

North Carolina Flower Growers' Bulletin

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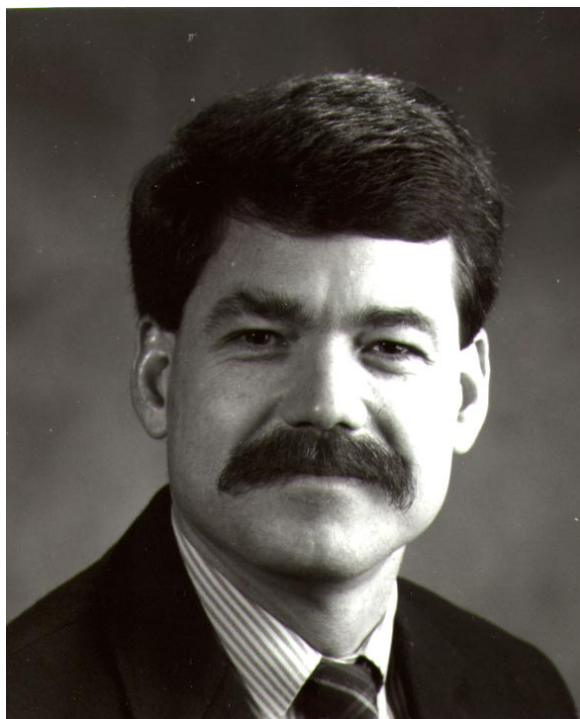
Official Publication of the North Carolina Commercial Flower Growers' Association

Dr. Robert Lyons is New Arboretum Director

The search for a Director of the J.C. Raulston Arboretum at NCSU has been successfully accomplished, and

Dr. Robert E. Lyons from VPI will assume that post February 1, 1999.

Dr. Lyons obtained his B.A. degree in Biological Sciences at Rutgers University in 1976. He then went to the University of Minnesota and obtained his M.S. degree in Horticulture in 1979. He remained at Minnesota for his Ph D degree and he received that in 1981. He worked on cyclamen with Dr. Richard Widmer. Upon completion of his Ph D



degree, Bob joined the faculty at VPI as an Assistant Professor, was promoted to Associate Professor in 1987, and became a Full Professor in

1995. In 1994 he was appointed as Director of the Virginia Tech Horticulture Gardens.

Dr. Lyons has won several teaching awards at VPI, two research publication awards, and also has won journalism awards from the Garden Writer's Association of America, both for his writing and for his photography. He was also instrumental in developing the Virginia Tech Horticulture Gardens, beginning in 1983.

Joe Stoffregen is Chosen 1998 Horticulture Outstanding Alumnus

The 1998 departmental selection as Outstanding Alumnus is Joseph C. Stoffregen, 1985 graduate and currently Vice-president of Homewood Nursery and Garden Center in Raleigh.

As an undergraduate, Joe was on the NCSU Flower Judging team, coached by Dr. Joe Love, which won first place in the Intercollegiate Flower Judging Contest held at Colorado State University in Fort Collins. Joe won the individual honor as the top judge. Joe was also a member of Pi Alpha Xi, a national honor society in floriculture and ornamental horticulture.

Joe has served as President of the N.C. Commercial Flower Growers' Association, President of the N.C. Horticulture Council, and is Chair of the Retail Marketing Committee of the N.C. Association of Nurserymen. In 1997 he was chosen as the Outstanding Young Nurseryman of the year. Each year he presents a lecture at the Student Seminar class, he is a frequent speaker at grower conferences, and he has a Friday morning television show. Congratulations to Joe for a well deserved honor.

Calendar of Events

Event	Date	Time	Location and contacts
NC State University Poinsettia Open House	Thursday 3 December	9:00 am to 3:00 pm	Horticulture Field Laboratory, Raleigh, N.C. Contact Bonnie for more details.
	AND Sunday 6 December	1:00 pm to 4:00 pm	
Green 'n Growin Show	Friday–Saturday 15-16 January 1999		Winston-Salem, NC. Contact Bonnie for more details.

Don't Miss The 1998 NC State University Poinsettia Open House

Thursday, 3 December 1998

9:00 AM to 3:00 PM

AND

Sunday, 6 December 1998

1:00 PM to 4:00 PM

**Held at the
Horticulture Research Laboratory
4301 Beryl Road
Raleigh, NC**



- See 71 cultivars of poinsettias and how they compare to each other under North Carolina growing conditions.
- Enjoy world-class complimentary refreshments.
- Don't let this opportunity pass you by; you can't afford to miss it!!!
- Contact Brian Whipker at 919.515.5374 for further information.

