

RESEARCH RESULTS FOR NURSERYMEN

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Horticulture Series No. 8

AGRICULTURAL EXPERIMENT STATION

OF

AUBURN UNIVERSITY

E. V. Smith, Director

August 1967

Auburn, Alabama

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1967

I. SURVIVAL, GROWTH WOODY ORNAMENTALS ALONG ROADSIDES

The Horticulture Department, Auburn University Agriculture Experiment Station in conjunction with the Alabama Highway Department and the Bureau of Public Roads, United States Department of Commerce, initiated a study in April 1963 to determine the method of establishing and adaptability of woody plants on roadsides. Detailed results giving all plants and procedures used are reported in the Alabama Highway Research HPR Report No. 25, Final Report, 1966.

During December 1966, a final evaluation was made of plants on cuts. Per cent survival, amount of growth, and cover rating were criteria used to determine the adaptability of the plants.

Species particularly adapted to adverse conditions along the cut were: Juniperus sabina lusitanica 'Von Ehron', Juniperus conferta, Lonicera japonica halliana, Robinia hispida, Rosa hugonis, Rosa wichuraiana and Celastrus orbiculatus.

Species that were satisfactory but possibly would do better on more favorable locations were: Gelsemium sempervirens, Jasminum floridum, Juniperus chinensis sargentii, Juniperus procumbens, and Rosa rugosa. Gelsemium is slow to establish but develops into an excellent ground cover.

Species that were poor on this location were: Liriope muscari, Euonymus fortunei coloratus, Euonymus fortunei vegetus, Hemerocallis sp. and Vinca major.

Vine and ground cover study

The following lists were compiled from a final evaluation of vines and other covers on cuts:

Species particularly adapted for adverse conditions on the cut were Celastrus orbiculatus, and Lonicera japonica halliana.

Species that were satisfactory but not outstanding were Ampelopsis brevipedunculata, Euonymus fortunei coloratus, Euonymus fortunei vegetus, Gelsemium sempervirens, Hemerocallis sp., Liriope muscari and Lonicera heckrottii.

Species that made poor growth were Celastrus scandens, Euonymus fortunei radicans, Vinca major and Vinca minor.

Undisturbed right-of-way study

Plants in three areas on I-85 were evaluated.

Small trees, 10 feet or more:

Outstanding - Malus 'Almey', Robinia pseudoacacia.

Satisfactory - Cercis canadensis, Cornus florida, Crataegus phaenopyrum, Fraxinus velutina modesto, Pinus strobus and Zelkova serrata.

Fair to poor - Carpinus caroliniana.

Large shrubs, 10 feet or more, multi-trunked:

Outstanding - Ligustrum indicum and Photinia villosa.

Good but not outstanding - Ilex cassino, Photinia fraseri, Photinia serrulata, Prunus caroliniana, Rhus glabra, Thuja orientalis 'Berchmans'.

Satisfactory - Cercis chinensis, Lagerstroemia indica, Rhus copallina, Rhus typhina and Thuja orientalis 'Baker'.

Poor - Chionanthus virginicus, Cotinus coggygri, Ilex cornuta 'Burford' and Ilex cornuta.

Medium Shrubs 6 to 9 feet:

Outstanding - Elaeagnus pungens, Pyracantha crenata serrata, Viburnum dentatum and Vitex agnuscastus.

Good but not outstanding - Abelia grandiflora, Forsythia viridissima, Lonicera maacki, Osmanthus americanus, Photinia glabra, Rhus aromatica, Spiraea vanhouttei and Viburnum lentago.

Satisfactory - Berberis julianae, Berberis mentorensis, Berberis sargentiana, Exochorda racemosa, Forsythia intermedia, Forsythia suspensa, Hibiscus syriacus, Nandina domestica, Spiraea prunifolia and Viburnum lantana.

Poor - Hydrangea quercifolia, Podocarpus macrophyllus maki and Tamarix odessana.

Small shrubs, under 5 feet:

Outstanding - Juniperus chinensis 'Pfitzer'.

Good but not outstanding - Jasminum floridum, Rosa hugonis, Rosa multiflora and Rosa rugosa.

Poor - Gardenia radicans, Prunus glandulosa 'Double White'.

II. a. CHEMICAL WEED CONTROL IN FIELD GROWN WOODY ORNAMENTALS

Repeated annual applications of Simazine and Casaron at rates of 1.6, 3.2, 4.8 pounds and 5 and 10 pounds of actual ingredient per acre, respectively, were applied during a 3-year period on Arbovitae and Juniper plantings at Auburn.

