

BRANCHING OF *PHOTINIA X FRASERI* IN RESPONSE TO ATRINAL AND OTHER GROWTH REGULATORS

Pruning or pinching in the nursery to produce compact, well-branched plants requires much hand labor. If sprays can be applied to do this pruning chemically, the cost of production may be reduced. Chemical pruning has been an accepted practice with a few kinds of plants ever since the introduction of fatty acid derivatives for this purpose in the 1960's (1,4,6).

Dikegulac-sodium (Atrinal) is now used for chemical pruning of greenhouse and nursery azaleas (2,3). It also increases branching of various other nursery plants including holly (10), euonymus (5), photinia (7) and various other ornamentals (8). A combination of the cytokinin PPA [6-benzylamino-9-(tetra-hydropyran2-yl)9 H-purine] and Off-Shoot-0' (methylesters of C₆ to C₁₂ fatty acids) resulted in branching of *Photinia x fraseri* and Exbury azaleas (9).

Chemical pruning has been an accepted practice on some plants since the late 1960's

We have studied the response of *Photinia x fraseri* to Atrinal since 1977, and more recently we have compared this response with the branching following application of another cytokinin, 6-benzylamino purine (also known as 6-benzyladenine or BA).

In 1977 we used photinia plants that were started from cuttings in February, potted into 2-inch pots in April, and transplanted to 1-gallon cans on June 13. Atrinal was applied July 14 and 29, or July 14, 21 and 29. Plants were approximately 10 cm (4 inches) tall when treated. There were 4 replications of 4 plants per treatment. Plants treated with 2 applications of Atrinal at 4,000 ppm or 3 applications at 3,000 ppm had 3 to 4 times as many branches as untreated plants (Table 1). The branches averaged about half as long in those two treatments as in the untreated plants. Plant height was not significantly reduced by any treatment except three applications of Atrinal at 4,000 ppm, although there was a tendency for reduction in plant height with increasing concentration and number of applications.

Table 1. Atrinal effects on branching and height of the *Photinia x fraseri*. 1977.¹

Rate of Atrinal (ppm)	Number of applications	Number of branches	Branch length (cm)	Height (cm)
None	-	2.7 a	22.6 a	38.1 a
2000	2	5.5 a	16.5 b	38.8 a
3000	2	9.7 b	12.0 c	34.2 ab
4000	2	11.4 bcd	10.4 c	32.8 ab
2000	3	9.9 be	11.0 c	32.1 ab
3000	3	13.7 d	9.2 c	32.4 ab
4000	3	12.9 cd	8.8 c	30.3 b

¹Means followed by the same letter within columns are not significantly different at the 5% level.

Treatments were not applied until August 8 and 23 in 1978, and the plants were 30 to 50 cm (12 to 20 inches) tall when treated. They had been rooted the previous summer, potted in November, and transplanted into gallon cans July 5. There were 4 replications of 3 plants in each treatment. Treatments included Atrinal at 3,000 and 4,000 ppm; BA at 525, 1,050 and 2,100 ppm; combination of BA + GA₄A₇ (gibberellins A₄ and A₇) at 550, 1,100 and 2,200 ppm of each chemical; Off-Shoot-0 at 4.2%; and Off-Shoot-0 with the BA + GA₄A₇ combination. There was only a 55% increase in number of branches from 2 applications of Atrinal at 4,000 ppm (Table 2) and no other treatment significantly affected the number of branches. The untreated plants had more branches than in other years. Lower or higher rates of BA or GA₄A₇ than the ones shown in Table 2 did not give significantly different results. Plant height was increased when the gibberellins were applied with BA.

Table 2. Effects of growth regulators on branching and height of *Photinia x fraseri*. 1978.¹

Treatment	Rates (ppm)	Branch No.	Branch Length (cm)	Height (cm)
Untreated	-	5.8 cd	11.7 ab	63.1 b
Handpinched	-	6.4 bcd	14.8 a	65.5 b
Off-Shoot-0 ²	-	4.8 d	13.1 ab	67.3 b
Atrinal, 2 applications ³	3000	8.7 ab	9.0 b	63.3 b
Atrinal, 2 applications ³	4000	9.1 a	9.3 b	64.3 b
BA	1100	5.3 d	12.7ab	65.4b
BA + GA _{4/7}	1100+1100	5.6 cd	13.1 ab	80.7 a
BA + GA _{4/7} + Off-Shoot-0 ²	1100+1100	7.8abc	13.3ab	84.0a

¹Means followed by the same letter within columns are not significantly different at the 5% level.

² Off-Shoot-0 was applied at 4.2% active ingredient.

³ Applied August 8 and 23. Other treatments August 8 only.