Grower Evaluation Site of the 71 Cultivars

**Homewood Nursery
10898 Honeycutt Road, Raleigh, NC (919-847-0117)**

Thursday, 3 December 1998

8:30 AM to 6:00 PM

Growth Regulators For Floricultural Crops

Brian E. Whipker and Douglas A. Bailey

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Ageratum	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	Plug culture and flat culture differ in recommended rates. The rates shown in this table include both plug (lower rates) and flat culture (higher rates) recommendations. Apply ALL foliar sprays of plant growth regulators using 0.5 gallon per 100 square feet of bench area. Growers should refer to Horticulture Information Leaflet #528, Height Control of Greenhouse Crops, for application techniques and timing for growth regulators on floricultural crops. Contact floricultural specialists at NC State University for further application information.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	5 to 45 ppm spray (0.16 to 1.44 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
		Sumagic	20 to 30 ppm spray (5.12 to 7.68 fl oz/gal)	
Alternanthera (Joseph's-Coat)	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Alyssum	To control plant height	Sumagic	5 to 25 ppm spray (1.3 to 6.4 fl oz/gal)	See Ageratum.
Amaryllis	To control plant height	Bonzi	23.66 mg a.i. drench for a 6 inch pot (6.4 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Aster	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
Azalea	To control plant height	A-Rest	26 ppm spray (12.6 fl oz/gal)	Contact floricultural specialists at NC State University.
	To promote flower initiation	B-Nine	1,500 to 2,500 ppm spray (0.24 to 0.39 oz/gal)	Apply solution when new growth from final pinch is 1 to 2 inches long.
		Cycocel	1,000 to 4,000 ppm spray (1.08 to 4.34 fl oz/gal)	Optimum rates are generally between 1,000 and 2,000 ppm. Two to six multiple sprays may be needed. Apply first application when new growth is approximately 2 inches long.
	To promote lateral shoot growth on vegetative plants	Off-Shoot-O	Use a 3 to 5% solution (8.6 to 14 fl oz/gal) solution in greenhouses; use 5 to 7% (14 to 20 fl oz/gal) outdoors. Apply as a foliar spray.	Efficacy is related to relative humidity and temperature. Spray a few plants to check activity prior treating the entire crop; effects should be visible in about 1 hour. Be certain chemical covers shoot tip. Ineffective if microscopic flower buds are present.
	To increase lateral branching	Florel	2,471 to 4,943 ppm spray (8 to 16 fl oz/gal)	
	To control plant height, reduce bypass shoot elongation, and promote flower bud initiation	Bonzi	100 to 200 ppm spray (3.2 to 6.4 fl oz/gal)	To control plant height and promote flower bud initiation, apply after final shaping, when new growth is 1.5 to 2 inches long. To reduce bypass shoot development, apply after bud set, when bypass shoots are barely visible.
			0.59 to 1.77 mg a.i. drench for a 6 inch pot (0.16 to 0.48 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
	To control plant height	Sumagic	10 to 15 ppm spray (2.56 to 3.84 fl oz/gal)	Apply at 1.5 quarts per 100 square feet of bench area. Contact floricultural specialists at NC State University for further application information.
	For partial or full substitution of cold	GibGro	250 to 1,000 ppm spray (1 to 4 fl oz/gal)	GibGro 4LS has 24(c) registration for distribution and greenhouse use only within North Carolina. Spray timing, concentration, and number of applications varies with cultivar as well as intended degree of cold substitution. Consult the label for exact recommendations.
To prevent flower bud initiation during vegetative growth	GibGro	100 to 750 ppm spray (0.4 to 3 fl oz/gal)	GibGro 4LS has 24(c) registration for distribution and greenhouse use only within North Carolina. Apply two to three sprays at 2 to 3 weeks intervals after each pinch.	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Bedding Plants (Not specifically listed in this table)	To control plant height	A-Rest	6 to 66 ppm spray (2.9 to 32 fl oz/gal). Use 15 ppm spray as a base rate and adjust as needed.	See Ageratum.
			0.06 to 0.12 mg a.i. drench for a 4 inch pot (0.5 to 1 fl oz/gal of drench solution; apply 2 fl oz/4 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		B-Nine + Cycocel	800 to 5,000 ppm B-Nine (0.13 to 0.79 oz/gal) + 1,000 to 1,500 ppm Cycocel (1.08 to 1.63 fl oz/gal) applied as a tank mix spray	It is recommended to use the highest rate of Cycocel that does not cause excessive leaf yellowing, and then adjust the B-Nine rate up and down within the labeled range to attain desired level of height control.
		Bonzi	30 ppm spray (0.96 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rates as needed for desired final plant height and duration of height control. Not recommended for use on fibrous begonia or vinca.
			0.118 mg a.i. drench for a 6 inch pot (0.032 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench applications are recommended only for bedding plants in 6 inch or larger containers. Not recommended for use on fibrous begonia or vinca.
		Cycocel	800 to 3,000 ppm spray (0.87 to 3.25 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rates as needed for desired final plant height and duration of height control.
		Sumagic	1 to 50 ppm spray (0.26 to 12.7 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rates as needed for desired final plant height and duration of height control.
Bedding Plant Plugs (Not specifically listed in this table)	To control plant height	A-Rest	3 to 35 ppm spray (1.5 to 17 fl oz/gal)	See Ageratum.
			Drench plug flats with a 0.5 to 1 ppm solution (0.25 to 1 fl oz/gal)	For uniform application, use a subirrigation delivery system. Plug trays should not be excessively dry prior to the subirrigation treatment.
		B-Nine	1,500 to 2,500 ppm spray (0.23 to 0.39 oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and duration of height control. Can be used at the beginning of the first true leaf stage through the finishing stage.
		B-Nine + Cycocel	800 to 5,000 ppm B-Nine (0.13 to 0.79 oz/gal) + 1,000 to 1,500 ppm Cycocel (1.08 to 1.63 fl oz/gal) applied as a tank mix spray	It is recommended to use the highest rate of Cycocel that does not cause excessive leaf yellowing, and then adjust the B-Nine rate up and down within the labeled range to attain desired level of height control.
		Bonzi	5 ppm spray (0.16 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and duration of height control. Plants should develop 1 to 2 true leaves prior to first application.
		Cycocel	400 to 1,500 ppm spray (0.43 to 1.63 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rates as needed for desired final plant height and duration of height control.
		Sumagic	0.5 to 10 ppm spray (0.13 to 2.6 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and duration of height control. Plugs can be especially sensitive to Sumagic.
Begonia	To control plant height	A-Rest	3 to 15 ppm spray (1.5 to 7.3 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
Bleeding Heart	To control plant height	A-Rest	65 to 132 ppm spray (31.5 to 64 fl oz/gal)	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Bleeding Heart , continued	To control plant height	A-Rest	0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Bromeliad	To promote flower initiation	Florel	2,471 ppm spray (8 fl oz/gal)	Contact floricultural specialists at NC State University.
Browallia	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
Bulb Crops (Not specifically listed in this table)	To control plant height	A-Rest	25 to 50 ppm spray (12.1 to 24.2 fl oz/gal)	Drenches are more effective than sprays.
			0.25 mg a.i. drench for a 6 inch pot (2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and length of height control.
		Bonzi	100 ppm spray (3.2 fl oz/gal)	
			1.183 mg a.i. drench for a 6 inch pot (0.32 fl oz/gal of drench solution; apply 4 fl oz per 6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			20 ppm bulb soak (0.64 fl oz/gal)	Soak for 15 minutes. Users should conduct trials on a small number of bulbs, adjusting the rate and soaking period (up to 1 hour) as needed for desired final plant height.
		Sumagic	2.5 to 20 ppm spray (0.64 to 5.1 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and length of height control.
			1 to 3 ppm drench (0.26 to 0.8 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		1 to 10 ppm bulb soak (0.26 to 2.6 fl oz/gal)	Soak for 1 to 5 minutes. Users should conduct trials on a small number of bulbs, adjusting the rate and soaking period as needed for desired final plant height.	
Caladium	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
		Bonzi	100 to 200 ppm spray (3.2 to 6.4 fl oz/gal)	First spray applications should be made when plants are 2 to 4 inches tall.
			1.183 to 2.366 mg a.i. drench for a 6 inch pot (0.32 to 0.64 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	First drench applications should be made when plants are 1 to 2 inches tall. Drench volumes and mg a.i. vary with pot size.
Calla Lily	To control plant height	Bonzi	1.183 to 3.549 mg a.i. drench for a 6 inch pot (0.32 to 0.96 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	See Caladium.
			20 ppm rhizome/tuber soak (0.64 fl oz/gal)	Soak the rhizomes/tubers for 15 minutes prior to planting.
Celosia	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	4 to 50 ppm spray (0.13 to 1.60 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
		Sumagic	10 to 20 ppm spray (2.56 to 5.12 fl oz/gal)	
China Aster	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Chrysanthemum, Cut	To reduce "neck" stretching	B-Nine	2,500 ppm spray (0.39 oz/gal)	Spray upper foliage 5 weeks after start of short-day treatment.
Chrysanthemum, Potted	To control plant height	A-Rest	25 to 50 ppm spray (12.1 to 24.2 fl oz/gal)	Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		B-Nine	1,000 ppm preplant foliar dip (0.16 oz/gal)	Contact floricultural specialists at NC State University.
			1,250 to 5,000 ppm spray (0.20 to 0.79 oz/gal)	Spray when new growth from pinch is 1 to 2 inches long. Some varieties may require another application 3 weeks later.
		Bonzi	50 to 200 ppm spray (1.6 to 6.4 fl oz/gal)	Contact floricultural specialists at NC State University.
			0.118 to 0.473 mg a.i. drench for a 6 inch pot (0.032 to 0.128 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Sumagic	2.5 to 10 ppm spray (0.64 to 2.56 fl oz/gal)	Contact floricultural specialists at NC State University.		
Chrysanthemum, Garden	To control plant height	Sumagic	2.5 to 10 ppm spray (0.64 to 2.56 fl oz/gal)	Contact floricultural specialists at NC State University.
	To increase lateral branching	Florel	500 ppm spray (1.619 fl oz/gal)	Florel applications will provide some growth retardant effects. A delay in flowering will also occur with the use of Florel. Read the label for restrictions on timing of applications.
Clematis	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Cleome	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	See Ageratum.
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
Coleus	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
		Bonzi	5 to 45 ppm spray (0.16 to 1.44 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
		Sumagic	10 to 20 ppm spray (2.56 to 5.12 fl oz/gal)	
Columbine	To control plant height	A-Rest	65 to 132 ppm spray (31.5 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Coneflower	To control plant height	Sumagic	30 to 40 ppm spray (7.7 to 10.2 fl oz/gal)	
Cornflower (Centaurea)	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Cosmos	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
Crossandra	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
Daffodil	To control plant height	Bonzi	2,366 to 4,732 mg a.i. drench for a 6 inch pot (0.64 to 1.28 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	See Caladium
		Florel	1,000 to 2,000 ppm spray (3.24 to 6.47 fl oz/gal)	Contact floricultural specialists at NC State University.
Dahlia, Bedding Plant	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	5 to 45 ppm spray (0.16 to 1.44 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
		Sumagic	10 to 20 ppm spray (2.56 to 5.12 fl oz/gal)	
Dahlia, Tuberous	To control plant height	A-Rest	0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		Bonzi	1,183 to 4,732 mg a.i. drench for a 6 inch pot (0.32 to 1.28 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Delphinium	To control plant height	A-Rest	35 to 132 ppm spray (17 to 64 fl oz/gal)	See Ageratum.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
Dianthus	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	5 to 60 ppm spray (0.16 to 1.92 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
Dracaena	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Dusty Miller	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
		Sumagic	30 ppm spray (7.7 fl oz/gal)	
Easter Lily	To control plant height	A-Rest	50 ppm spray (24.2 fl oz/gal)	Contact floricultural specialists at NC State University.

