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A New Growth Regulator Works on Pot Mums

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Growth of potted chrysanthemums has been at least partially controlled with growth regulators for over 30 years. In those 3 decades new chemicals have been introduced regularly, but many never got beyond the company's "numbered compound" stage. Two new compounds which really do work on pot mums are Bonzi, formerly designated as PP 333, and Sumagic, referred to as XE-1019. They also control stem elongation of several other floricultural crops, such as poinsettias, Easter lilies, some bedding plant species and geraniums, and at concentrations much weaker than one associates with the long-established growth regulators Cycocel and B-Nine.

Bonzi was discussed previously [N.C. Flower Growers' Bul. 30(2):1-21 (April, 1986)]. This article primarily will discuss results with Sumagic. Two experiments with Sumagic have been conducted by the authors. Objectives of the first experiment were to investigate the effectiveness of Sumagic in controlling stem elongation of the varieties "Candlelight," "Spice" and "Stoplight," and to compare Sumagic with B-Nine, Bonzi and A-Rest. The best treatments from the first experiment were then used in a second experiment, on the varieties "Bright Golden Anne," "Cirbronze" and "Garland."

Materials and Methods

Experiment I. Rooted cuttings of "Candlelight," "Spice" and "Stoplight" were potted April 15, 1986 (4 cuttings/6½" azalea pot in Metro Mix 360). Plants were placed under long days until April 22, and pinched April 29. Growth regulator treatments were applied to "Spice" plants on May 9, when lateral shoots were approximately 1½-2 inches long. "Candlelight" and "Stoplight" plants were treated May 12. Treatments are shown in Table 1. Plants were fertilized weekly with 20-10-20 (500 ppm N, 450 ppm P, 600 ppm K). Osmocote was applied as a top-dressing on April 22 (1 tsp./pot). Benlate and Truban were applied as drenches on April 15 (8 and 6 oz./100 gals. water, respectively). Temik was applied immediately after pinching.

Plant heights were measured 3 weeks after pinching and again when plants were "salable". Plant diameter and date of flowering also were recorded. Typical plants from each treatment were photographed at the conclusion of the experiment.

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Experiment II. Rooted cuttings of "Bright Golden Anne", "Cirbronze", and "Garland" were potted June 12, 1986 (4 cuttings/6½" azalea pot), in Metro Mix 360. "Bright Golden Anne" and "Garland" plants were grown under natural long days for one week, while "Cirbronze" plants were grown under long days until July 2. All plants were pinched June 26, and growth regulator treatments were applied when lateral shoots were 1½ to 2 inches long. Plants were fertilized in the same manner as reported for Experiment I. Plant heights were recorded on July 21 and when plants were "salable". Plant diameter and days required for flowering again were recorded. Typical plants were photographed at the end of the experiment. Data from both experiments were analyzed statistically.

Results and Discussion

Experiment I. Stem elongation was curtailed with Sumagic, Bonzi, A-Rest and B-Nine (Table 1). All growth regulator treatments resulted in plants which were shorter than untreated plants. Sumagic foliar spray applications at 5 or 10 ppm were about equally effective, while 20 ppm had a stronger reaction, as one would expect. The 3 Sumagic drench treatments were very similar in activity. Bonzi, applied as a 0.50 mg drench, was most effective for "Candlelight" and "Spice" plants, while a 100 ppm Bonzi spray controlled elongation to the greatest extent for "Stoplight" plants. Flowering was delayed with the Bonzi drench treatments for all 3 varieties.

Data in Table 1 reveal that control plants of the varieties "Candlelight" and "Spice" grew 9 cm. (slightly more than 3½") from May 21 to the time of flowering, while plants treated with growth regulators often only elongated 4 to 6 cm. "Stoplight" plants increased 9 to 11 cm. in height in control and growth regulator treatments with the exception of Bonzi-treated plants, which only increased 4 cm. if treated with a 100 ppm foliar spray, or 7 cm. when a 0.5 mg drench was used.

Pot mums treated with Sumagic or Bonzi spray applications occasionally had one plant in the pot which seemed to be unaffected by the treatment. Shoots of that plant would extend beyond the plant canopy (Figure 1). Poor spray coverage has often been blamed for this appearance, or reports have been made that Sumagic and Bonzi are both poorly translocated from foliage to stems, and that it is essential that spray applications be directed to the stems, rather than the leaves. Allen Hammer (personal communication) recently stated that researchers at both chemical companies which formulate Bonzi and Sumagic have reported adequate translocation from leaves, while James Barrett and his colleagues at the University of Florida have shown the increased effectiveness of Bonzi spray treatments, when application was directed at the stems. Method and precision of application must be closely evaluated. There is little margin for error with either Sumagic or Bonzi, as the materials are very active, even at very low concentrations. Many growers have been lulled into carelessness by the tolerance of plants to high rates of B-Nine (exceeding 3000 ppm), while rates of 20 ppm and 100 ppm of Sumagic and Bonzi, respectively, were as high as one had to go to achieve height control. Possible dripping of growth regulators from leaves to the growing medium, thus also acting as a drench treatment, should not be overlooked or allowed, or excessive control might result.

