RESEARCH RESULTS FOR FLOWER GROWERS

Azalea Studies 1966 - 1969

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I. Influence of Commercial Root-Inducing Substances and 2,4,5-T on the Rooting of Azalea Cuttings, cv. 'Red Wing'. (Sanderson)

Cuttings of the azalea cultivar, 'Red Wing', were treated by dipping the base of cuttings in either commercial root-inducing substances, a 5 p.p.m. solution made from the herbicide 2,4,5 trichlorophenoxyacetic acid (2,4,5-T) and its derivatives, or a 40 p.p.m. solution of 2,4,5-T and its derivatives. The root-inducing substances and respective rooting scores are presented in Table 1.

Table 1. Influence of Several Commercial Root-Inducing Substances and 2,4,5 Trichlorophenoxacetic Acid on Rooting of Azalea, cv. 'Red Wing'.

Rooting substance[1]	Active ingredient[2]	Rooting score[3]
Check	. . .	2.8
Hormodin No. 1	IBA	2.4
Hormodin No. 2	IBA	2.6
Hormodin No. 3	IBA	2.6
Rainbow Tender	2,4,5-T & NAA	2.4
Rainbow Woody	2,4,5-T & NAA	2.6
Rootone	NAA, NAAA & IBA	1.9
Rootone No. 10	NAA, NAAA & IBA	0.6
2,4,5-T 5 p.p.m.	2,4,5-T	2.4
2,4,5-T 40 p.p.m.	2,4,5-T	2.6

1/ Manufacturers of the commercial root-inducing substances are: Merck & Company, Inc., Rahway, N. J., Hormodin No. 1, 2, 3; Rainbow Color and Chemical Company, Northbridge, California, Rainbow Tender and Rainbow Woody; Amchem Company, Ambler, Pa., Rootone and Rootone No. 10. The 2,4,5-T solutions were prepared from the herbicide 2,4,5 trichlorophenoxy-acetic acid.

2/ IBA = Indole butryic acid, 2,4,5-T = Trichlorophenoxyacetic acid, NAA = Napthaleneacetic acid, NAAA = Naphthylacetamides.

3/ Rooting scores are based on: 0 = no rooting, 1 = light rooting, 2 = medium rooting, 3 = heavy rooting.

Use of commercial root-inducing substances did not influence the ultimate rooting of 'Red Wing' azalea cuttings. Untreated cuttings yielded the highest rooting score (2.8 out of a possible 3.0) indicating that the cultivar 'Red Wing' will root well without the use of a root-inducing substance. Certain commercial materials gave the poorest rooting score, but generally yielded similar scores (2.4 - 2.6). Root-inducing substances may have influenced the time required for rooting. The earliest rooting time was observed in cuttings treated with 2,4,5-T.

II. Effect of Cuttings Taken from Growth Retardant Treated Plant on the Rooting of Azalea, cv. 'Red Wing'. (Sanderson)

Stock plants on the azalea cultivar 'Red Wing' were sprayed with a 0.25 per cent spray of the growth retardant succinic acid 2,2-dimethylhydrazide (B-Nine, trade mark of Uniroyal Company). Cuttings were removed from the plants at intervals of 2, 5 and 7 days following spraying. A check, consisting of cuttings taken from untreated plants was also provided. Cuttings taken from retardant-treated stock plants rooted as well as the cuttings from untreated stock plants. There was no difference in the sprayed cuttings taken at various intervals following spraying.

III. Effect of a Fungicide Dip on the Propagation of Azalea, cv. 'Red Wing' in Unsterilized Media. (Sanderson)

An unsterilized media consisting of equal parts of soil and peat moss was used as a propagation media. Cuttings of the azalea cultivar 'Red Wing' were given the following basal treatments: (1) check (no treatment), (2) Ferbam, (3) Hormodin No. 2, and (4) 1:1 Ferbam and Hormodin No. 2. Heavy rooting was observed with all treatments. Rooting scores (0 = none, 1 = light, 2 = medium and 3 = heavy) were as follows: Check - 2.8, Ferbam - 2.9, Hormodin No. 2 - 2.8 and 1:1 Ferbam-Hormodin No. 2 - 2.9. Although Ferbam has been reported to inhibit rooting of certain woody plant species, this was not the case with 'Red Wing' azalea.

IV. Influence of Several Growth Regulating Substances on Rooting of Azalea, cv. 'Coral Bells' and cv. 'Red Wing'. (Sanderson and Martin)

Root-inducing treatments were prepared from 10 growth-regulating substances by diluting the material with a small amount of alcohol and making up to volume with water. The materials are listed in Table 2 along with a check and two commercial root-inducing substances. The concentration of the prepared solutions was 20 p.p.m. for all the substances except Gibberellic acid, which contained 1,000 p.p.m. Treatment consisted of dipping 1/2 inch of base of the cutting in the solution for 5 seconds. The commercial materials were in talc form and the cuttings were dipped, then immediately removed from these materials. Cuttings of the cultivars 'Red Wing' and 'Coral Bells' were used.

