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Environmental Versus Chemical Manipulation of Azalea Flowering

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West coast azaleas at times seem to be quite different in flowering response than azaleas obtained from growers in southeastern states. Dormancy seems to be more intense in the west coast-grown plants and a longer forcing period often is required. Varieties also are often different from what we frequently use in the east, so we were eager to study the responses of nearly two dozen varieties donated to our research program by Darrell Messick, Saratoga, California.

Plants were potted in 6½" azalea pots on May 22, 1984, in peat moss. All plants were pinched June 14, and grown at a minimum night temperature of 65°. One-third of the plants of all varieties were treated with 1500 ppm B-Nine SP on July 10 and 25, one-third were subjected to a 9-hour daylength on July 23, while the remaining one-third were control plants. All plants were fertilized regularly with 21-7-7. On October 1st plants were sub-divided again, and half of the plants in the above treatments were placed at 48°F. Incandescent lights were on in the cooler for 12 hours daily, and plants were watered twice a week. The other half of the plants in the experiment began receiving gibberellic acid treatment on October 15 (ProGibb 4, 7 at 1000 ppm). Some plants required only two applications, while others failed to flower even after five applications. Flowering data were recorded at the conclusion of the experiment, and pictures were taken of representative plants.

Results and Discussion

Number of days to force: Helmut Vogel plants treated with only two applications of $GA_{4,7}$, applied one week apart, were salable within two to three weeks after gibberellin was first applied (Table 1, Figure 1). Plants subjected to 48°F for six weeks forced in five weeks. Number of days to force was from the day of the first gibberellin application or day of removal from 48°. Several varieties treated with GA had been removed from the experiment before their counterparts had been removed from the cooler.

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Figure 1. Helmut Vogel plant treated with $GA_{4,7}$, and salable within 2 to 3 weeks after initial treatment.

Table 1.

Flowering response of 22 azalea cultivars treated with B-Nine SP or short days GA or 48°

Cv.	Treatment to initiate flower buds (a)	Treatment to break dormancy (b)	Number of days to force (c)	Number of flowers per shoot	Number of flowering shoots per plant	Number of by-pass shoots per plant
Chimes	B-Nine	GA	50	2	20	1
	Short days	GA	45	2	26	12
	Control	GA	43	2	23	13
	B-Nine	48°	50	2	29	8
	Short days	48°	41	2	34	18
	Control	48°	52	2	30	14
Dogwood	B-Nine	GA	48	2	13	6
	Short days	GA	48	2	23	9
	Control	GA	41	2	14	8
	B-Nine	48°	52	3	29	10
	Short days	48°	42	3	35	14
	Control	48°	42	3	33	17
Dogwood (Variegated)	B-Nine	GA	47	3	20	14
	Shorts days	GA	43	3	20	4
	Control	GA	49	3	10	6
	B-Nine	48°	47	3	31	21
	Short days	48°	39	3	16	2
	Control	48°	52	3	38	6
Dorothy Gish	B-Nine	GA	52	2	22	10
	Short days	GA	-	-	-	-
	Control	GA	-	-	-	-
	B-Nine	48°	49	3	20	7
	Short days	48°	58	3	46	0
	Control	48°	54	3	31	6

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Table 1—*(continued from page 2)*

Cv.	Treatment to initiate flower buds (a)	Treatment to break dormancy (b)	Number of days to force (c)	Number of flowers per shoot	Number of flowering shoots per plant	Number of by-pass shoots per plant
Erie	B-Nine	GA	31	2	28	3
	Short days	GA	32	2	19	16
	Control	GA	32	2	20	14
	B-Nine	48°	35	2	25	2
	Short days	48°	-	-	-	-
	Control	48°	-	-	-	-
Gloria	B-Nine	GA	36	2	20	20
	Short days	GA	27	2	19	7
	Control	GA	-	-	-	-
	B-Nine	48°	66	3	23	19
	Short days	48°	41	3	29	2
	Control	48°	54	3	53	3
Helmut Vogel	B-Nine	GA	18	2	30	15
	Short days	GA	14	2	33	4
	Control	GA	13	2	34	2
	B-Nine	48°	35	2	28	8
	Short days	48°	31	2	28	8
	Control	48°	35	2	35	6
Hot Pink	B-Nine	GA	53	3	11	8
	Short days	GA	60	3	9	1
	Control	GA	51	3	12	4
	B-Nine	48°	56	3	13	7
	Short days	48°	38	3	21	0
	Control	48°	38	3	18	0
Inga	B-Nine	GA	19	2	26	14
	Short days	GA	15	2	28	9
	Control	GA	13	2	29	2
	B-Nine	48°	35	3	27	10
	Short days	48°	33	2	39	8
	Control	48°	35	2	35	4
Jean Haerens	B-Nine	GA	-	-	-	-
	Short days	GA	-	-	-	-
	Control	GA	-	-	-	-
	B-Nine	48°	60	2	14	11
	Short days	48°	57	2	17	27
	Control	48°	56	2	13	14
Kingfisher	B-Nine	GA	35	3	20	10
	Short days	GA	35	2	18	8
	Control	GA	35	2	18	7
	B-Nine	48°	39	3	23	3
	Short days	48°	39	2	18	5
	Control	48°	48	2	40	0