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Easter Lily, continued	To control plant height	A-Rest	0.25 to 0.5 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		Sumagic	10 to 25 ppm spray (2.56 to 6.4 fl oz/gal)	Contact floricultural specialists at NC State University.
			0.03 to 0.06 mg a.i. drench for a 6 inch pot (0.065 to 0.13 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Exacum	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
Fatsyhedera	To control plant height	A-Rest	65 to 132 ppm spray (31.5 to 64 fl oz/gal)	
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Flowering/Foliage Plants, Herbaceous Species (Not specifically listed in this table)	To control plant height	A-Rest	20 to 50 ppm spray (9.7 to 24.2 fl oz/gal)	Recommended starting rate for an A-Rest spray on a new herbaceous flowering or foliage species is 33 ppm (16 fl oz/gal).
			0.125 to 0.25 mg a.i. drench for a 6 inch pot (0.5 to 1 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		Bonzi	30 ppm spray (0.96 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and length of height control.
			0.118 mg a.i. drench for a 6 inch pot (0.032 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		Cycocel	800 to 4,000 ppm spray (0.87 to 4.34 fl oz/gal)	Optimum rate depends on species, desired amount of height control, and environmental conditions. The suggested initial rate for small-scale trials is 1,250 ppm. Example herbaceous species known to respond to cycocel are Achimenes, Aster, Astilbe, Begonia (hiemalis), Begonia (tuberous), Calceolaria, Carnation, Chrysanthemum, Columbine, Easter lily, <i>Gynura aurantiaca</i> , Ivy, Kalanchoe, <i>Lilium</i> spp., Morning glory, Pachystachys, <i>Pilea</i> spp., Pentas, <i>Salvia</i> spp., Schefflera, <i>Sedum</i> spp., and Sunflower.
			2,000 to 4,000 ppm drench	Drench volumes vary with pot size. See label for recommended volumes. Herbaceous species known to respond to cycocel are listed above.
		Sumagic	5 to 40 ppm spray (1.3 to 10.2 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and length of height control.
			0.1 to 1 ppm drench (0.026 to 0.26 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Flowering/Foliage Plants, Woody Species (Not specifically listed in this table)	To control plant height	A-Rest	50 ppm spray (24.2 fl oz/gal)	
		A-Rest	0.25 mg a.i. drench for a 6 inch pot (1 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		B-Nine	2,500 to 7,500 ppm spray (0.39 to 1.18 oz/gal)	Two or more applications may be necessary if new growth begins to stretch or for enhanced coloration.