Vigor and foliage color were not effected by these treatments. Similar treatments on wax leaf Ligustrum resulted in foliage discoloration although actual height was not affected when compared with check.

Single applications of Daxtron at 0.5 and 0.75 pounds and Dupont 7.32 at 2 and 4 pounds actual per acre were toxic to established Arbovitae, Juniper, and Ligustrum at Auburn.

Ammate X at rates of 30, 60, and 90 pounds per acre applied as a post-emergent herbicide around Arbovitae, Juniper, and Ligustrum did not induce injury other than on foliage accidentally sprayed.

Deliberate spraying of the basal portion of the trunks with ammate X did not induce injury among these species.

II. b. WEED CONTROL AROUND ESTABLISHED HIGHWAY PLANTINGS

In May of the current year, an experiment involving four herbicides used for post-emergence weed control was begun along I-85 between Auburn and Opelika.

Three species of evergreen shrubs were selected to study any adverse effects from using the herbicides tested. They were Ilex vomitoria (Yaupon Holly), Ilex cornuta (Burford Chinese Holly) and Berberis julianae (Wintergreen Barberry).

A randomized block design was used with three replications of each treatment per species. Plots were sprayed May 17-19, and all treatments with the exception of the higher rate of Amazine and Dowpon, were repeated June 1-5. All herbicides were used in combination with a wetting agent except Amazine.

A weed cover rating was given each plot approximately 2 weeks after each spraying. A final evaluation was made July 14.

In the following chart, the rates are given in terms of concentration per 50 gallons of water. This was used because variation and density of the weed cover in each plot made it impossible to cover each plot uniformly and still cover all foliage thoroughly.

Evaluation of Weed Control*

Herbicide	Rate	Lb or gal. per 50 gal. water	First spray- ing	Second spray- ing	Final evaluation July 14
Ammate	X	25 lb.	1.8	2.6	1.2
Ammate	2X	50 lb.	4.5	5.7	3.9
Dowpon	X	3 lb.	.6	2.7	3.7
Dowpon**.....	2X	6 lb.	8	2.3	.1
Amazine.....	X	5 gal.	2.1	5.5	6.9
Amazine**.....	2X	10 gal.	1.9	4.2	3.6
MSMA-Herban....	X	.625 gal.	1.6	2.7	.7
MSMA-Herban....	2X	1.25 gal.	2.7	6.9	3.5

* 10.0 = complete control of existing weeds and grasses

0 = no control

** Sprayed only once.

Ammate 2X gave the best over-all weed control following the initial spraying. Most broadleaf weeds, such as ragweed, goldenrod, and horse-nettle were eliminated. Perennial grasses were burned back after each spraying but new growth soon occurred. Occasional burning of the leaves was noted where plant was contacted by the spray. Ammate X was less effective but generally controlled most broadleaf weeds after a second spraying.

Dowpon, at either rate, gave no control on broadleaf weeds. However, two applications at the lower rate gave good control over perennial grasses.

Amazine gave similar results from both rates after the initial spraying. Weeds and grasses appeared chlorotic, some weeds turning a variety of colors. A second application at the lower rate killed most perennial grasses and some of the smaller broadleaf weeds. Slight plant phytotoxicity (at both rates) in the form of chlorotic-appearing leaves was evident in Wintergreen Barberry at the last evaluation.

MSMA-Herban killed most broadleaf weeds after one spraying. Perennial grasses were burned down but grew back even after a second spraying. Occasional burning of the lower leaves occurred when contacted by the spray. MSMA-Herban at the lower rate gave only partial control over broadleaf weeds and grasses for a relatively short time.

The weed cover in the check plots increased an average of 38% during the experiment.

III. a. PLANT PROPAGATION MADE EASY

The use of "Nurse Seed Grafting" and "Modified Nurse Seed Grafting" developed at the Auburn Agricultural Experiment Station under a grand-in-aid project has given excellent results with both dormant and active scion. The active scions have been protected by intermittent mist until new growth appeared. The terminal buds have been removed from all active scions to eliminate the inhibitor that prevents the buds from growing before a rest period.

The nurse seed graft is used to propagate camellia and is also used to dwarf other plant material. It is made by removing the young plant after the seed has germinated and inserting a trimmed scion into the seed between the cotyledon petioles.

