Impact of Augeo, Configure and Florel on Hydrangea Branching[1]

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Abstract

Hydrangeas are an increasingly popular group of shrubs which are prized for their showy inflorescence. Nursery crop producers grow numerous hydrangea varieties for the landscape and florist markets. Hydrangeas are typically hand-pruned during propagation and production to promote compaction and to increase the number of branches which has potential for increasing blooms and marketability. Identifying a plant growth regulator (PGR) treatment that effectively improves the architecture of hydrangeas became an IR-4 Project research priority for 2011. Research evaluating Augeo (dikegulac sodium), Configure (benzyladenine) and Florel (ethephon) shows worthwhile results. Augeo (800 and 1600 ppm) significantly increased branching compared to untreated pots of florist varieties *Hydrangea macrophylla* 'Merritt's Supreme' and landscape varieties *H. macrophylla* 'Nikko Blue' and *H. paniculata* 'Limelight'. Configure (300 ppm and 600 ppm) and Florel (500 and 1000 ppm) did not significantly improve branching in five of six trials compared to the control. Significant chlorosis on Augeo treated plants was observed initially but this diminished by 6 weeks after treatment (WAT) for four out of six trials. Little to no crop injury was observed with Configure or Florel treatments to hydrangea liners. This research shows promise for identifying a plant growth regulator treatment to meet the demand for improved branching on hydrangea.

Index words: plant growth regulator, plant architecture, branch architecture, nursery production, plant quality.

Species used in this study: hydrangea (*Hydrangea macrophylla* 'Merritt's Supreme'); (*Hydrangea macrophylla* 'Nikko Blue'); (*Hydrangea paniculata* 'Limelight').

Growth regulators used in this study: Augeo (dikegulac sodium); Configure (6-benzyladenine), n-(phenylmethyl)-1H-purine-6-amine; Florel (ethephon), [(2-chloroethyl) phosphonic acid].

Significance to the Nursery Industry

Hydrangeas are not only a popular garden specimen but an economically important crop in both the floral and landscape industries. The value of landscape hydrangea sales was considered to be $73 million in the 2009 USDA survey (1). This is a threefold increase from 1997. A well branched hydrangea plant has more flowers and is most desirable to retailers. Hydrangea producers commonly hand pinch or prune this crop in order to stimulate lateral branching with mediocre results. A plant growth regulator that can reliably promote enhanced architecture would enable growers to efficiently produce a more desirable crop. The IR-4 Project identified this need as a priority for research in 2011. Both floral type cultivars (*H. macrophylla* 'Merritt's Supreme') and landscape varieties (*H. macrophylla* 'Nikko Blue', *H. paniculata* 'Limelight') were evaluated for branching response and crop injury after plant growth regulator applications. Identifying a branching agent effective on hydrangeas allows growers to reliably manage production with potentially greater efficiency and marketability.

Introduction

Many woody plant species do not branch adequately in a container nursery production system. In order to produce a well branched plant that meets desired size specifications, plants are typically pruned or pinched during propagation and/or production. This process is labor intensive and hydrangeas frequently do not respond with sufficient lateral breaks. PGR's are conventionally applied to established plants during container production. However, research has shown utility for these products in the propagation stage (7).

A number of chemical treatments have proven effective in stimulating branching on ornamental crops (3, 5, 6, 8). Augeo (dikegulac sodium), Configure (benzyladenine) and Florel (ethephon) are labeled as branching agents but do not specifically list hydrangea. Tiburon (cyclanilide) was found to have significant impact on azalea branching but this product is not being commercialized (2). In 2011 the IR-4 Ornamental Horticulture Program set out to identify a PGR treatment(s) that effectively improves hydrangea architecture.

Material and Methods

Florel, Configure and Augeo were evaluated on container grown hydrangea in six trials across the United States. These include evaluation of the florist type hydrangea, *H. macrophylla* 'Merritt's Supreme' in the greenhouse in California, Mississippi, and North Carolina (Trials 1, 2, and 3), as well as, the landscape types *H. macrophylla* 'Nikko Blue' in nursery shadehouses in Georgia and Alabama (Trials 4 and

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Table 1. List of products and rates tested in 2011.