The results are presented in Table 2. Most of the treatments yielded a high percentage of rooting with the exception of 2,4,5-TP, 2,4,5-T, and 2,4-D. Hormodin No. 2, IAA, indole propionic acid and P-chlorophenoxy acetic acid gave best rooting percentages for 'Coral Bells'. 'Red Wing' had high rooting percentages with all the substances except 2,4,5-TP, 2,4,5-T and 2,4-D yielding low scores. 'Coral Bells' cuttings gave the best rooting scores when cuttings were dipped in Hormodin No. 2, IAA and P-chlorophenoxy acetic acid. 'Red Wing' cuttings rooted well with no treatment or all the materials except 2,4,5-TP, 2,4,5-T, and 2,4-D. Hormodin No. 2 and IAA gave the best combined rooting score for the two cultivars.

Table 2. Influence of Several Growth-Regulating Substances on the Rooting of Azalea, cv. 'Red Wing' and cv. 'Coral Bells'

Treatments [1]	Per cent rooted			Rooting score [2]		
	'Red Wing'	'Coral Bells'	Mean	'Red Wing'	'Coral Bells'	Mean
Check (no treatment)	100	70	85	2.7	1.7	2.2
O-chlorophenoxy acetic acid	100	75	88	2.6	1.8	2.2
P-chlorophenoxy acetic acid	95	88	92	2.3	2.2	2.3
2,4,5 Trichlorophenoxypropionic acid (2,4,5-TP)	18	28	23	0.2	0.7	0.5
2,4,5 Trichlorophenoxy acetic acid (2,4,5-T)	28	48	38	0.3	1.0	0.7
2,4 Dichlorophenoxy acetic acid (2,4-D)	65	73	69	1.1	1.7	1.4
3 Indole propionic acid	100	85	93	2.6	1.8	2.2
Indole butryic acid (IBA)	100	78	89	2.6	1.6	2.1
Indole 3 acetic acid (IAA)	100	85	93	2.7	2.2	2.5
Gibberellic acid 10% K salt	100	83	92	2.5	1.7	2.1
Hormodin No. 1	100	80	90	2.7	1.9	2.3
Hormodin No. 2	100	93	98	2.5	2.5	2.5

1/ All treatments consisted of 20 p.p.m. concentration with the exception of gibberellic acid which was a 1,000 p.p.m. concentration. Hormodin No. 1 and No. 2 are the products of Merck & Co., Rahway, N.J. Active ingredient is indole butryic acid.

2/ Rooting scores are based on 0 = no rooting, 1 = light rooting, 2 = medium rooting and 3 = heavy rooting.

V. Influence of Various Chemical Treatments on the Growth and Cold Hardiness of Three Azalea Cultivars. (Sanderson and Self)

A test on cold damage to azaleas was begun with a group of container grown plants in the field on November 1, 1967 at the Spring Hill Ornamental Horticulture Field Station. A second test was begun December 20 on 'Coral Bells', 'Pink Supreme', and 'Coral Bells Supreme' azaleas.

Treatments consisted of foliage sprays (1) check, water; (2) 2.38 per cent Potassium bromide (KBr), 2.18 per cent calcium chloride ($CaCl_2$) plus 1.5 per cent potassium nitrate (KNO_3); (3) treatment 2 plus 0.01 per cent napthleneacetic acid (NAA); (4) treatment 2 plus 0.25 per cent succinic acid 2,2-dimethylhydrazide (B-Nine); (5) treatment 2 plus 0.01 per cent indole acetic acid (IAA); (6) treatment 2 plus 0.01 per cent maleic hydrazide; (7) 0.05 per cent salicylic acid (aspirin); (8) 0.28 per cent 2-chloroethyl trimethylammonium chloride (Cycocel); (9) 0.25 per cent B-Nine; (10) 12.5 per cent Wilt Pruf; (11) 25.0 per cent Wilt Pruf; (12) 1/2 tsp. KNO_3/No. 6 can; (13) 1/2 tsp. 12-6-4/No. 6 can; and (14) 1/4 tsp. Sulpho-mag/No. 6 can.

Day temperature for three weeks prior to treatment of test 2 had been in the seventies with nights in the fifties. On December 19, the high was 80 degrees. The plants were in a new flush of growth when the temperature dropped to 24° F. on December 23. The next day the temperature was 28° F. and on the 29th and 30th, the temperature was 31° F.

In the first test the KBr, $CaCl_2$, and KNO_3 combinations burned the foliage of 'Pink Ruffles' azaleas.

Top weights of plants in test 2 were taken May 10, 1968 after the first flush of growth. Per cent changes in top fresh weight from check are presented in Table 3.