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Flowering/Foliage Plants, Woody Species, continued	To control plant height	Bonzi	50 ppm spray (1.6 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and length of height control.
			0.237 mg a.i. drench for a 6 inch pot (0.064 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		Cycocel	800 to 4,000 ppm spray (0.87 to 4.34 fl oz/gal)	Optimum rate depends on species, desired amount of height control, and environmental conditions. The suggested initial rate for small-scale trials is 1,250 ppm. Example woody species known to respond to cycocel are <i>Baleria cristata</i> , Bougainvillea, Camellia, Gardenia, Fuchsia, Hollies, Hydrangea, Lantana, <i>Pseuderanthemum lactifolia</i> , Rhododendron, and Roses (potted).
			2,000 to 4,000 ppm drench	Drench volumes vary with pot size. See label for recommended volumes. Woody species known to respond to cycocel are listed above.
		Sumagic	20 to 50 ppm spray (5.1 to 12.7 fl oz/gal)	Users should conduct trials on a small number of plants, adjusting the rate as needed for desired final plant height and length of height control.
			0.5 to 2 ppm drench (0.13 to 0.52 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
Freesia	To control plant height	Bonzi	100 to 300 ppm corm soak (3.2 to 9.6 fl oz/gal)	Soak corms in the solution for 1 hour before planting.
Fuchsia	To increase lateral branching	Florel	500 ppm spray (1.619 fl oz/gal)	Florel applications will provide some growth retardant effects. A delay in flowering will also occur with the use of Florel. Read the label for restrictions on timing of applications.
Gardenia	To control plant height	A-Rest	50 ppm spray (24.2 fl oz/gal)	
			0.25 mg a.i. drench for a 6 inch pot (1 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		B-Nine	5,000 ppm spray (0.79 oz/gal)	
Geranium	To control plant height	A-Rest	26 to 66 ppm spray (12.6 to 32 fl oz/gal)	See Ageratum.
		Bonzi	5 to 20 ppm spray (0.16 to 0.64 fl oz/gal)	Apply to zonal geraniums when new growth is 1.5 to 2 inches long. Apply to seed geraniums approximately 2 to 4 weeks after transplanting.
		Cycocel	800 to 1,500 ppm spray (0.87 to 1.63 fl oz/gal)	First application should be made 2 to 4 weeks after planting plugs or rooted cuttings (after stems have started elongating). Multiple applications may be needed.
		Sumagic	3 to 6 ppm spray (0.77 to 1.54 fl oz/gal) for cutting geraniums and 2 to 4 ppm spray (0.51 to 1.02 fl oz/gal) for seed geraniums	See Ageratum.
	To promote earlier flowering in seed geraniums	Cycocel	1,500 ppm spray (1.63 fl oz/gal)	Make two applications at 35 and 42 days after seeding. Treated plants should flower earlier, be more compact, and more well-branched than untreated plants.
	To increase lateral branching	Florel	300 to 500 ppm spray (1.619 to 3.24 fl oz/gal)	Labeled for zonal and ivy geraniums. Use the lower concentration for ivy geraniums. Florel will also provide some growth retardant effect. A delay in flowering will also occur with the use of Florel. Read the label for restrictions on timing of applications.
Gerbera Daisy	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Gerbera Daisy, continued	To control plant height		0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		B-Nine	1,200 to 5,000 ppm spray (0.18 to 0.79 oz/gal)	
Gloxinia	To control peduncle length	B-Nine	1,250 ppm spray (0.19 oz/gal)	Phytotoxicity may occur at rates >1,250 ppm.
Gomphrena	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
Hibiscus	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	Application should be made when laterals are 1 to 4 inches long. Single applications control lateral growth for 3 to 6 months. Multiple applications starting prior to first pinch are recommended. Start with 460 ppm in trials.
		Bonzi	30 to 150 ppm spray (0.96 to 4.8 fl oz/gal)	
		Cycocel	200 to 600 ppm spray (0.22 to 0.65 fl oz/gal)	
Holly	To control plant height	A-Rest	50 ppm spray (24.2 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 mg a.i. drench for a 6 inch pot (1 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Hollyhock	To control plant height	Sumagic	5 to 40 ppm spray (1.3 to 10.2 fl oz/gal)	
Hyacinth	To reduce stem topple	Florel	1,000 ppm spray (3.24 fl oz/gal)	Contact floricultural specialists at NC State University.
Hybrid Lily	To control plant height	Bonzi	250 to 500 ppm spray (8.0 to 16.0 fl oz/gal)	See Caladium.
			1.183 to 2.366 mg a.i. drench for a 6 inch pot (0.32 to 0.64 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
		Bonzi	20 to 30 ppm bulb soak (0.64 to 0.96 fl oz/gal)	Soak bulbs in the solution for 15 minutes prior to planting.
		Sumagic	2.5 to 10 ppm spray (0.6 to 2.6 fl oz/gal)	Soak bulbs in the solution for 1 to 5 minutes prior to planting.
1 to 10 ppm bulb soak (0.26 to 2.6 fl oz/gal)				
Hydrangea	To control plant height	A-Rest	50 ppm spray (24.2 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 mg a.i. drench for a 6 inch pot (1 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
		B-Nine	2,500 to 7,500 ppm spray (0.39 to 1.18 oz/gal)	Contact floricultural specialists at NC State University.
Hypoestes	To control plant height	Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	See Ageratum.
Impatiens	To control plant height	A-Rest	10 to 44 ppm spray (4.8 to 21.3 fl oz/gal)	See Ageratum.
		Bonzi	5 to 45 ppm spray (1.44 to 2.02 fl oz/gal)	
		Sumagic	5 to 10 ppm spray (1.28 to 2.56 fl oz/gal)	
Jerusalem Cherry	To control plant height	Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	See Ageratum.