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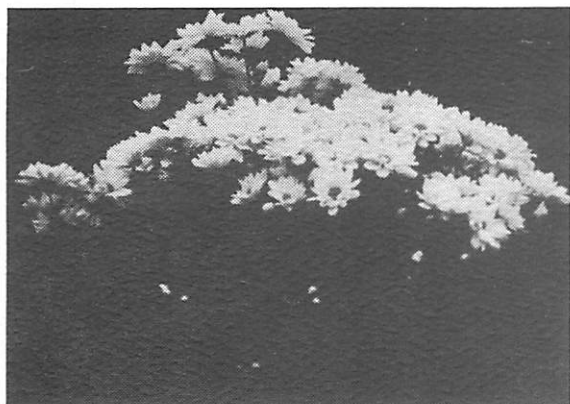
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Figure 1. 'Candlelight' plant treated with a Sumagic foliar spray application. Poor translocation and/or poor spray coverage might be responsible for irregular growth.

Experiment II. The best growth regulator treatments from Experiment I were tried in this experiment, and positive results were achieved with most treatments (Table 2). Plants treated with growth regulators were always shorter than untreated plants, but the differences with Bonzi drench treatments were slight. Response of "Cirbronze" plants to various growth regulator treatments was quite pronounced. A Sumagic foliar spray (10 ppm) or drench (0.25 mg/pot) was about as effective as B-Nine at 2500 ppm (Figure 2) and Bonzi at 100 ppm (Figure 4). Untreated plants were occasionally 10 cm (4") taller (Figure 4).

Untreated "Garland" plants flowered in 57 days, while treated plants were salable 4 to 7 days later. The delay for "Cirbronze" plants was only 0-3 days, but flowering was delayed from 7 to 13 days for "Bright Golden Anne" plants.

Figure 2. "Cirbronze" plants treated with 2500 ppm B-Nine, 10 ppm Sumagic spray, and 0.25 mg/pot Sumagic drench.

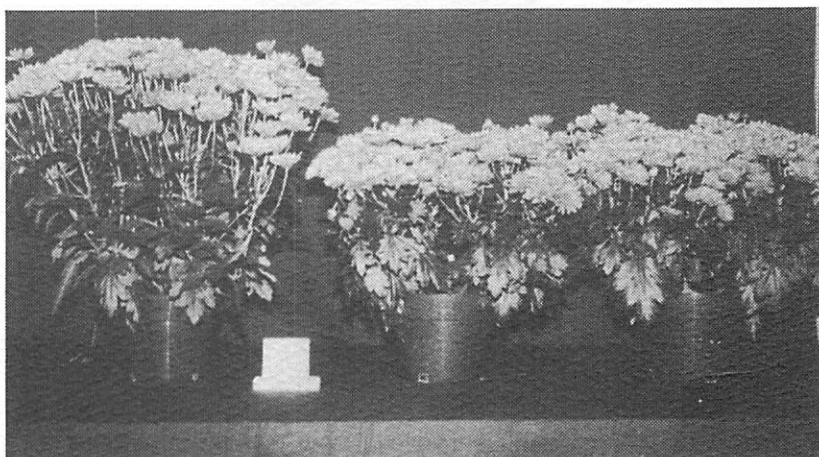


Figure 3. "Cirbronze" plants treated with 2500 ppm B-Nine, 10 ppm Sumagic spray, and 100 ppm Bonzi spray.

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Figure 4. "Cirbronze". Left to right: Control, 10 ppm Sumagic spray; 0.25 mg/pot Sumagic drench.



Very few articles have been published on the use of Sumagic. Allen Hammer has studied its effects on a wide range of crops, but not on pot mums. James Barrett also has used it in his quest for better height control under Florida conditions. We have compared Sumagic to Bonzi, A-Rest, B-Nine and Cycocel on several crops. All investigators have quickly become aware of its strong activity, and the need to be very precise in preparing the concentration, and in applying the material. The area of production space covered, and the amount of dilute solution which is used, are as important as the concentration. Applying too much material as a foliar spray could cause the excess spray to drip on the growing medium and also act as a drench. Applying too little material could result in some plants not receiving adequate amounts, and uneven growth could occur.

Growers should be cautious about any pesticide used in their production programs, and this philosophy surely should be adopted for the highly active growth regulators. Growers also should be alert for new chemicals which could help them in their efforts to grow high quality floral products.

