400 and 800 ppm, decrease in height and width and delay in bloom. Minor injury with hi rate.	20120202b.pdf
Augeo (Dikegulac sodium)	Vervain	Verbena sp. V. 'Aztec Blue Velvet'	Niu	2011	Overall no improvement: Fewer blooms and shoots, and smaller width and lower quality with 400 and 800 ppm compared to pinched untreated. Minor crop injury.	20120130a.pdf
Augeo (Dikegulac sodium)	Vervain	Verbena sp. V. 'Aztec Blue Velvet'	Pemberton	2011	Higher quality and flower number with for low rate at 33 DAT but no difference in shoot number compared to pinched untreated with 400 and 800 ppm. No crop injury.	20120202a.pdf
Augeo (Dikegulac sodium)	Vervain	Verbena sp. V. 'Aztec Red Velvet'	Niu	2011	Lower quality with 400 and 800 ppm compared to controls; reduction in branching, bloom, height and width; unacceptable injury with high rate.	20120130a.pdf

Product	Common Name	Latin Name	Researcher	Trial Year	Results	Data Link
Augeo (Dikegulac sodium)	Vervain	Verbena sp. V. 'Aztec Wild Rose'	Niu	2011	Lower quality, significantly fewer branches and bloom shoots, shorter and more narrow plants with 400 and 800 ppm 33DAT compared to controls; minor crop injury.	20120130a.pdf
Augeo (Dikegulac sodium)	Vervain	Verbena sp. V. 'Aztec Wild Rose'	Pemberton	2011	Increase in quality with 400 and 800 ppm and increase in flowering with lo rate. No differences in shoot number. No crop injury.	20120202a.pdf
Augeo (Dikegulac sodium)	Vervain	Verbena sp. V. 'Wildfire Dark Red'	Niu	2011	Lower quality, significantly fewer branches and smaller width for 400 and 800 ppm 33DAT compared to controls. Lower bloom shoots count and height for high rate compared to pinched control. V. minor crop injury.	20120130a.pdf
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. C. 'Callie Light Pink'	Catlin	2011	No differences in quality, dry weight or days to bloomfor plants treated with 400 and 800 ppm compared to pinched control. Some chlorosis (not rated for injury)	
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Apricot'	Niu	2011	Significantly fewer shoots and smaller width with 2 applic. @ 150 and 300ppm. Better quality rating than pinched untreated. Little to no crop injury.	20120130a.pdf
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. C. Can-Can Apricot'	Pemberton	2011	Shoot number was higher for lo rate than untreated unpinched. Quality and flower number was less than the pinched and unpinched controls at 33DAT. No crop injury.	20120202a.pdf
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Mocha'	Niu	2011	Fewer bloom shoots, lower quality, and smaller width at 33DAT with 2 applic. @ 150 and 300 ppm compared to controls; no crop injury.	20120130a.pdf
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. C. Can-Can Mocha'	Pemberton	2011	Increased shoot number with 150 ppm, decreased quality with 300 ppm, delay in flower and stunting with both rates 23DAT.	20120202a.pdf
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Orange'	Niu	2011	Lower quality, fewer branches and smaller width from 2 applic. @ 150 and 300 ppm and significantly fewer bloom shoots with hi rate at 33DAT compared to controls. No crop injury.	20120130a.pdf
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Strawberry'	Niu	2011	Lower quality and smaller width from 2 applic. @ 150 and 300 ppm 33DAT; fewer branches and bloom shoots at high rate; no crop injury.	20120130a.pdf
Configure (6-benzyladenine)	Calibrachoa	Calibrachoa sp. Can-Can Orange	Jiang	2011	Tested in June 2011: significant decrease in quality, height and width and delay in bloom with 150 and 300 ppm; unacceptable crop injury	20120202b.pdf

Product	Common Name	Latin Name	Researcher	Trial Year	Results	Data Link
Configure (6-benzyladenine)	Vervain	Verbena sp. V. 'Aztec Blue Velvet'	Niu	2011	Smaller width and slightly lower quality 33DAT with 150 and 300 ppm (2 applic.) compared to pinched untreated. No difference in bloom or shoot counts; Minor crop injury with hi rate 21 DAT.	20120130a.pdf
Configure (6-benzyladenine)	Vervain	Verbena sp. V. 'Aztec Blue Velvet'	Pemberton	2011	By 33 DAT significantly lower quality, flower number with 150 and 300 ppm; fewer shoots with low rate and minor crop injury with high rate.	20120202a.pdf
Configure (6-benzyladenine)	Vervain	Verbena sp. V. 'Aztec Red Velvet'	Niu	2011	Pots treated with 150 and 300 ppm (2 applic.) had significantly lower quality, shorter, more narrow plants with fewer bloom shoots and total branches 33DAT compared to pinched untreated. Minor crop injury 21DAT.	20120130a.pdf
Configure (6-benzyladenine)	Vervain	Verbena sp. V. 'Aztec Wild Rose'	Niu	2011	Lower quality and significantly smaller width for 150 and 300ppm (2 applic.) at 33DAT compared to controls; high rate had lower bloom shoot count; no dif. In branching; Minor crop injury.	20120130a.pdf
Configure (6-benzyladenine)	Vervain	Verbena sp. V. 'Aztec Wild Rose'	Pemberton	2011	No differences in shoot number, quality or flowering for plants treated with 400 and 800 ppm compared to pinched control. Minor crop injury	20120202a.pdf
Configure (6-benzyladenine)	Vervain	Verbena sp. V. 'Wildfire Dark Red'	Niu	2011	Lower quality and signficant reduction in branching, bloom shoot count, height and width for 150 and 300 ppm (2 applic.) at 33DAT compared to controls;v. minor crop injury.	20120130a.pdf
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. C. 'Callie Light Pink'	Catlin	2011	No differences in quality or days to bloomfor plants treated with 400 and 800 ppm compared to pinched control. Some necrosis and reduces leaf size (not rated for injury)	
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Apricot'	Niu	2011	Number of shoots with 500ppm comparable to pinched untreated but fewer with 1000ppm. Width more narrow but quality comparable to pinched untreated. No phyto.	20120130a.pdf
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Apricot'	Pemberton	2011	Greater shoot number and quality rating at 33 DAT with 500 and 1000 ppm compared to unpinched control. No crop injury.	20120202a.pdf
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Mocha'	Niu	2011	Significantly lower quality and smaller width for 500 and 1000ppm 33DAT; fewer bloom shoots with high rate; no crop injury.	20120130a.pdf
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Mocha'	Pemberton	2011	Increase in shoot number and no significant differences in quality, stunting,or flowering for plants treated with 400 and 800 ppm compared to pinched control. No crop injury.	20120202a.pdf