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Kalanchoe	To control peduncle length	B-Nine	1,200 to 5,000 ppm spray (0.18 to 0.79 oz/gal)	Phytotoxicity possible if B-Nine accumulates in cupped areas of certain cupped-leaved varieties.
Lantana	To increase lateral branching	Florel	500 ppm spray (1.619 fl oz/gal)	Florel applications will provide some growth retardant effects. A delay in flowering will also occur with the use of Florel. Read the label for restrictions on timing of applications.
Liatris	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
Marigold	To control plant height	A-Rest	13 to 33 ppm spray (6.3 to 16 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	10 to 60 ppm spray (0.32 to 1.92 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
		Sumagic	10 to 20 ppm spray (2.56 to 5.12 fl oz/gal)	
Monarda	To control plant height	Sumagic	15 to 30 ppm spray (3.8 to 7.7 fl oz/gal)	
Monstera	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Montbretia	To control plant height	Bonzi	20 to 30 ppm corm soak (0.64 to 0.96 fl oz/gal)	Soak corms in the solution for 15 minutes prior to planting.
Nasturtium	To control plant height	Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
Nephtytis, Green & Green Gold	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Pansy	To control plant height	A-Rest	3 to 15 ppm spray (1.5 to 7.3 fl oz/gal)	See Ageratum.
		Bonzi	1 to 15 ppm spray (0.03 to 0.48 fl oz/gal)	
		Sumagic	1 to 6 ppm spray (0.26 to 1.54 fl oz/gal)	
Petunia	To control plant height	A-Rest	10 to 26 ppm spray (4.8 to 12.6 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	5 to 60 ppm spray (0.16 to 1.92 fl oz/gal)	
		Sumagic	25 to 50 ppm spray (6.4 to 12.79 fl oz/gal)	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Philodendron	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Phlox	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
Pilea	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Poinsettia	To control plant height	A-Rest	0.06 to 0.25 mg a.i. drench for a 6 inch pot (0.25 to 1 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Contact floricultural specialists at NC State University.
		B-Nine	2,000 to 3,000 ppm spray (0.31 to 0.47 oz/gal)	Not effective in our studies.
		B-Nine + Cycocel	800 to 2,500 ppm B-Nine (0.13 to 0.39 oz/gal) + 1,000 to 1,500 ppm Cycocel (1.08 to 1.63 fl oz/gal) spray	Use the higher rates of this tank mix spray on stock plants and for finishing crops in very warm regions. Outside of very warm areas, growers should use the lower rates. Too late of an application can delay flowering and reduce bract size.
		Bonzi	10 to 30 ppm spray (0.32 to 0.96 fl oz/gal)	Contact floricultural specialists at NC State University.
			0.237 to 0.473 mg a.i. drench for a 6 inch pot (0.064 to 0.128 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volume and mg a.i. vary with pot size. Consult the label for recommended volumes.
		Cycocel	800 to 1,500 ppm spray (0.87 to 1.63 fl oz/gal)	For natural season crops in N.C., do not apply cycocel after Nov. 1. Late applications can reduce bract size and delay flowering.
			3,000 to 4,000 ppm drench (3.25 to 4.34 fl oz/gal of drench solution)	Drench volume varies with pot size. Consult the label for recommended volumes.
Sumagic	2.5 to 10 ppm spray (0.64 to 2.56 fl oz/gal)	Contact floricultural specialists at NC State University.		
Portulaca	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	See Ageratum
		Sumagic	15 to 30 ppm spray (3.8 to 7.7 fl oz/gal)	
Pothos	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Purple Coneflower	To control plant height	Sumagic	30 to 40 ppm spray (7.7 to 10.2 fl oz/gal)	
Purple Passion (<i>Gynura auranfiaca</i>)	To control plant height	A-Rest	26 to 132 ppm spray (12.6 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Salvia	To control plant height	A-Rest	10 to 26 ppm spray (4.8 to 12.6 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	5 to 60 ppm spray (0.16 to 1.92 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
		Sumagic	5 to 10 ppm spray (1.28 to 2.56 fl oz/gal)	
Schefflera	To control plant height	A-Rest	25 to 132 ppm spray (12.1 to 64 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 to 0.50 mg a.i. drench for a 6 inch pot (1 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
Shasta Daisy	To control plant height	Sumagic	15 to 30 ppm spray (3.8 to 7.7 fl oz/gal)	
Snapdragon	To control plant height	A-Rest	10 to 26 ppm spray (4.8 to 12.6 fl oz/gal)	See Ageratum.
		Bonzi	5 to 90 ppm spray (0.16 to 2.88 fl oz/gal)	
		Sumagic	25 to 50 ppm spray (6.4 to 12.79 fl oz/gal)	
Spathiphyllum	To induce flower initiation	GibGro	250 ppm spray (1 fl oz/gal)	GibGro 4LS has 24(c) registration for distribution and greenhouse use only within North Carolina. One application should be made during the non-seasonal blooming period, typically June through January.
Speedwell (Veronica)	To control plant height	Sumagic	20 to 40 ppm spray (5.1 to 10.2 fl oz/gal)	
Sunflower	To control plant height	Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
Tulip	To control plant height	A-Rest	0.125 to 0.5 mg a.i. drench for a 6 inch pot (0.5 to 2 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
		Bonzi	0.591 to 4.732 mg a.i. drench for a 6 inch pot (0.16 to 1.28 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	Drench volumes and mg a.i. vary with pot size.
			2 to 5 ppm bulb soak (0.064 to 0.16 fl oz/gal)	Soak bulbs for 1 hour prior to planting.
Verbena	To control plant height	B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	See Ageratum.
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	
	To increase lateral branching	Florel	500 ppm spray (1.619 fl oz/gal)	Florel applications will provide some growth retardant effects. A delay in flowering will also occur with the use of Florel. Read the label for restrictions on timing of applications.
Vinca (Catharanthus)	To control plant height	A-Rest	5 to 18 ppm spray (2.4 to 8.7 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	

