RESEARCH RESULTS FOR NURSERYMEN

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I. NATIVE PLANTS FOR ROADSIDE CONSERVATION AND BEAUTIFICATION

(Orr, Bryce and Hogg)

Shrubs, small trees, and standard trees in roadside landscapes are needed for conservation, safety and beauty. Alabama has a wealth of native plants possibly desirable for multiple purposes along the roadsides.

For the past five years the Department of Horticulture, Auburn University has cooperated with the Alabama State Highway Department in an effort to determine trees, shrubs, and vines adaptable for use on Alabama highways.

Since 1966, research has been concentrated on evaluating native plant material. Earlier evaluations of introduced and native species were reported in "Research Results for Nurserymen," Horticulture Series No. 8, 1967.

A part of the current study is devoted to the evaluation of planting established on portions of the interstate system in Alabama now open to the public. Three areas of the state were selected for study: I-65 in Escambia, Conecuh and Butler counties; I-65 in Jefferson, Blount and Cullman counties; and I-59 in DeKalb county.

Each area was visited in the spring of 1967. Numerous plants of several species were observed in one or more locations. Sample plants were tagged, measured for height and width (or caliper for trees) and given a growth rating. These areas were visited again in the fall and plants remeasured to determine the year's growth. Another growth rating was made.

Several native standard trees were considered satisfactory in the Southern portion of the State. These included Sycamore, Tuliptree, Southern Magnolia, Bald Cypress, Red Maple, and Laurel Oak. Other native trees evaluated and found lacking in some of the characteristics desirable for low-maintenance plantings includes Eastern Red Cedar, American Holly, Sweet Gum and Scarlet Oak.

Of the four native small trees planted in the Southern portion of the State, Flowering Crabapple and Eastern Redbud were considered satisfactory. Flowering Dogwood varied considerably from site to site. This species planted on well drained slopes averaged slightly more growth and showed better vigor than when planted in level, moist areas. White Fringe Tree was rated poor.

Relatively few species of native shrubs were planted in this Southern area. Southern Waxmyrtle was rated best of seven native shrubs used. This shrub also proved to be an excellent choice in the Cullman area where it survived well and made excellent growth.

Seven species of small native trees were used in the two Northern areas. Only Flowering Crabapple was rated good out of this group including White Fringe Tree, Persimmon, Eastern Redbud, Flowering Dogwood and Common Smoketree. Washington Hawthorn was satisfactory in the Ft. Payne area.

Eighteen standard native trees were evaluated in the Cullman and Ft. Payne areas. Species showing promise included Red Maple, Bald Cypress, Sycamore, Cottonwood, Loblolly Pine and Slash Pine.

In a continuing effort to determine native material suitable for roadside use, twenty-four species of native trees, shrubs and vines were planted in plots along both sides of I-85 near Auburn in March 1967. These sites included dry, open, undisturbed locations, damp low locations, exposed bank locations, and shady locations.

Where possible, two sizes of each species were obtained to allow a comparison of survival and rate of growth.

After one year's evaluation, several native species, not in use on our highways at the present time, may be useful as well as attractive when used in selected sites. These include: Ninebark, Devils Walkingstick, American Bittersweet, Grey Dogwood, and Vernal Witchhazel.

II. EFFECTS OF GIBBERELLIC ACID ON GERMINATION OF SEEDS FROM SELECTED NATIVE TREES AND SHRUBS

(Hogg and Orr)

Tests were conducted to determine the effects of 24-hour treatments in three concentrations (100,200,400 p.p.m.) of gibberellic acid (75% K salt) on germination of seeds from Acer floridanum, Florida Maple; Diospyros virginiana, Common Persimmon; Halesia carolina, Carolina Silverbell; Callicarpa americana, American Beautyberry; Osmanthus americanus, Devilwood Osmanthus and Symphoricarpos orbiculatus, Indian Currant Coralberry. Seed replications were germinated in clear plastic boxes on a layer of cellulose paper in the controlled environment chamber. Temperatures were maintained at 68 F in darkness (16 hours) and 86 F (8 hours) under fluorescent lighting of approximately 160 foot candles.