Table 3. Per Cent Changes in Top Fresh Weight from Check of Azaleas Receiving Various Chemical Treatments, May 10, 1968 1/

Treatment 1/	'Coral Bells'	'Pink Supreme'	'Coral Bells Supreme'	Mean
	%	%	%	%
Check				
KBr, $CaCl_2$, KNO_3 spray	-60	00.0	-25.0	-28.3
KBr, $CaCl_2$, KNO_3, NAA spray	+60	+16.6	-37.5	+13.7
KBr, $CaCl_2$, KNO_3, B-Nine spray	-60	+16.6	-37.5	-26.9
KBr, $CaCl_2$, KNO_3, IAA spray	-60	-16.6	-37.5	-38.0
KBr, $CaCl_2$, KNO_3, MH spray	-80	00.0	-37.5	-39.2
Aspirin spray	-80	+16.6	-12.5	-25.3
Cycocel spray	+20	00.0	+12.5	+10.8
B-Nine spray	-20	+50.0	00.0	+10.0
12.5% Wilt Pruf spray	-20	+50.0	+25.0	+18.3
25.0% Wilt Pruf spray	+20	+66.6	-12.5	+24.7
1/2 tsp. KNO_3 per can	-40	+50.0	+12.5	+ 7.5
1/2 tsp. 12-6-4 per can	-20	00.0	-25.0	-15.0
1/4 tsp. sulpho-mag per can	-20	+66.6	00.0	+15.5

1/ Treatments applied December 20, 1967.

VI. Preliminary Experiments on the Chemical Pinching of Azaleas. (Sanderson and Self)

Preliminary experiments on chemical pinching of azaleas were conducted during 1967 at the Ornamental Research Field Station in Springhill and two commercial nurseries in Semmes, Alabama. The two chemical pinching agents, Emery C-9 (Emery Industries', designation for methyl nonanoate) and P & G (Off-shoot-O) manufactured by Proctor and Gamble), have been evaluated at various concentrations on a number of plant species. The pinching agents were usually applied with an electric mist blower and permitted to remain on the plant for 10 minutes before being washed off.

Springhill Experiments: Experiment 1.

The chemical pinching agents, Emery C-9 and Proctor and Gamble, were applied at 3 per cent and 6 per cent concentrations with a small electrically driven mist blower and washed off 10 minutes later with water. Hand pinched (sheared) plants were used as a check. The following cultivars were used in the experiment: 'Alaska', 'Coral Bells', 'Hinodegiri', 'Pink Supreme' and 'Red

Wing'. All plants were grown in a shaded greenhouse under the prevailing weather conditions. Treatments were applied on June 16, 1967.

The terminal buds of the azaleas were observed to turn brown within a few minutes after treatment with the pinching agents. The buds were visibly dead within 24 hours. A foliage burn occurred at the higher concentrations on some cultivars. New lateral shoot development began on some treated cultivars within two weeks. Certain cultivars were successfully pinched with concentrations of 3 to 6 per cent. Table 4 shows results for several cultivars treated at the Springhill Station. Chemical pinching produced fewer shoots than manual pinching in the cultivars 'Alaska', 'Pink Supreme' and 'Red Wing'. More shoots were observed with chemical pinching than manual pinching in the cultivars 'Chimes', 'Coral Bells', and 'Hinodegiri'. The 6 per cent concentration produced more shoots than the 3 per cent concentration but damaged the plant. Foliage damage was most severe with the 6 per cent Emery C-9.

Table 4. Effect of Chemical Pinching Agents on the Mean Number of Lateral Branches per Eight Inch Stem, Springhill Experiment

Cultivars	Pinching treatments				
	Emery C-9		Offshoot-O		Hand pinch (sheared)
	3%	6%	3%	6%	No treatment
'Alaska'	1.5	1.9	1.9	1.7	4.2
'Chimes'	2.5	2.8	2.6	2.5	2.4
'Coral Bells'	3.9	6.1	5.0	5.9	2.1
'Hinodegiri'	2.9	6.5	6.5	5.9	4.8
'Pink Supreme'	3.5	3.4	3.2	4.8	5.3
'Red Wing'	1.4	2.5	1.5	1.7	4.5
Mean	2.6	3.9	3.5	3.8	3.8

Experiment 2.

Three per cent P and G chemical pinching agent sprays were applied to 'Alaska' azaleas and washed off ten minutes later. Treatments were applied September 25 and November 4, 1967 with a high volume, low pressure sprayer. Counts were made on the number of new branches per 5 new stems per plant. The per cent increase in lateral branches 6 weeks later as a result of the treatments was 53.8, 65.3, and 69.0 for three separate groups of 5 plants.

Experiment 3.

Emery C-9 and P and G pinching agents were applied at 6 per cent concentrations, and Ortho 991 (a fungicide that exhibited some pinching activity) at a 1 lb./100 gal. concentration, and washed off 10 minutes later. Plant material included 'Red Wing' and 'Chimes' azaleas. Six months after treatment a bloom

count per 6 plants and new shoot growth on 5 stems per 5 plants were determined and are presented in Table 5 and Table 6.

Table 5. Change in Number of Flowers as Compared with Unsheared Plants on Chemically Pinched Azaleas

Treatment	Change from unsheared check	
	'Red Wing'	'Chimes'
	%	%
6% P & G	+2.9	-8.1
6% Emery	+4.3	-18.9
Ortho-991	-8.6	-24.3

Table 6. Change in Number of New Shoots on Chemically Pinched Azaleas as Compared to Sheared Azaleas

Treatment	Change from unsheared check	
	'Red Wing'	'Chimes'
	%	%
6% P & G	+26.7	+264.2
6% Emery C-9	+28.5	+221.4
Ortho-991 1 lb./gal.	-12.4	+200.0

Treatment at this time obviously destroyed many of the flower buds. If plants are to be developed further vegetatively, the use of a disbudant at this time would be highly desirable.