Crop	Purpose	Product	Application Method & Rate	Precautions & Remarks
Vinca, continued	To control plant height	Sumagic	1 to 3 ppm spray (0.26 to 0.77 fl oz/gal)	See Ageratum.
Vinca Vine (<i>Vinca spp.</i>)	To increase lateral branching	Florel	500 ppm spray (1.619 fl oz/gal)	Florel applications will provide some growth retardant effects. A delay in flowering will also occur with the use of Florel. Read the label for restrictions on timing of applications.
Viola	To control plant height	Sumagic	1 to 5 ppm spray (0.26 to 1.28 fl oz/gal)	See Ageratum.
Wandering Jew	To control plant height	A-Rest	26 to 132 ppm spray (12.6 to 64 fl oz/gal)	
Woody Landscape Plants (Not specifically listed in this table)	To control plant height	A-Rest	50 ppm spray (24.2 fl oz/gal)	Drench volumes and mg a.i. vary with pot size. Contact floricultural specialists at NC State University.
			0.25 mg a.i. drench for a 6 inch pot (1 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	
		Bonzi	0.473 mg a.i. drench for a 6 inch pot (0.128 fl oz/gal of drench solution; apply 4 fl oz/6 inch pot)	See Bedding Plants
Zinnia	To control plant height	A-Rest	7 to 26 ppm spray (3.4 to 12.6 fl oz/gal)	See Ageratum.
		B-Nine	2,500 to 5,000 ppm spray (0.39 to 0.79 oz/gal)	
		Bonzi	5 to 45 ppm spray (0.16 to 1.45 fl oz/gal)	
		Cycocel	400 to 3,000 ppm spray (0.43 to 3.25 fl oz/gal)	

Research Report: Fertilizer Rate Effects on Growth of Variegated and Green-leaved Double Impatiens

Brian E. Whipker¹, Shravan Dasoju², Michael S. Dosmann², and Jeffery K. Iles²

Variegated leaves may have an aesthetic appeal for the gardener, but this trait can be detrimental to the plant. Variegated leaves have reduced photosynthetically active tissue and are more attractive to insect pests (Sadof, 1991). With New Guinea impatiens a “rippled” or “wavy” leaf surface is a common indicator of a too high fertilization rate. The authors also have observed “rippled” or “cupped” leaves on variegated

cultivars of double impatiens, geraniums, and lantana when grown at fertilization rates of 200 to 300 ppm of N while green-leaved cultivars show no leaf distortion. These facts and observations lead the authors to speculate that variegated plants may require lower fertilization rates than green plants for optimal growth. The objectives of this study were to determine the effect of increased rates of fertility on plant growth and development of both green and variegated double impatiens and to develop fertilization recommendations for growers.

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Experimental Design

Rooted cuttings of double impatiens cultivars Blackberry Ice (variegated-leaf type) and Purple Magic (green-leaf type) were potted into 4-inch square containers on 7 Feb. 1997. The root substrate contained 2 soil : 5 sphagnum peat : 3 perlite (by volume) and was amended with ground dolomitic limestone to pH 5.1. Plants were grown under the natural occurring photoperiod (lat. 42 °N [Ames, Iowa]) with day/night temperature set points of 75/64 °F. The plants were grown on flood benches and irrigated with Excel® 15-5-15 Cal-Mag at a rate of 50, 100, 200, or 300 ppm N. Fertilizer solutions were replaced every 6 to 7 days.

Beginning on 7 Feb. and continuing every three weeks until 22 Apr., plant height, plant diameter (measured at the widest dimension and turned 90°, and averaged), and plant fresh weight were recorded for 5 single-plant replications within each treatment. The root substrate was analyzed at each sampling date for pH, EC, NO₃-N, NH₄-N, P, K, Ca, and Mg. Tissue samples were taken at the end of the experiment and analyzed for N, P, K, Ca, Mg, B, Mo, and Zn.

Results and Discussion

Root Substrate Nutrient Levels. The root substrate EC levels increased over time as the fertilizer concentration increased for both cultivars (Fig. 1). EC levels at week 9 were similar for both cultivars at each fertilizer rate, except for the 100 ppm N where EC levels of Blackberry Ice (variegated-leaf) were more than double those of Purple Magic (green-leaf). EC levels for Purple Magic were similar with 50 and 100 ppm N, indicating the plants were utilizing the additional nutrients provided at the 100 ppm N rate. The higher EC levels with 100 ppm N for Blackberry Ice when compared to Purple Magic indicated that variegated-leaved plant nutrient demands were less, and fertilization rates lower than 100 ppm N would be required. The increase in EC levels at the fertilization rates 200 ppm N indicated neither cultivar was utilizing all of the

available nutrients and those rates were excessive. Similar accumulations of excess fertilizer salts when fertilization rates exceeded the amount required by the plant have been reported on New Guinea impatiens and several foliage plant species. Levels of N, P, K, Ca, and Mg in the root substrate also accumulated as the fertilizer concentration increased.

Plant Growth. Total plant heights varied by fertilizer concentrations and cultivars over time, with 100 ppm N resulting in the tallest plants (Fig. 2). Total plant heights at week nine were similar for both cultivars at each fertilizer rate, except for 100 ppm N where Purple Magic plants were 20% taller than Blackberry Ice. Purple Magic plants grown with the 200 ppm N were the next tallest plants, while plants grown with 50 or 300 ppm N were the shortest. Blackberry Ice plants grown with 50 or 200 ppm N were similar in height and the shortest plants resulted from 300 ppm N.

Plant diameter was significantly affected only by fertilizer concentration over time and not by cultivar. Differences in plant diameter occurred only after 6 weeks of growth, with smaller plant growth resulting with 50 or 300 ppm N. After 9 weeks, plants grown with 100 ppm N were 22% larger than plants grown with either 50 or 200 ppm N. Fertilization rates of 50 ppm N resulted in plants which were covered with a higher percentage of blooms per unit of leaf area, but the plants were smaller (Fig. 3). Similar reductions in plant diameter, due in part to a reduction in leaf size as the N fertilization rate increased, have been reported for New Guinea impatiens.