Product	Active ingredient(s)	Concentration (ppm)	Manufacturer
Augeo	Dikegulac sodium	800 and 1600	OHP
Configure	6-benzyladenine	300 and 600	Fine Americas
Florel	ethephon	500 and 1000	Monterey AgResources

Table 2. Impact of plant growth regulators on lateral branching in hydrangea.

		Average lateral branches at bud set					
		'Merritt Supreme'			'Nikko Blue'		'Limelight'
		Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Treatment	Rate	MS	CA	NC	GA	AL	TN
Pinched check	0 ppm	3.9b[z]	3.4c	4.8bc	8.7a	23.1a	26.7bc
Augeo	800 ppm	5.9a*	8.3a*	7.7b*	8.3a	13.1b*	101.1a*
	1600 ppm	5.7a*	12.0ab*	10.9a*	7.8a	22.5a	103.4a*
Configure	300 ppm	4.0b	5.8bc	4.4c	8.3a	9.3b*	33.5bc
	600 ppm	3.8b	7.3bc*	4.6c	8.0a	9.5b*	31.6bc
Florel	500 ppm	3.9b	6.3bc	4.2c	7.2a	9.5b*	25.1c
	1000 ppm	3.9b	6.8bc	4.2c	8.0a	12.7b*	37.2b

[z]Tukey's mean comparison. Means within a column followed by the same letter are similar, $P = 0.05$.
*Dunnett's comparison. Means within a column followed by * differ from the pinched check, $P = 0.05$.

5), and *H. paniculata* 'Limelight' in Tennessee (Trial 6). A minimum of ten pots per treatment were used. Cuttings were planted into soilless media in high density liner trays. Rooted cuttings received a pinch while in liner trays. After rooting for approximately 6 to 8 weeks liners were transplanted into 5" or 1 gal containers.

Treatments were sprayed over the top to wetness. Concentrations are listed in Table 1. Configure was applied twice except in Trials 3 and 6 where one application was made. Treatments included a pinched untreated control for comparison.

Crop safety evaluations were taken at 2 and 6 weeks after treatment (WAT) on a scale of 0 to 10 (0 = no efficacy; 10 = complete kill). Number of breaks (lateral shoots) were counted at bud set when stems swelled. Height and width measurements were collected.

Data from each location were analyzed separately using Dunnett's test (P = 0.05). Please visit http://ir4.rutgers.edu/ornamental/OrnamentalDrafts.cfm to view protocol (11-001) and individual trial reports.

Results and Discussion

Branching and crop injury data were collected from six experiments conducted across the United States. Three trials used florists' type *Hydrangea macrophylla* 'Merrit's Supreme', two used landscape type *H. macrophylla* 'Nikko

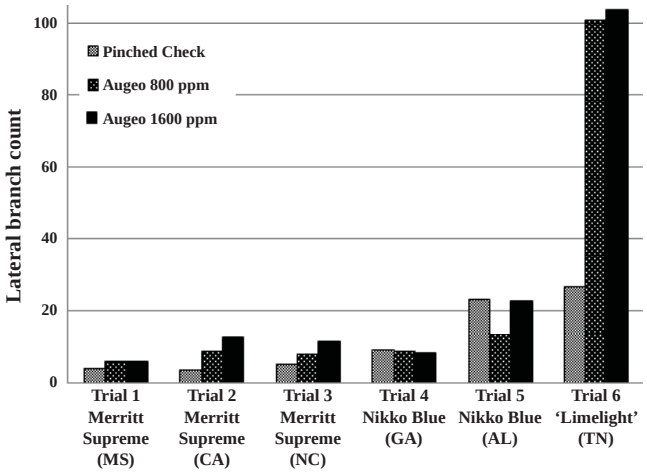

Fig. 1. Impact of Augeo on lateral branch count on *Hydrangea* sp.