Experiment 4.

Proctor and Gamble disbudant was applied at 3 per cent, 4½ per cent and 6 per cent concentrations and not washed off. Three applications were made to 'Red Wing' azaleas with new growth.

A count of the number of new shoots per eight-inch stem was determined seven weeks after the third treatment (July 29, 1968). The per cent increase over that of the checks is given in Table 7.

Table 7. Per Cent Change in the Number of Shoots per Eight-Inch Stem on Chemically Pinched Azaleas Compared to Unsheared Azaleas

Treatment	Change from unsheared check
	%
3% P & G	+75
4½% P & G	+117
6% P & G	+182

The 3 per cent rate of application produced satisfactorily headed plants, but the 6 per cent rate of application produced most compact, slightly smaller plants with the possibility of the most blooms.

Semmes Experiments:

Experiments on chemical pinching were conducted on field grown azaleas at two commercial nurseries in Semmes, Alabama, Blackwell Nurseries, Inc., and Tom Dodd Nurseries, Inc. An electric mist blower was used to apply a 3 per cent mist of the two chemical pinching agents, Emery C-9 and Proctor and Gamble. Plants were washed with water 10 minutes after application of the pinching agent. One-gallon plants of the cultivars 'Alaska', 'Coral Bells', 'Hinodegiri', 'Pink Supreme', 'Red Wing' and 'Sweetheart Supreme' were treated at Blackwell Nurseries, Inc. The check consisted of sheared plants. Treatments were applied on June 15, 1967. Two-gallon plants were used at Tom Dodd Nurseries, Inc. The cultivars 'Coral Bells', 'Evensong', 'Hersey Red', 'Hexe', 'Hinodegeri', 'Morning Star', 'Pink Supreme', 'Red Wing', 'Sweetheart Supreme' and 'Snow' were treated with the chemical pinching agents on June 16, 1967. Unsheared plants served as a check.

Results of experiments conducted in Semmes, Alabama are presented in Table 8. Although some cultivars produced more shoots when chemically pinched, the mean number of shoots for chemically pinched one-gallon plants was little different from the shoot number for sheared plants. Considering the two-gallon plants, the cultivars 'Evensong' and 'Hershey Red' showed a definite response to chemical pinching.

VII. Influence of Chemical Pinching Agents Applied with and without B-Nine on Four Cultivars of Azaleas. (Sanderson, Martin and Barrick)

Four cultivars of azaleas, 'Gloria', 'Coral Bells', 'Red Wing' and 'Anytime received the following treatments on July 15, 1968: (1) sheared, (2) sheared plus 0.15 per cent B-Nine, (3) 4 per cent Emgard 2077, (4) 4 per cent Offshoot-O, (5) Emgard 2077 combined with 0.15 per cent B-Nine, (6) 4 per cent Offshoot-O combined with 0.15 per cent B-Nine. All treatments were applied with a mist blower. Plants were grown in a shade house until forcing. Fertilization and other cultural practices were kept as uniform as possible. Data on

the number of breaks per shoot and plant height was taken on March 26, 1969. Ten shoots were examined on five plants in each treatment for breaks per shoot. The height above the pot rim of the tallest shoot was recorded on five plants per treatment.

Table 8. Response of Several Azalea Cultivars of One-Gallon and Two-Gallon Size to Chemical Pinching 1/

Cultivar	Mean number of breaks per shoot					
	One-gallon			Two-gallon		
	Emery C-9	P & G	sheared	Emery C-9	P & G	Unsheared
	3%	3%		3%	3%	
'Alaska'	2.5	2.7	2.7	---	---	---
'Coral Bells'	2.5	3.1	2.6	3.2	3.5	2.1
'Evensong'	---	---	---	5.4	4.2	1.8
'Hershey Red'	---	---	---	3.7	3.8	1.5
'Hexe'	---	---	---	1.2	2.3	1.1
'Hinodegiri'	2.8	2.9	3.4	4.5	3.9	4.2
'Morning Star'	---	---	---	2.7	2.4	1.9
'Pink Supreme'	2.4	2.4	2.3	2.2	2.3	1.9
'Red Wing'	3.0	2.2	2.5	2.4	1.8	1.1
'Sweetheart Supreme'	3.0	2.7	2.0	2.4	2.4	1.8
'Snow'	---	---	---	2.9	2.2	2.3
Mean	2.7	2.7	2.6	3.1	3.1	2.0

1/ One-gallon plants sprayed at Blackwell Nurseries, Inc., Semmes, Ala. Two-gallon plants sprayed at Tom Dodd Nurseries, Inc., Semmes, Ala. The cooperation of these two nurseries is gratefully acknowledged.