Purple Magic plants had a greater dry weight than Blackberry Ice over all the fertilization rates. Plant tissue dry weight (leaf, bud, stem, and total) increased to the highest level at 100 ppm N, then decreased as fertilization rate increased. Judd and Cox (1992) reported a similar reduction in New Guinea impatiens dry weight with EC levels >1.5 mS/cm.

Leaf Tissue Nutrient Concentration. Leaf tissue concentrations of N, P, and K increased with the

fertilization rate, however, levels were higher for Blackberry Ice than Purple Magic over all fertilization rates. Higher tissue-N concentration was in agreement with Sadof and Raupp (1991) who reported elevated N in the phloem of variegated plants compared to green plants. Tissue-Ca concentrations were similar for both cultivars and levels decreased as the fertilizer rate increased. The decrease in leaf tissue Ca

concentrations may be attributed to the antagonistic relationship between K and Ca. Competition from increased rates of K has been reported to decrease Ca content in poinsettias.

Conclusions

Fertilization rates of 50 ppm N resulted in plants which were smaller. Higher fertilization rates of 200 to 300 ppm N resulted in an

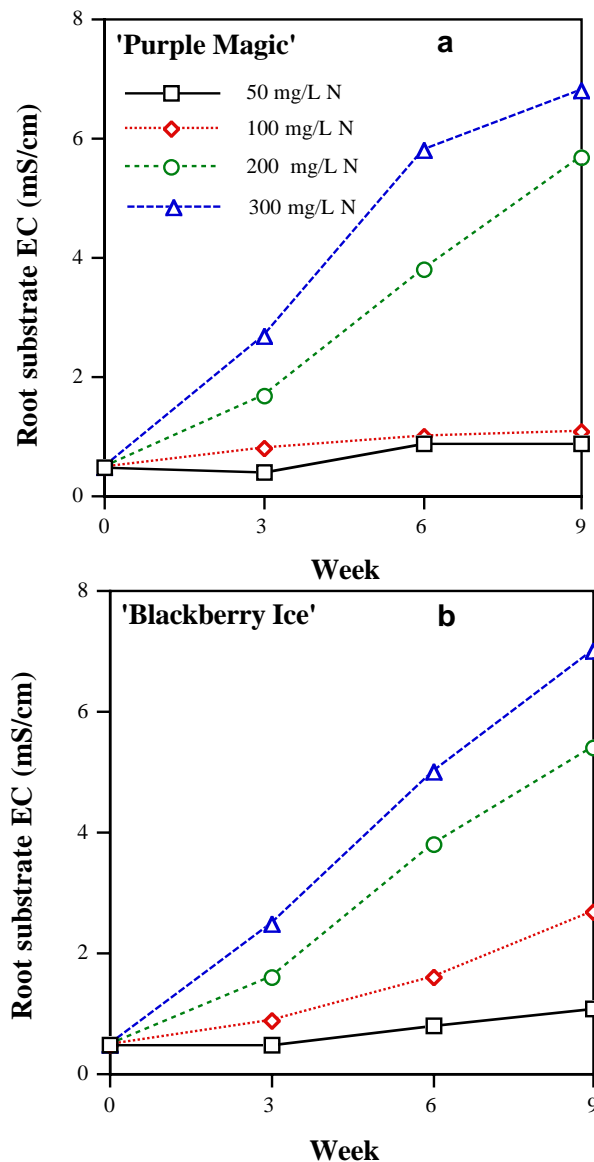


Fig. 1. Root substrate EC levels of Purple Magic (green-leaf) (a) and Blackberry Ice (variegated-leaf) (b) double impatiens fertilized with 50, 100, 200, or 300 ppm N on flood benches.

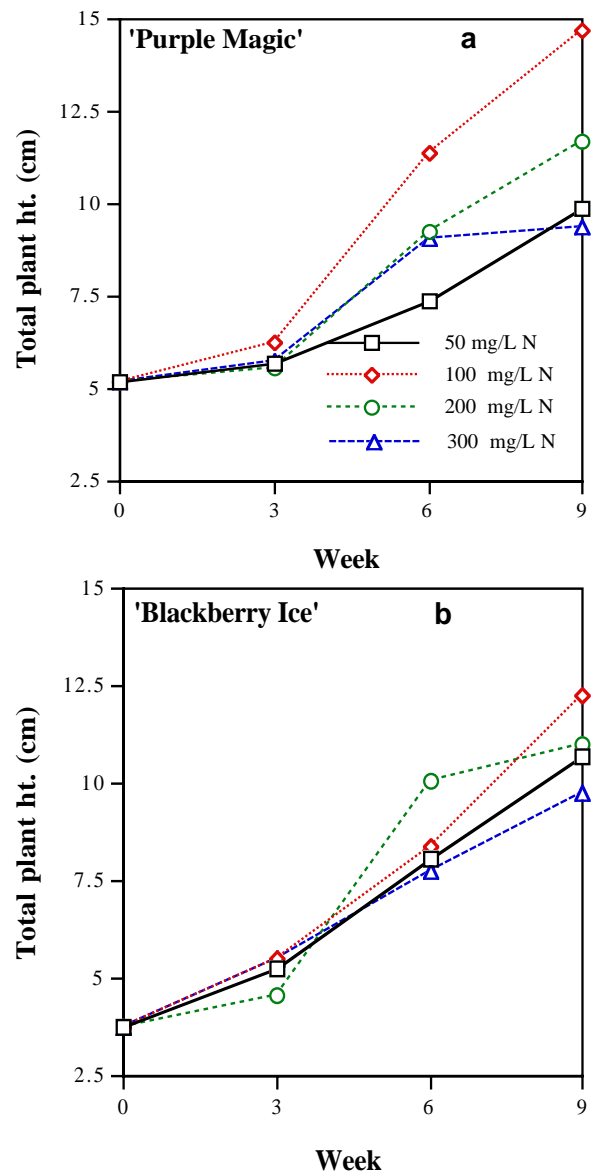


Fig. 2. Total plant height of Purple Magic (green-leaf) (a) and Blackberry Ice (variegated-leaf) (b) double impatiens fertilized with 50, 100, 200, or 300 ppm N on flood benches (1 inch = 2.5 cm).