Such treatments to promote germination in lieu of cold stratification showed limited success. Higher percentage germination was observed in one lot of treated seeds of Acer floridanum than in the standard germination test. No germination occurred in seeds soaked in water. When compared to those soaked in water two lots of Diospyros virginiana seeds showed much higher germination percentage and earlier germination when soaked in gibberellic acid solutions. Two lots of Halesia carolina showed low percentage germination when soaked in gibberellic acid but no germination when soaked in water. For one lot of Callicarpa americana seeds there was increasing germination with increase in concentration of gibberellic acid and no germination of those soaked in water. All seeds from three different lots (two seed crops) of Osmanthus americanus failed to germinate under conditions specified. Symphoricarpos orbiculatus seeds from two lots responded poorly to all treatments. Germination of this species in the chamber was only successful in the case of one standard germination test. An additional group of S. orbiculatus seeds planted in a soil mix and stored 60 days outside under a sawdust mulch showed similar germination percentage of all treatments, including water soaking. Lack of response from O. americanus and S. orbiculatus may be attributed to failure to break down the tough seed coats, or critical timing of treatments needed to alter cold requirements of the seeds.

III. CHEMICAL PINCHING OF SELECTED ORNAMENTAL PLANTS

(Sanderson, Self and Martin)

Several experiments have been conducted on chemical pinching of ornamental plants at Auburn University, the Ornamental Research Field Station in Mobile and two

commercial nurseries in Semmes, Alabama. The two chemical pinching agents, Emery C-9 (Emery Industries', designation for Methyl Nonanoate) and Offshoot-O (a mixture of Methyl Octanoate and Methyl Decanoate manufactured by Proctor and Gamble), have been evaluated at various concentrations on a number of plant species. Research on chemical pinching of chrysanthemum has involved a comparison of various types of pinches, the influence of treatment time on the plant, the stability of the materials, single material vs. combined sprays and the effect of spray volume and concentration. 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.

At concentrations of 3% and 6%, the two pinching agents produced no effect other than burning of the foliage on Aucuba japonica, Euonymus japonicus, Gardenia jasminoides, Ilex cornuta rotunda, Ilex vomitoria, Ligustrum indicum, Pittosporum tobira, Podocarpus macrophyllus and Schefflera actinophylla. Coleus blumei was effectively pinched with the agents at a concentration of 1½%. Excessive damage occurred at 3% concentrations and a 4½% concentration killed some coleus. Ilex crenata 'Heller' showed some response to a chemical pinching at concentrations of 3 to 6%. Plants were damaged at the higher concentration.

Rhododendron spp. have been quite successfully pinched with concentrations of 3 to 6%. Table 1 shows the results for several cultivars treated at the Springhill Research 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% concentration produced more shoots than the 3% concentration but damaged the plant.

Table 1. 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		Check
	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

Results of experiments conducted in Semmes, Alabama are presented in Table 2. 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.

All types of chrysanthemums (cut, potted and garden) have been successfully pinched with chemicals.

Table 2. 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	Offshoot	Sheared	Emery	Offshoot	Pinch
	3%	3%		3%	3%	No.
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.

The tedious and time consuming task of pinching chrysanthemum is quickly realized in garden chrysanthemum. These plants often require three pinches thus multiplying the task with each pinch. A cultivar response was observed in garden chrysanthemums, however chemical pinching produced more flowers, a shorter compact plant, and a more desirable plant in those cultivars that did respond to chemical pinching. The cultivars 'Rosey Nook' and 'Gemini', gave excellent responses to a 3% concentration. Other cultivars treated included 'Lawrence Blaney', 'Falcon', 'Mango', 'Millionaire', 'Yellow Joanette', 'Yellow Fujii Williams', 'Yellow Minnpink', and 'Corvette'.