Plants receiving growth retardants were darker green in color and had shorter shoots. In some cultivars the combination of a chemical pinching agent and a growth retardant produced a very desirable, compact plant. In the cultivar 'Coral Bells' the shoot growth was so compact that measurement of shoot number was difficult. The treatments did not seem to influence flowering time.

The four cultivars produced as many or more breaks per shoot when pinched chemically than when sheared, Table 9. The mean number of breaks for shearing (2.6) was less than the number of breaks produced by chemical pinching. The two chemical pinching agents averaged approximately the same number of breaks per shoot. Offshoot-O produced more breaks per shoot when combined with B-Nine (3.2) than when sprayed alone (2.8). The addition of B-Nine did not influence

the mean break production for Emgard 2077. B-Nine did not seem to have any effect on the number of breaks per shoot as the untreated (2.8) and treated (2.9) plants were essentially equal.

Table 9. Influence of Chemical Pinching Agents Applied with and without B-Nine on the Number of Breaks per Shoot

Treatments	Cultivars				
	'Anytime'	'Coral Bells'	'Gloria'	'Red Wing'	Mean
Sheared	2.6	2.7	2.4	2.5	2.6
Sheared plus B-Nine	2.6	2.5	2.4	2.5	2.5
4% Emgard	2.9	3.2	3.2	2.8	3.0
4% Offshoot-0	2.6	3.2	2.6	2.6	2.8
4% Emgard plus 0.15% B-Nine	2.8	3.0	3.4	2.8	3.0
4% Offshoot-0 plus 0.15% B-Nine	3.2	3.2	3.5	2.9	3.2
Mean	2.8	3.0	2.9	2.7	2.9

Table 10 shows that B-Nine influenced the height of the plants. The mean height of untreated plants (29.1 cm) exceeded the mean height of B-Nine treated plants (27.4 cm). Shearing plus B-Nine produced the shortest mean height. The application of either of the chemical pinching agents without B-Nine produced the tallest plants (mean 29.7 cm). The combination of Emgard 2077 and B-Nine (27.7 cm) yielded a mean height less than the sheared treatment (27.9 cm) and any chemical treatment.

Table 10. Influence of Chemical Pinching Agents Applied with and without B-Nine on the Height of Plants (cm) Above the Pot Rim

Treatments	Cultivars				
	'Anytime'	'Coral Bells'	'Gloria'	'Red Wing'	Mean
Sheared	29.2	30.1	26.7	25.4	27.9
Sheared plus B-Nine	26.4	26.0	28.4	26.4	26.4
4% Emgard 2077	35.0	30.2	26.4	27.7	29.4
4% Off-Shoot 0	30.9	32.7	29.3	28.4	30.3
4% Emgard 2077 plus 0.15% B-Nine	30.1	28.6	25.2	26.7	27.7
4% Offshoot-0 plus 0.15% B-Nine	33.0	28.9	26.9	27.7	29.1
Mean	30.8	29.4	27.2	27.1	28.5

VIII. Influence of Chemical Pinching Agents Used in Combination with Manual Shearing on the Azalea Cultivars, 'Red Wing' and 'Chimes'. (Sanderson, Barrick and Martin)

The azalea cultivars, 'Red Wing' and 'Chimes' were treated on September 5, 1968 as follows: (1) sheared, (2) not sheared, (3) 4.1 per cent Emgard 2077, (4) 4.1 per cent Offshoot-0, (5) 2.05 per cent Emgard 2077 and 2.05 per cent Offshoot-0, (6) sheared, 4.1 per cent Emgard 2077, (7) sheared, 4.1 per cent Offshoot-0, (8) sheared, 2.05 per cent Offshoot-0. Chemical pinching agents

were applied with a low pressure, high volume hand sprayer. Six plants were used per treatment. The experiment was conducted in a greenhouse. The number of breaks was determined for 10 shoots on each plant.

The cultivar 'Chimes' showed excessive leaf injury from the chemical pinching agents. Damage is believed to be a result of the cupping nature of Chimes leaves, an application of too much material and excessive concentration.

Chemical pinching produced a mean of 2.8 breaks per shoot in comparison to 2.4 breaks produced by shearing, Table 11. Offshoot-0 with or without shearing averaged the most breaks (2.9) per shoot. Emgard 2077 and the combination of Emgard and Offshoot-0 produced the same mean number of breaks per shoot (2.7). Applying the chemical pinching agents to sheared plants decreased the mean number of breaks on 'Red Wing' (2.8 for unsheared vs. 2.6 for sheared) but increased the mean number of breaks per shoot on 'Chimes' (2.6 for unsheared vs. 2.9 for sheared). The mean number of shoots for unsheared and sheared, chemically pinched plants was 2.7 and 2.8 respectively.