(continued on page 4)

Table 1—*(continued from page 3)*

Cv.	Treatment to initiate flower buds (a)	Treatment to break dormancy (b)	Number of days to force (c)	Number of flowers per shoot	Number of flowering shoots per plant	Number of by-pass shoots per plant
Knute Erwin	B-Nine	GA	-	-	-	-
	Short days	GA	-	-	-	-
	Control	GA	-	-	-	-
	B-Nine	48°	71	2	12	8
	Short days	48°	63	2	13	36
	Control	48°	63	2	16	9
Lentengroot	B-Nine	GA	64	3	10	7
	Short days	GA	-	-	-	-
	Control	GA	-	-	-	-
	B-Nine	48°	61	3	10	33
	Short days	48°	60	3	15	20
	Control	48°	60	3	14	12
Mission Bells	B-Nine	GA	50	3	15	11
	Short days	GA	48	2	16	7
	Control	GA	51	3	20	6
	B-Nine	48°	52	3	29	2
	Short days	48°	39	3	21	6
	Control	48°	39	3	20	2
Oregon Alaska	B-Nine	GA	50	3	17	7
	Short days	GA	51	3	12	4
	Control	GA	49	3	14	2
	B-Nine	48°	45	3	23	11
	Short days	48°	52	3	28	0
	Control	48°	47	2	35	5
Prize	B-Nine	GA	37	2	27	10
	Short days	GA	39	2	30	0
	Control	GA	39	2	28	1
	B-Nine	48°	36	2	27	3
	Short days	48°	39	2	21	3
	Control	48°	39	2	28	0
Red Wing (5)	B-Nine	GA	56	3	18	0
	Short days	GA	51	2	6	0
	Control	GA	51	3	8	2
	B-Nine	48°	54	2	21	6
	Short days	48°	44	2	40	2
	Control	48°	54	2	27	5
Roadrunner (5)	B-Nine	GA	83	3	15	75
	Short days	GA	63	3	12	32
	Control	GA	63	3	13	36
	B-Nine	48°	63	2	21	27
	Short Days	48°	66	2	25	44
	Control	48°	63	2	19	45

(continued on page 5)

Table 1—*(continued from page 4)*

Cv.	Treatment to initiate flower buds (a)	Treatment to break dormancy (b)	Number of days to force (c)	Number of flowers per shoot	Number of flowering shoots per plant	Number of by-pass shoots per plant
Rosalia	B-Nine	GA	90	3	17	1
(5)	Short days	GA	-	-	-	-
	Control	GA	-	-	-	-
	B-Nine	48°	57	3	17	8
	Short days	48°	38	3	29	5
	Control	48°	42	3	50	3
Sweetheart	B-Nine	GA	-	-	-	-
(5)	Short days	GA	-	-	-	-
	Control	GA	-	-	-	-
	B-Nine	48°	61	4	16	9
	Short days	48°	54	3	24	8
	Control	48°	54	3	20	10
White Gish	B-Nine	GA	76	2	20	8
(5)	Short days	GA	-	-	-	-
	Control	GA	-	-	-	-
	B-Nine	48°	61	3	15	32
	Short days	48°	42	3	35	9
	Control	48°	57	3	38	10
Whitewater	B-Nine	GA	59	3	12	19
(5)	Short days	GA	59	2	12	25
	Control	GA	50	2	8	24
	B-Nine	48°	63	3	28	22
	Short days	48°	40	2	31	22
	Control	48°	54	2	44	27