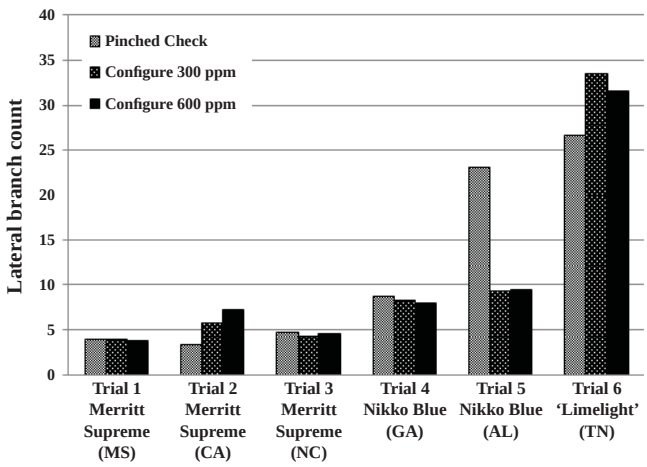

Fig. 2. Impact of Configure on lateral branch count on *Hydrangea* sp.

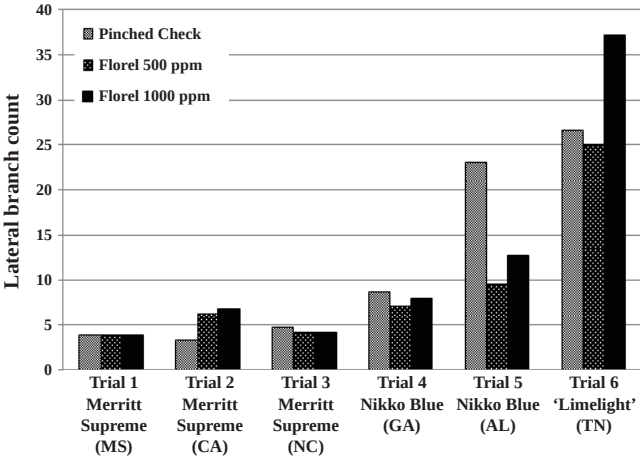

Fig. 3. Impact of Florel on lateral branch count on *Hydrangea sp.*

Blue', and one used landscape type *H. paniculata* 'Limelight'. Hydrangea plants treated with either Augeo at 800 or 1600 ppm developed significantly more lateral shoots than the pinched untreated in four of six experiments (Table 2; Fig. 1). One researcher noted that growth of lateral branches appeared stalled late in the experiment with Augeo treated pots. In general, branch count was not increased with Configure (Table 2; Fig. 2) or Florel (Table 2; Fig. 3). In Trials 3 and 5 pots treated with Configure or Florel had fewer branches than the control. In a single experiment, 'Merritt's Supreme' plants treated with Florel were described as full and glossy.

Injury to hydrangea was evaluated at 2 and 6 WAT on a scale of 0–10 (0 = no injury and 10 = death). Averages across all hydrangea cultivars 2 WAT had unacceptable injury (> 3) with 1600 ppm Augeo (Fig. 4) and by 6 WAT average injury dropped to acceptable levels for Augeo at 800 ppm. Configure at 300 and Florel at 1000 ppm caused slight crop injury compared to the untreated initially but by 6 WAT these pots recovered from treatment. Pots treated with Configure at 600 ppm, however, were rated within the acceptable range. Generally, the initial injury symptoms observed with any of these treatments would not be a concern with hydrangea because sales typically occur the season following application and defoliation of foliage occurs during vernalization.

Overall, results demonstrated that treatments with Augeo at 800 or 1600 ppm will provide a well-branched full growth habit on hydrangea comparable to the pinched control. A follow-up application of growth regulator such as GA may help lateral branches to resume growth and is worth consideration. Fine tuning the application(s) may increase the likelihood of this amendment being adopted as a commercial practice.

Literature Cited

1. Anonymous. 2009. Census of Horticultural Specialties, Vol. 3, Special Studies, Part 3, AC-07-SS-3.

2. Barcel, D. 2008. Effects of Tiburon (cyclanilide) on ornamentals for finished crop production. Proc. 35th Plant Growth Reg. Soc. of Amer., p. 33.