Table 11. Influence of Chemical Pinching Agents Used in Combination with Manual Shearing on the Number of Breaks per Shoot on the Azalea, cv. 'Red Wing' and 'Chimes'

Treatment	Cultivar		
	'Red Wing'	'Chimes'	Mean
Sheared	2.5	2.3	2.4
4.1% Emgard 2077	2.7	2.5	2.6
4.1% Offshoot-0	3.1	2.6	2.9
2.05% Emgard 2077 & 2.05% Offshoot-0	2.6	2.8	2.7
Sheared plus 4.1% Emgard 2077	2.5	2.9	2.7
Sheared plus 4.1% Offshoot-0	2.7	3.2	2.9
Sheared plus 2.05% Emgard 2077 & 2.05% Offshoot-0	2.7	2.7	2.7
Mean	2.7	2.7	2.7

IX. Influence of Chemical Pinching Agents on Sheared and Unsheared Azaleas, cv. 'Red Wing'. (Sanderson, Barrick and Martin)

Tests were conducted to determine the effects of chemical pinching agents on sheared and unsheared 'Red Wing' azaleas. Two chemical agents, Emgard 2077 at 4.1 per cent and Offshoot-0 at 4.1 per cent, and a combination of the two at 2.05 per cent each were used. Application of the chemical pinching agents was done on September 30, 1968 using the Emgard Sprayer with 2.9 oz. or 86 ml. of the chemical agent mixed with water to fill a quart volume. The eight treatments, using six plants per treatment, were as follows:

(1) Check - not sheared.
(2) Check - sheared manually.
(3) Spray Emgard 2077 at 4.1 per cent not sheared.
(4) Spray Emgard 2077 at 4.1 per cent sheared.
(5) Spray Offshoot-0 at 4.1 per cent not sheared.
(6) Spray Offshoot-0 at 4.1 per cent sheared.
(7) Spray Emgard 2077 at 2.05 per cent and Offshoot-0 at 2.05 per cent not sheared.
(8) Spray Emgard 2077 at 2.05 per cent and Offshoot-0 at 2.05 per cent sheared.

All plants were grown in a greenhouse at a temperature of 70° F. A monthly fertilizer program consisting of 2 pounds of 21-7-7 soluble fertilizer per 100 gallons was used. The plants also received on application of 12-6-6 granular fertilizer with 2 per cent Di-Syston at the rate of 1 teaspoon per pot. Data was taken on five plants in each treatment. The number of breaks per shoot was determined on ten shoots per plant.

Plants sprayed with chemical pinching agents (3.0) averaged more breaks per shoot than manually sheared plants (2.8). When treated with a chemical pinching agent, (3.2) unsheared plants yielded more breaks per shoot than sheared plants (2.9). The combination spray of 2.05 per cent Emgard and 2.05 per cent Offshoot-0 (3.3) yielded the most breaks per shoot of the experiment when applied to unsheared plants. The mean number of shoots produced by Offshoot-0 (3.2) exceeded that of Emgard 2077 (3.0) and the combination (2.9).

Table 12. Influence of Chemical Pinching Agents Applied to Sheared and Unsheared Azaleas, cv. 'Red Wing', on the Number of Breaks per Shoot

Spray treatment	Shear treatment		Mean
	None	Sheared	
None	---	2.8	2.8
4.1% Emgard 2077	3.1	2.9	3.0
4.1% Offshoot-0	3.1	3.2	3.2
2.05% Emgard 2077 & 2.05% Offshoot-0	3.3	2.6	2.9
Mean	3.2	2.9	3.0

X. Effect of Chemical Pinching Agents Plus Growth Retardants on Azalea, cv. 'Red Wing'. (Sanderson, Barrick and Martin)

Tests were conducted to determine the effects of chemical pinching agents plus growth retardants on Red Wing azaleas. Emgard 2077 (4.1%) and Offshoot-0 (4.1%), chemical pinching agents, were used in combination with growth retardants, B-Nine (0.15%) and UNI (0.05%). Application of the chemical pinching agents and growth retardant combinations was done on September 30, 1968, using the Halaby mist blower. The nine treatments using six plants per treatment were as follows:

(1) Check - sheared.
(2) Check - sheared and sprayed with 0.15 per cent B-Nine.
(3) Check - sheared and sprayed with 0.05 per cent UNI-F 529
(4) Emgard 2077 at 4.1 per cent.
(5) Emgard 2077 at 4.1 per cent plus 0.15 per cent B-Nine.
(6) Emgard 2077 at 4.1 per cent plus 0.05 per cent UNI-F 529
(7) Offshoot-0 at 4.1 per cent.
(8) Offshoot-0 at 4.1 per cent plus 0.15 per cent B-Nine.
(9) Offshoot-0 at 4.1 per cent plus 0.05 per cent UNI-F 529

All plants were grown in a greenhouse under uniform cultural conditions. Fertilization consisted of both liquid (21-7-7 at the rate of 3 pounds per 100 gallons each month) and dry (one application of 12-6-6 with 2 per cent Di-Syston at the rate of 1 teaspoon per pot) fertilizers. The number of breaks on ten shoots per plant was recorded on March 18, 1969.