(a) B-Nine at 1500 ppm; short days were 9-hours.
(b) GA 4,7 (Pro-Gibb 3.91%) 1000 ppm.
Number of applications shown below cultivar name 48° for 6 weeks; plants lighted for 12 hours daily
(c) From day of first application for GA-treated plants, or from day of removal from 48°

Dorothy Gish, Jean Haerens, Knute Erwin, Lentengroot, Rosalia, Sweetheart and White Gish plants generally did not respond to $GA_{4,7}$. Dorothy Gish and Erie plants did not respond to 48°, an unusual and unexplained circumstance. Forcing of many varieties did seem to be slower than experienced when the same varieties have been received from southeastern growers, or started in our greenhouse and placed in our year-round flowering program. Flowering almost always occurs within six weeks after removal from 48° and forced at 60 to 65°F night temperatures. In this experiment 17 out of 22 varieties generally required more than 42 days for forcing.

Comparison of plants in the B-Nine or 9-hour day length treatments reveal inconsistency but B-Nine-treated plants often were slower in forcing than those given short days.

Number of flowers per shoot: Two or three flowers per shoot were usually recorded. Not much time was allowed from the date of the final pinch to the start of the dormancy-breaking treatments (4 or 4½ months), so multiple buds were not produced on all shoots. Plants exposed to 48° occasionally averaged

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one more flower per shoot than plants treated with GA but there was seldom much difference due to B-Nine, short days or untreated plants.

Number of flowering shoots per plant: Floriferousness was more affected by the number of flowering shoots per plant, than by the number of flowers per shoot. Plants placed at 48° often had more flowering shoots than plants treated with GA. Nineteen out of 22 varieties showed such a response. Some varieties had twice as many flowering shoots when plants had been exposed to 48° as the dormancy-breaking treatment. Helmut Vogel, Inga and Prize plants were equally or more floriferous with GA treatments. Helmut Vogel and Inga flowers will frequently occur on the same plant (Figure 2), so the similarity in response is not surprising. Plants not treated with B-Nine or given short days often had as many flowering shoots as plants which had received those treatments.

Much of our early work on chemical and day length control of azalea flowering had been done on the variety Red Wing, as the variety was very popular and did respond to treatment. Red Wing plants treated with $GA_{4,7}$ did not perform as usual in this experiment, and there were few flowering shoots on plants given either short days or used as control plants.

Figure 2. Helmut Vogel and Inga flowers on one plant.

Number of by-pass shoots: This trait has to be considered in manipulation of flowering, as by-pass shoots have to be manually removed, particularly if the number is excessive. By-pass shoot production often is directly proportional to the duration of time from the final pinch to forcing. Usually by-pass shoot production is limited when only four months elapses from pinch to dormancy-breaking treatment, but in this experiment several varieties had many by-pass shoots. The variety Roadrunner was especially bad, perhaps because forcing time was so prolonged (nine weeks instead of a more customary five to six weeks). Plants treated with B-Nine frequently had the most by-pass shoots.

Discussion and Conclusion

Azalea varieties grown on the west coast often seem to respond quite differently from the same varieties obtained from azalea specialists in the southeast. This experiment revealed some apparent differences from what we usually expect in azalea production. We did not compare azalea plants from the two areas

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simultaneously, however, a procedure which would be needed for verification of this philosophy.

Growers should be aware that there is label clearance for B-Nine application to stimulate flower bud initiation of azaleas. A recent computer search by an employee of the North Carolina Department of Agriculture did reveal that no company had obtained label clearance for GA on azaleas. GA is highly successful on many varieties when plants are at the proper stage of floral development, the correct concentration and frequency of application are followed, and a surfactant is added to the solution to ensure adequate covering.

Azalea floral morphology is illustrated in another article in this bulletin, to give guidance to growers who desire to manipulate flowering.

Editor's note. Appreciation is extended to Darrell E. Messick, Saratoga, California for the generous contribution of plants for this experiment. 21-7-7 fertilizer was donated by Robert B. Peters, and B-Nine SP was donated by Uniroyal.