Product	Common Name	Latin Name	Researcher	Trial Year	Results	Data Link
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Orange'	Niu	2011	Lower quality and smaller width at 500 and 1000 ppm 33DAT than controls; fewer branches at high rate; no crop injury or difference in bloom shoot count.	20120130a.pdf
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. C. 'Can-Can Strawberry'	Niu	2011	Significanlty lower quality, fewer branches and smaller width with 500 and 1000ppm at 33DAT compared to controls; no crop injury or differences in bloom shoot counts.	20120130a.pdf
Florel (Ethephon)	Calibrachoa	Calibrachoa sp. Can-Can Apricot	Jiang	2011	Tested in Sept. 2011: Increased quality with low rate. Significant delay in flowering at both 500 and 1000 ppm and decrease in quality, ht and width with hi rate. Minor crop injury	20120202b.pdf
Florel (Ethephon)	Vervain	Verbena sp. V. 'Aztec Blue Velvet'	Niu	2011	Total shoots comparable to pinched untreated but fewer bloom shoots and smaller width with 1000ppm. Quality slightly less at 33DAT with 500 and 1000 ppm. Little to no crop injury	20120130a.pdf
Florel (Ethephon)	Vervain	Verbena sp. V. 'Aztec Blue Velvet'	Pemberton	2011	Higher quality rating with 500 ppm and 1000 ppm compared to untreated unpinched control 33 DAT. No difference in flower or shoot number compared to the pinched control. No crop injury.	20120202a.pdf
Florel (Ethephon)	Vervain	Verbena sp. V. 'Aztec Red Velvet'	Niu	2011	Pots treated with 500 and 1000 ppm had significantly lower quality, shorter, more narrow plants with fewer bloom shoots and total branches 33DAT esp. at hi rate compared to pinched untreated. Crop injury marginally unacceptable with hi rate 21DAT.	20120130a.pdf
Florel (Ethephon)	Vervain	Verbena sp. V. 'Aztec Wild Rose'	Niu	2011	Lower quality for 500 and 1000ppm at 33DAT compared to controls ; reduction in branching, bloom shoot count, height and width for high rate; unacceptable crop injury with high rate.	20120130a.pdf
Florel (Ethephon)	Vervain	Verbena sp. V. 'Aztec Wild Rose'	Pemberton	2011	No differences in shoot number or flowering with 500 and 1000 ppm. Slightly higher quality with the low rate. No crop injury	20120202a.pdf
Florel (Ethephon)	Vervain	Verbena sp. V.'Wildfire Dark Red'	Niu	2011	Lower quality and significant reduction in width and bloom shoot count with 500 and 1000ppm at 33DAT compared to controls; minor crop injury.	20120130a.pdf

Label Suggestions

No label recommendations at this time. Due to variability in response, possibly due to cultivar or environmental conditions, more research is needed before a recommendation for enhanced branching using Augeo, Configure or Florel use on calibrachoa or verbena.

Appendix 1: Contributing Researchers

Nora Catlin	Extension Educator CCE of Suffolk County 246 Griffing Avenue Riverhead, NY 11901-3086
Dr. Cai-Zhong Jiang	Research Plant Physiologist Crops Pathology & Genetic Research Unit USDA, Agricultural Research Service 103 Mann Lab, Mail-Stop 3, Department of Plant Sciences
Dr. Genhua Nui	Texas AgriLife Research Center at El Paso 1380 A&M Circle El Paso, TX 79927
Dr. Brent Pemberton	Texas A & M University Agricultural Research and Education Center P. O. Box E Overton, TX 75684

Appendix 2: Submitted Data

Researcher reports included in the printed copy of this report are those received by 2/15/2012. Reports are in alphanumeric order of author then PR number.

These reports can also be found at www.rutgers.ir4.edu by searching under Ornamental, Research Summaries.