The modified nurse seed graft has been effective when used on chestnuts, hickory, pecans, persimmons, walnuts, Queensland nuts, and several species of oaks. This method involves removal of the epicotyl from young plants and inserting a trimmed scion into the split hypocotyl leaving the old seed attached. The old germinated seed attached has given marked stimulation to the new grafted plant under all conditions used.

These methods are simple and can be made at a rapid rate - 100 grafts have been made per hour by the project leader.

In cooperative work between the Horticulture Department and the Forestry Department, good results have been obtained from modified nurse seed graft using Chinese chestnut and oaks.

III. b. AZALEA PROPAGATION

1. Commercial Root-Inducing Substances and 2,4,5-T

Cuttings of the azalea cultivar, 'Red Wing', were treated by dipping the base of the cuttings in either commercial root-inducing substances, a 5 ppm solution made from the herbicide 2,4,5 trichlorophenoxyacetic acid (2,4,5-T) and its derivatives, or a 40 ppm 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 Trichlorophenoxyacetic Acid on Rooting of Azalea Cultivar 'Red Wing'

<u>1/</u> Rooting Substance	<u>2/</u> Active Ingredient	<u>3/</u> Rooting Score
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 ppm	2,4,5-T	2.4
2,4,5-T 40 ppm	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, Northridge, Calif., 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 trichlorophenoxyacetic acid.

2/ IBA = Indole butyric acid, 2,4,5-T = 2,4-D trichlorophenoxyacetic acid, NAA = Naphthylacetic 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 they 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.

2. Cuttings Taken from Growth Retardant Treated Plants

Stock plants of the azalea cultivar 'Red Wing' were sprayed with a 0.25% spray of the growth retardant N-dimethyl succinamic acid (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.

3. Fungicide Dip for Propagation in Unsterilized Media

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' was 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.

4. Growth Regulating Substances as Root-Inducing Substances

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 ppm for all the substances except Gibberellic acid, which contained 1000 ppm. 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' has high rooting percentages with all the substances except 2,4,5-TP, 2,4,5-T and 2,4-D. Rooting score results were similar to percentage rooting results with 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 Cultivars
'Red Wing' and '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 Dichlorophenoxyacetic 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 butyric 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 ppm concentration with the exception of gibberellic acid which was a 1000 ppm concentration. Hormodin No. 1 and No. 2 are the products of Merck & Co., Rahway, New Jersey. Active ingredient is indole butyric acid.

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

III. c. LOBLOLLY PINE SEED GERMINATION

Seed of Loblolly pine, *Pinus taeda* were treated as follows prior to planting: (1) Soaked for 15 minutes in water, (2) soaked for 15 minutes in a 0.1% potassium nitrate solution (KNO₃), (3) soaked for 15 minutes in a 0.1% KNO₃ solution and stored 1 week at 40° F., (4) soaked for 15 minutes in a 3.0% NH₂CSNH₂ solution and stored for 1 week at 40° F., and (5) soaked in a 1.0% hydrogen peroxide (H₂O₂) solution for 48 hours. Seeds soaked in H₂O₂ for 48 hours yielded the highest germination percentage (61%). The lowest germination percentage (45%) resulted from soaking the seeds in water for 15 minutes.

IV. GARDEN CHRYSANTHEMUMS

Rooted cuttings of 18 varieties of garden Chrysanthemums were received from Gloeckner and Company, on June 21, 1966 and potted with one cutting per 4-inch pot. These were grown in the greenhouse until July 15 when they were planted in beds in the garden, spaced 18 in. x 24 in. All plants received three soft pinches - June 30, July 15, and Aug. 12.

Records were taken on plant height and spread at maximum flowering and were evaluated for sturdiness and overall appearance with the most outstanding varieties marked (*) in the following table:

Garden Chrysanthemums, 1966

Variety	Height	Spread
	inches	inches
Golden Fantasy	14	15
*Cameo	11	13
Fujii Jess Williams	17	15
*White Masquerade	19	21
Corvair	19	13
Loveliness	16	15
Real Gold	14	14
Chas. Nye	15	12
*Dolli-ette	15	15
Remembrance	17	17
Martian	13	15
*Rosey Nook	17	22
*Millionaire	22	22
*Purple Dusk	16	19
Lawrence Blaney	15	12
*Gemini	19	22
*Marbletop	15	21
*Falcon	13	17

*Outstanding varieties