Table 13 shows that plants pinched with 4.1 per cent Offshoot-0 (3.3) averaged more breaks per shoot than plants pinched with 4.1 per cent Emgard 2077 (2.8) or sheared plant (2.7). The growth retardant UNI-F 529 (2.7) yielded fewer breaks per shoot than the untreated check (2.9). The combination of 4.1 per cent Offshoot-0 and 0.15 per cent B-Nine (3.8) produced the most breaks per shoot. Shearing plus 0.05 per cent UNI (2.5) and 4.1 per cent Emgard 2077 (2.5) gave the fewest number of breaks per shoot.

Table 13. Effect of Chemical Pinching Agents Combined with Growth Retardants on the Number of Breaks per Shoot on Azalea, cv. 'Red Wing'.

Pinching treatment	Growth retardant			Mean
	None	0.15 per cent B-Nine	0.05 per cent UNI-F 529	
Sheared	2.9	2.8	2.5	2.7
4.1% Emgard	2.5	2.9	2.9	2.8
4.1% Offshoot-0	3.2	3.8	2.8	3.3
Mean	2.9	3.1	2.7	2.9

XI. Influence of the Type of Sprayer on the Effectiveness of Chemical Pinching Agent, cv. 'Red Wing'. (Sanderson, Barrick and Martin)

Tests were conducted on Red Wing azaleas to see the effectiveness of two methods of applying chemical pinching agents. Emgard 2077 and Offshoot-0 were both applied with the Halaby mist blower and with the Sovereign sprayer. The seven treatments using six plants per treatment were applied on September 30, 1968 as follows:

(1) Check - sheared.
(2) Emgard 2077 at 4.1 per cent - Sovereign sprayer.
(3) Emgard 2077 at 4.1 per cent - Halaby mist blower.
(4) Offshoot-0 at 4.1 per cent - Sovereign sprayer.
(5) Offshoot-0 at 4.1 per cent - Halaby mist blower.
(6) Emgard 2077 at 2.05 per cent plus Offshoot-0 at 2.05 per cent - Sovereign sprayer.

(7) Emgard 2077 at 2.05 per cent plus Offshoot-0 at 2.05 per cent - Halaby mist blower.

The experiment was conducted in a greenhouse at a temperature of 70° F. Fertilization consisted of a monthly application of 21-7-7 soluble fertilizer at the rate of 3 pounds per 100 gallons.

Differences in the number of breaks per shoot between mist (2.2) and spray (2.3) applications of chemical pinching agents were not distinguishable, Table 14. Offshoot-0 (2.2), Emgard 2077 (2.3) and the combination of the two (2.3) produced approximately the same number of breaks per shoot. The best chemical pinching treatments were the 4.1 per cent Emgard 2077 spray (2.5) and the combination of 2.05 per cent Emgard 2077 and 2.05 per cent Offshoot-0 mist (2.4) sheared plants (2.9) produced more breaks per shoot than chemically pinched plants (2.3).

Table 14. Influence of Chemical Pinching Sprays and Mists on the Number of Breaks per Shoot on Azalea, cv. 'Chimes'

Treatment	Number of breaks per shoot
Sheared	2.9
4.1% Emgard 2077 spray	2.5
4.1% Emgard 2077 mist	2.1
4.1% Offshoot-0 spray	2.2
4.1% Offshoot-0 mist	2.1
2.05% Emgard 2077 & 2.05% Offshoot-0 spray	2.2
2.05% Emgard 2077 & 2.05% Offshoot-0 mist	2.4
Mean	2.4

XII. Influence of Photoperiod on Shoot Growth of Azalea, cv. 'Coral Bells'. (Sanderson)

On May 24, 1968, 18 azaleas; cv. 'Coral Bells', were pruned so that each shoot had only 3 nodes. All shoots having less than 3 nodes were removed. The plants were placed in a growth chamber at a night temperature of 70° F. and a day temperature of 80° F. Photoperiod treatments consisted of a 9-hour day, 9-hour day plus 2 hours of incandescent light in the middle of the night and a 9-hour day plus 4 hours of incandescent light in the middle of the night. An automatic watering system supplied the plants with 4 oz. of water at each watering early in the experiment. As the plants grew, the amount of water per watering was increased to 6 oz. Fertilization consisted of monthly applications of 25-10-10 fertilizer at the rate of one teaspoon per gallon of water. The mean number of shoots and shoot length were recorded on July 23, 1968.

The mean number of shoots per stem for the 9-hour day, 9-hour plus 2 hours at night and 9-hour day plus 4 hours at night were 4.3, 4.0 and 3.7 shoots

respectively. Plant which received 2 hours of light in the middle of the night (9.0 cm) produced longer shoots than plants grown on a 9-hour day (8.2 cm) or a 9-hour day plus 4 hours of light in the middle of the night (6.7 cm).

XIII. Influence of Temperature and Photoperiod on the Growth of Azalea, cv. 'Kingfisher'. (Barrick and Sanderson)

The influence of temperature and photoperiod on the growth of the azalea cultivar 'Kingfisher' was studied in a growth chamber experiment. Two chambers with minimum night temperatures of 95° F. and 65° F., respectively were employed. Day temperatures were maintained ten degrees above the night temperatures. Photoperiod treatments at each temperature consisted of a 9-hour day, a 9-hour day plus 4 hours of incandescent light in the middle of the night and a 9-hour day plus 15 hours in incandescent light. A light intensity of 5,000 f.c. was provided by flourescent and incandescent sources during the day. Supplemental incandescent light had an intensity of approximately 40-55 f.c. at the plant level. Temperature and photoperiod treatments were started on December 5, 1968.