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The departmental greenhouse staff also is acknowledged for their diligence and ability.

Mention of materials used does not imply endorsement, nor does omission imply criticism.

Table 1. Influences of Sumagic and other growth regulators on growth and flowering of 3 pot mum varieties. Experiment conducted at N.C. State University (April to June, 1986)

Variety	Treatment			Plant height (cm) ^(w)		Plant diameter (cm)
	Chemical	Method	Rate	May 21	Anthesis	
Candlelight	Control	Spray	0 ppm	20	29	46
	Sumagic	Spray	5 ppm	17	25	46
	Sumagic	Spray	10 ppm	16	21	42
	Sumagic	Spray	20 ppm	15	19	39
	Control	Drench	0 mg/pot	21	30	47
	Sumagic	Drench	0.12 mg/pot	18	25	45
	Sumagic	Drench	0.25 mg/pot	18	24	43
	Sumagic	Drench	0.50 mg/pot	16	23	46
	B-Nine	Spray	2500 ppm	17	24	44
	Bonzi	Drench	0.50 mg/pot	14	18	38(x)
	Bonzi	Spray	100 ppm	16	22	41
	A-Rest	Spray	50 ppm	15	23	42
			LSD .05	1.3	1.4	3.8
Spice	Control	Spray	0 ppm	20	28	48
	Sumagic	Spray	5 ppm	15	23	44
	Sumagic	Spray	10 ppm	16	22	41
	Sumagic	Spray	22 ppm	14	18	39
	Control	Drench	0 mg/pot	20	27	49
	Sumagic	Drench	0.12 mg/pot	18	25	49
	Sumagic	Drench	0.25 mg/pot	17	22	44
	Sumagic	Drench	0.50 mg/pot	16	22	43
	B-Nine	Spray	2500 ppm	16	23	42
	Bonzi	Drench	0.50 mg/pot	13	15	35(x)
	Bonzi	Spray	100 ppm	15	20	40
	A-Rest	Spray	50 ppm	17	24	45
			LSD .05	2.1	1.6	3.6
Stoplight	Control	Spray	0 ppm	27	38	49
	Sumagic	Spray	5 ppm	20	30	46
	Sumagic	Spray	10 ppm	19	29	44
	Sumagic	Spray	20 ppm	16	25	39(y)
	Control	Drench	0 mg/pot	26	36	50
	Sumagic	Drench	0.12 mg/pot	25	34	47
	Sumagic	Drench	0.25 mg/pot	23	33	44
	Sumagic	Drench	0.50 mg/pot	22	31	44
	B-Nine	Spray	2500 ppm	17	27	42
	Bonzi	Drench	0.50 mg/pot	15	22	40(z)
	Bonzi	Spray	100 ppm	15	19	38(z)
	A-Rest	Spray	50 ppm	19	28	44
			LSD .05	2.1	2.3	1.7

^(w) Plant height measured from pot rim to uppermost part of plant canopy.

^(x) Approximate 5 day delay in flowering.

^(y) 1-2 day delay in flowering.

^(z) 3-4 day delay in flowering.

Conversion 2.5 cm = 1 inch.

Table 2. Control of stem elongation of 3 pot mum varieties with Sumagic, Bonzi and B-Nine. (Experiment conducted from June to August, 1986).

Variety	Treatment			Plant Height (cm)		Plant diameter (cm)	Days to Flower
	Chemical	Method	Rate	May 21	Anthesis		
Bright Golden Anne	Control	Spray	0 ppm	31	46	59	64
	Sumagic	Spray	10 ppm	20	33	54	77
	Sumagic	Drench	0.25 mg/pot	22	34	58	74
	Bonzi	Spray	100 ppm	23	36	59	72
	Bonzi	Drench	0.25 mg/pot	27	41	60	71
	B-Nine	Spray	2500 ppm	24	37	59	73
	LSD .05			2.1	3.4	4.8	
Cirbronze	Control	Spray	0 ppm	27	34	53	61
	Sumagic	Spray	10 ppm	18	23	46	63
	Sumagic	Drench	0.25 mg/pot	19	25	43	64
	Bonzi	Spray	100 ppm	19	27	47	64
	Bonzi	Drench	0.25 mg/pot	21	30	50	64
	B-Nine	Spray	2500 ppm	20	26	49	61
	LSD .05			1.9	1.9	6.2	
Garland	Control	Spray	0 ppm	32	40	57	57
	Sumagic	Spray	10 ppm	22	28	49	64
	Sumagic	Drench	0.25 mg/pot	21	30	52	62
	Bonzi	Spray	100 ppm	23	31	51	62
	Bonzi	Drench	0.25 mg/pot	23	34	53	61
	B-Nine	Spray	2500 ppm	24	33	49	61
	LSD .05			2.1	2.3	6.4	