accumulation in root substrate fertilizer salts and a reduction in plant growth. For maximum shoot growth, growers should apply 100 ppm N when growing Purple Magic (green-leaved) double impatiens on flood benches. Because Blackberry Ice (variegated-leaved) plants have a lower growth rate and higher accumulation of fertilizer salts than green plants, fertilization rates slightly lower than 100 ppm N would be recommended with flood benches. General grower recommendations suggest applying 33% to 50% less fertilizer to flood bench grown plants than hand-watered plants. Therefore, assuming this applies to double impatiens, adjusting the 100 ppm N recommended fertilization rate of flood bench irrigated plants to hand-watering would result in a recommended hand-watering irrigation rate of 150 to 200 ppm

N, with the lower range suggested for variegated-leaved varieties.

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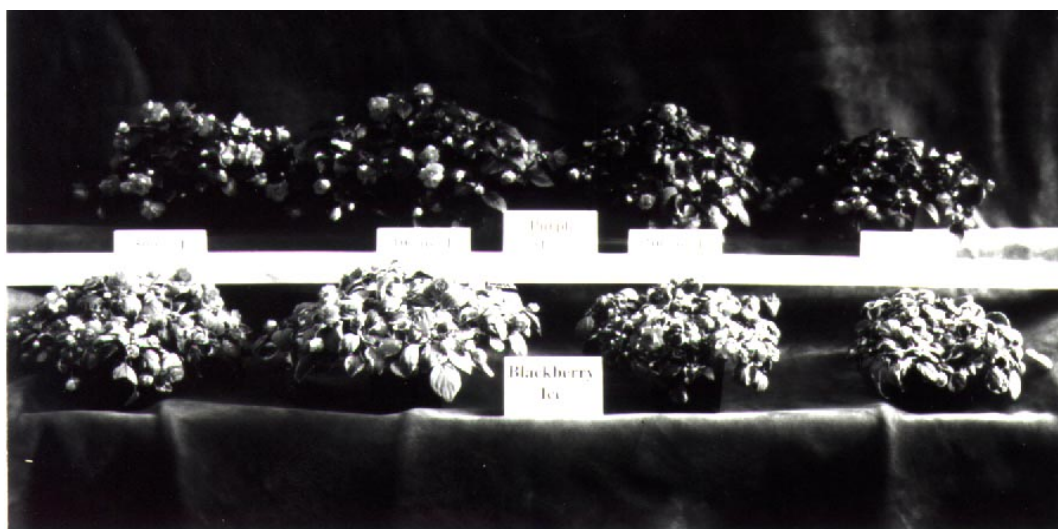


Fig. 3. Plant growth of Purple Magic (green-leaf) (top row) and Blackberry Ice (variegated-leaf) (bottom row) double impatiens fertilized with (left to right) 50, 100, 200, or 300 ppm N on flood benches.

Fall Crop Review

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Pansies. Many growers had a difficult time controlling stretch due to the hotter August and September temperatures. Demand early in the season was lighter due to the hot weather, when many gardeners avoided outdoor activities. An unusually high number of pansy plugs and plants with *Phytophthora* root rot were confirmed by the NCSU Plant Diagnostic Clinic this fall. Reports from most growers indicate a high demand and tight supplies of late season pansies.

Garden Mums. Heat delay with the garden mum crop caused a 1 to 2 week delay in bloom for many growers. The hot weather also caused slower consumer demand. Crop rotations from garden mums to poinsettias were delayed for many growers because of the late mum crop.

Ornamental Cabbage and Kale. Demand for ornamental cabbage and kale was brisk in the Charlotte area. After composting plants in the fall of 1997, many growers scaled back production in 1998 resulting in tighter supplies. With the warm temperatures, many plants grew out of the effects of the plant growth regulator treatment and plants were taller than last season. Coloration was later than last year, but as long as the plants had a little color they were being marketed. For those of you interested in ornamental cabbage and kale, James Gibson, a M.S. student in the Department of Horticultural Science at NC State will be conducting a cultivar evaluation this fall/winter. The plants can be viewed in the trial beds at the J.C. Raulston Arboretum.

Ornamental Vegetables. Ornamental vegetables are a hot new item for many growers in the Charlotte and Raleigh areas. Most of the excitement is about the Red Giant variety of Indian Mustard. It has a brilliant red color and coloration is 2 to 3 weeks earlier than ornamental cabbage and kale. It looks to be an excellent plant for the landscape. The big question is

how well it handles the winter weather in North Carolina. A few plants will be evaluated in the trial garden at the J.C. Raulston Arboretum.

Poinsettias. We are in the final half of the poinsettia season and most growers are happy with their crop. The delay in moving out the garden mum crop caused the most headaches for some growers in finding enough room to space the poinsettias. The warmer night temperatures also encourage abundant plant growth and many growers were frustrated by tall poinsettias. Many growers stated they planned to apply a late season, low dose plant growth regulator drench to the crop in late October or early November.

A number of cases of bacterial soft rot were confirmed earlier in the season at the NCSU Plant Diagnostic Clinic. But Ron Jones didn't think the problem was any more prevalent than normal.

With cooler weather finally arriving, there have been a few reports of cracked heat exchangers. Remember to inspect the heaters for hairline cracks.

A few cases of the physiological leaf disorder called leaf crippling, distortion, and puckering have been reported. According to the Ecker Poinsettia Manual, "leaf distortion frequently occurs in late September and early October after the plants have been moved into the finishing area. Branches which develop after pinching may have 2 to 3 misshapen and distorted leaves. In most instances, these leaves remain distorted, but green, throughout the forcing period. Leaves which expand later are usually normal and hide the damaged leaves by market time. The causes of the leaf distortion are not well understood. It seems that when cells in very young leaf tissues are ruptured or killed, the leaf becomes misshapen as it expands. Plants under stress from bright light, extremely warm temperatures, or moving air often have more leaf distortion. It is helpful to provide shade and syringe the foliage until roots are well established and the side branches begin to develop."

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