Plants of the cultivar 'Kingfisher' were obtained through the courtesy of Yoder Brothers, Barberton, Ohio and potted in six-inch pots. German peat moss, amended with 56 g of limestone and 56 g of gypsum was used in potting. Plants were sheared prior to treatment. An automatic watering system was used to water the plants. A setting of 4 oz. per watering was used early in the experiment. The setting was increased to 6 oz. as the plant grew. Fertilization consist of 21-7-7 at the rate of 3 pounds per 100 gal. every two weeks. A teaspoon of 2 per cent Di-Syston impregnated 12-6-6 fertilizer was applied to the plants during the first month of the experiment. The number of breaks per shoot and shoot length was determined in March, 1969.

Plants grown in the 95° F. chamber exhibited severe chlorosis on new growth. Developing leaves were a creamy white color. Growth in the 65° F. chamber was not chlorotic. Table 15 indicates that higher growth temperatures (95° F.) may influence the number of breaks produced by a shoot following shearing. Photoperiod treatments did not seem to influence break numbers. A combination of the 95° F. temperature and the 9-hour day (2.3) yielded the most breaks. Continuous lighting (9-hour day plus 15 hour) and the 65° F. temperature (1.9) produced the smallest number of breaks per shoot. Plants grown at 95° F. (7.6 cm) showed onlay a slight increase in break length over plants grown at 65° F. (7.4 cm). Photoperiods of 9-hour plus 15-hours of light (8.6 cm) produced the longest breaks. Breaks on plants grown on a 9-hour day (6.5 cm) were shortest in length. A combination of 9-hour day plus 65° F. or 95° F. temperatures produced the longest breaks. The shortest breaks were produced on a 9-hour day at either 65° F. or 95° F.

Table 15. Influence of Temperature and Photoperiod on the Number of Breaks per Shoot and Break Length of Azalea, cv. 'Kingfisher'

Photoperiod	Temperature		Mean
	65° F.	95° F.	
Number of breaks per shoot			
9-hr. day	2.1	2.3	2.2
9-hr. day plus 4 hr.	2.0	2.1	2.1
9-hr. day plus 15 hr.	1.9	2.2	2.1
Mean	2.0	2.2	2.1
Length of breaks (cm)			
9-hr. day	6.5	6.4	6.5
9-hr. day plus 4 hr.	7.0	7.0	7.0
9-hr. day plus 15 hr.	8.6	8.5	8.6
Mean	7.4	7.6	7.5

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1. Commercial root inducing substances did not influence the ultimate rooting of 'Red Wing' azaleas. Untreated cuttings rooted as well as treated cuttings.

2. Cuttings taken from stock plants which had been treated with B-Nine rooted as well as cuttings taken from untreated stock plants.

3. The addition of Ferbam to root inducing substances did not inhibit but rather may have increased rooting in unsterilized media.

4. Hormodin No. 2 and 20 ppm IAA gave the best rooting scores of a number of root inducing substances used on 'Red Wing' and 'Coral Bells' azaleas. Several herbicides promoted good rooting, however, 2,4,5 T and 2,4,5 TP gave poor rooting.

5. Applications of cold hardiness inducing sprays of Cycocel, B-Nine, Wilt Pruf and a combination of inorganic salts plus IAA and a soil application of sulpho-mag increased the top fresh weight of azaleas. Cold hardiness was not observed because of unusually warm weather.

6. Chemical pinching had consistently yielded more breaks per shoot than manual shearing. Cultivars vary in their response to chemical pinching with 'Chimes', 'Coral Bells', 'Red Wing' and 'Hinodigiri' giving a good response. The chemical pinching agents Emgard 2077 and Offshoot-O were effective pinching agents. In six out of nine experiments Offshoot-O produced slightly more breaks per plant than Emgard 2077. A 4.0 per cent concentration has been effective in most cases.

7. Combining 0.15 per cent B-Nine with either 4.0 per cent Emgard 2077 or 4.0 per cent Offshoot-O did not influence pinching in one experiment but the combination of B-Nine and Offshoot-O produced the most breaks in another experiment. The combination produced a shorter, more compact plant in both experiments. The new growth retardant UNI-F 529 was found to be quite effective on azaleas.

8. Applying chemical pinching agents to sheared plants decreased the number of breaks per shoot.

9. The type of sprayer (mist vs. spray) used to apply chemical pinching agents did not seem to influence the number of breaks per shoot when the material was allowed to remain on the plant.

10. Photoperiod influenced the number of breaks per shoot and the length of the breaks in one experiment but not in another. The addition of 2-15 hour of supplementary light seemed to reduce the number of breaks but increased the length of the breaks. A temperature of 95° F. at night produced slightly more breaks and longer breaks than a temperature of 65° F. at night.