In 1980, treatments were applied July 25 on plants started the previous September, potted in March, and transplanted into gallon cans June 19. They averaged 28 cm (11 inches) in height when treated. Ten single-plant replications were used. In the 1980 experiment, untreated plants and those treated with Off-Shoot-0 showed almost no branching, and the response to hand pinching was not significantly different from no treatment (Table 3). One application of Atrinal at the highest concentration (6,000 ppm) increased the branching compared with untreated plants but not compared with hand-pinched plants. A combination of BA at 2,000 ppm plus Off-Shoot-0 at 4.2% resulted in nearly 7 branches per plant. When GA₄A₇ was added to this combination, the number of branches was reduced, but plant height was increased as in 1978. The BA + GA₄A₇ combination without Off-Shoot-0 did not significantly influence branching or plant height.

Table 3. Effects of growth regulators on branching and height of *Photinia x fraseri*. 1980.¹

Treatment	Rates (ppm)	Branch		
		Branch No.	length (cm)	Height (cm)
Untreated	-	0.2d	17.5 a	53.1 bc
Hand pinched	-	2.0 bcd	12.2 ab	43.5 d
Off-Shoot-0 ²	-	0.3 d	8.3 ab	53.9 bc
Atrinal	4000	0.7 cd	8.2 ab	58.1 ab
Atrinal	6000	2.6 bc	10.6 ab	48.7 cd
BA+				
Off-Shoot-0 ²	2000	6.7 a	5.7 b	53.9 bc
BA + GA _{4/7} +				
Off-Shoot-0 ²	2000 +2000	3.3 b	6.4 b	61.9 a
BA +GA ₄₁₇	2000+ 2000	0.4 cd	8.5 ab	58.0 ab

¹Means followed by the same letter within columns are not significantly different at the 5% level.

² Off-Shoot-0 was applied at 4.2 % active ingredient.

All rates in this report are in ppm active ingredient. Atrinal at 2,000 ppm active ingredient is 1.3 oz. of product per gallon of spray solution.

The BA + GA₄A₇ combination is being developed under the trade name Promalin for its effect on Delicious apple fruit shape and size.

Two applications of atrinal at 3,000 or 4,000 ppm produced a well-branched plant.

In summary, two applications of Atrinal at 3,000 or 4,000 ppm produced a well-branched plant. This is in good agreement with results on photinia in California (7).

We are continuing to study effects of timing and concentration of Atrinal on photinia and other kinds of plants. The combination of 6-benzylamino purine with Off-Shoot-0 also is being

evaluated further. There appears to be potential for manipulating plant height and amount of branching by adding the gibberellins to this combination.

Literature cited

1. Cathey, H. M. 1970. Chemical pruning of plants. Amer. Nurs. 131: 8-11, 49, 52-55.
2. Cohen, M.A. 1977. Shaping ornamentals with growth regulators. Amer. Nurs. 145: 104-106.
3. de Silva, W. H., P. F. Bocion and H. R. Walther. 1976. Chemical pinching of azalea with dikegulac. HortScience 11: 569-570.
4. Furuta, Tokuji. 1967. Chemical pinching agents for azaleas. Univ. of Calif. Agric. Ext. Serv. AXT-256.
5. Johnson, A. G. and G. P. Lumis. 1979. Chemical pruning of *Euonymus fortunei* 'Colorata' with dikegulac-sodium. HortScience 14: 626-627.
6. Kozel, P. C. and K. W. Reisch. 1972. Guidelines for chemical pruning. Amer. Nurs. 135: 13, 68, 70, 72, 80, 82.
7. Kretchun, Thomas M. and T. G. Byrne. 1979. Improving photinia growth characteristics-Progress Report. Flower & Nursery Rpt. pp. 3-4.
8. Miller, D. 1976. The growth regulator "Atrinal" an aid to management. Proc. Intern. Plant Prop. Soc. 25: 206-209.
9. Ryan, G. F. 1974. Chemicals to increase branching of *Photinia* 'Fraseri' and Rhododendron Exbury azaleas. HortScience 9: 534-535.
10. Self, Raymond L. 1976. Effects of Atrinal growth inhibitor on azaleas and several woody ornamentals. (abst.) HortScience 11: 230.

Pesticide Use - Due to constantly changing laws and regulations, no liability for the suggested use of chemicals in this Newsletter is assumed by the ONW Newsletter. Pesticides should be applied according to label directions on the pesticide container.

Permission to Reprint material appearing in the ONW Newsletter is granted with the request that you credit the source: Ornamentals Northwest Newsletter, date, volume, issue, page numbers. Do not excerpt or reprint in such a manner as to imply the author's endorsement or criticism of a product or concept.

Nondiscrimination - The information in the Ornamentals Northwest Newsletter is provided with the understanding that no discrimination is intended and that listing of commercial products implies no endorsement by the authors. Criticism of products or equipment is neither intended nor implied.