3. Grzesik, M. and R.M. Rudnicki. 1989. Effect of growth regulators on growth and the branching of roses 'Sonia' and 'Mercedes'. Acta Hort. 251:411–414.

4. Hester, K., C. Palmer, and E. Vea. 2012. PGR effects on branching of woody ornamentals. IR-4 Ornamental Program. Accessed online at: http://ir4.rutgers.edu/Ornamental/ornamentalSummaryReports.cfm.

5. Keever, G.J. 1994. BA-induced offset formation in hosta. J. Environ. Hort. 12:36–39.

6. Latimer, J. and J. Freeborn. 2009. New uses of PGR's in ornamentals: Configure (6-BA) increases branching of herbaceous perennials. Proc. Plant Growth Reg. Soc. of Amer., p 88.

7. Seckinger, A. 2012. Gaining a better start with early PGR treatments. Greenhouse Product News magazine; accessed online at http://www.gpnmag.com/gaining-better-start-early-pgr-treatments.

8. Starman, T. 1991. Response of Kientzler New Guinea impatiens to manual and chemical pinching. HortScience 26:856–857.

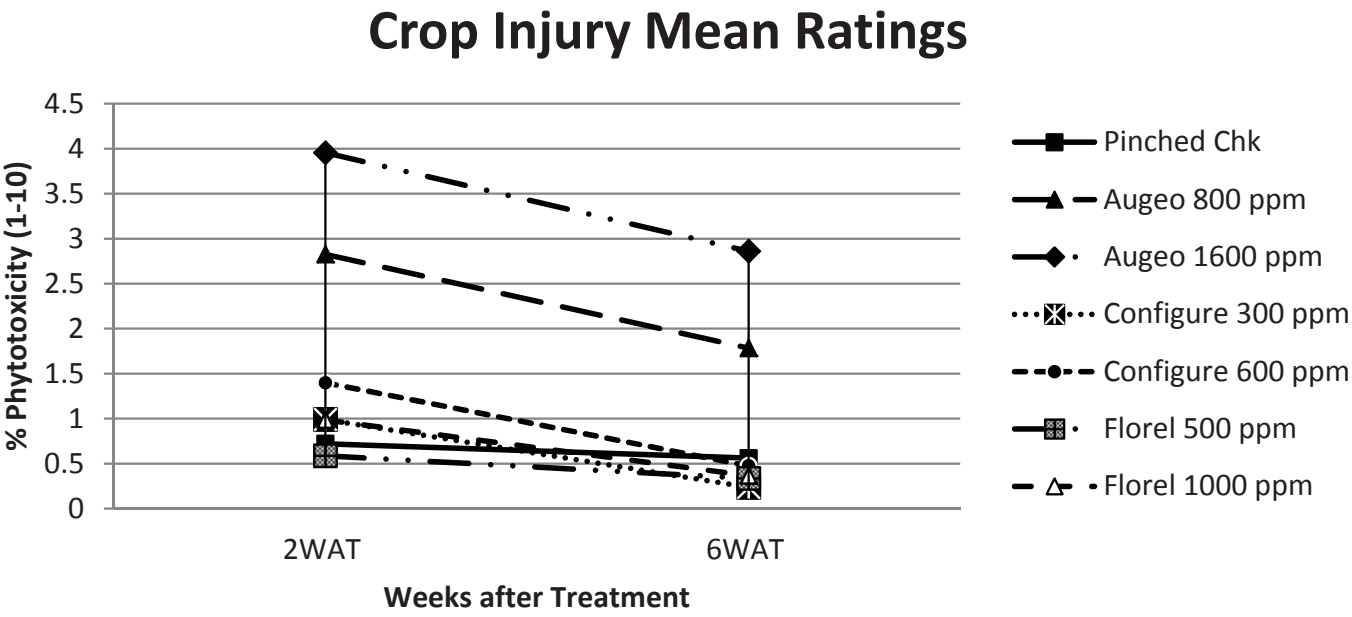

Fig. 4. Impact of Augeo, Configure, and Florel on phytotoxicity to *Hydrangea* sp. at 2 and 6 weeks after treatment. Means are reported as averages of all trials.