A 2 to 3% concentration, depending on the cultivar, has been used on other chrysanthemums. Chemical pinching has produced more shoots than various types of manual pinches. Shoot development was slower with chemical pinching than with manual

pinching. Low pressure, high volume sprays yielded poorer results than a full strength mist. Reducing the concentration and applying a high volume spray injured and killed plants. A mixture of equal parts of the two chemical pinching agents was more effective in pinching than separate applications of the same concentrations. Leaving the materials on the plants for 15 minutes increased their effectiveness on cv. 'Golden Yellow Princess Anne'. Pinching agents were found to be quite stable. Materials refrigerated or stored at room temperature for 30 days yielded pinching results equal to fresh made materials.

IV. UTILIZATION OF PROCESSED GARBAGE-SLUDGE AS A MEDIA ADDITIVE IN THE PRODUCTION OF WOODY PLANTS IN CONTAINERS

(Sanderson, Self, Orr and Martin)

Identical experiments were established at Auburn University, Auburn, Alabama and the Springhill Ornamental Horticulture Field Station, Mobile, Alabama to compare processed garbage amended with raw sewage with other media additives in container plant production. The nine media mixtures shown in Table 3 were used to grow the following species: Camellia sasanqua, Ilex cornuta 'Burford', Ilex crenata 'Hetz', Juniperus conferta, Rhododendron obtusum japonicum and Viburnum burkwoodi. The pH and soluble salts of the mixtures are also presented in Table 3. Spurway analysis of processed garbage-sludge revealed nitrates 0 p.p.m., phosphorus 0 p.p.m., potassium 20-40 p.p.m. and calcium 100 p.p.m. Soluble salts frequently exceeded 80, the toxic level. Following soil analysis, the pH of the nine mixtures was adjusted to either 6.0 or 5.0. The lower pH being used on the azaleas and camellias. The pH adjustments were made with either limestone or dusting sulfur. Mixtures adjusted with sulfur received 2 lb. of gypsum per cu. yd. Superphosphate (0-20-0) was added to all the mixtures at the rate of 2 lb. per cu. yd. Fertilization consisted of four applications of 12-6-6 analysis fertilizer with minor elements added (Sta-Green supplied by the Parker Fertilizer Company, Sylacauga, Alabama) and one application of a 14-4-6 analysis fertilizer tablet during the growing season. The 12-6-6 analysis fertilizer was applied at the rate of one-half level teaspoon per container. One 12 g. container tablet was placed in each container. The experiment was replicated four times at each location. Experimentally, there were 2 locations, 4 replications, 6 species, 5 plants per treatment and 9 treatments for a total 2,160 plants. A randomized block design was used at both locations. A mean height, spread and dry weight was determined for each species.

Table 3. Mean pH and Soluble Salts of Media Mixtures Prior to Adjustment 1/

Media Mixture 2/	pH	Soluble salts
Sand and Peat	4.4	0
Sand and Garbage-Sludge	8.2	40
Sand, Peat and Garbage-Sludge	6.2	26
Perlite, Vermiculite and Bagasse	4.5	10
Perlite, Vermiculite and Garbage-Sludge	8.2	42
Perlite, Vermiculite, Bagasse and Garbage-Sludge	6.5	27
Vermiculite and Peat	4.3	5
Vermiculite and Garbage	8.1	44
Vermiculite, Peat and Garbage	6.4	26

1/ Adjustments were made with either limestone or sulfur to produce pH 6.0 and 5.0. Mixtures adjusted with sulfur received 2 lb. of Gypsum per cu. yd.

2/ Equal portions of material were used in each mixture.

Observations one year after planting showed high soluble salts and pH of processed garbage-sludge had made it extremely difficult to maintain adequate plant nutrition. The soluble salts dropped rapidly following pH correction and culture (probably leaching). Some plants exhibited deficiency symptoms soon after planting but usually recovered normal color following fertilization. Winter injury killed 85% of camellias and 20% of the azaleas in Mobile during the first growing season. Losses in Auburn were not as great with 8% of the camellias and less than 1% of the azaleas being killed. The losses could not be correlated with treatment. The foliage color of the plants in Mobile was not as good as that in Auburn. Shore Junipers showed extreme chlorosis in the sand mixtures at Mobile. Best leaf color appeared in the vermiculite mixtures with the bagasse mixtures being next. Plants at Auburn did not display such great differences in leaf color. Increased rainfall in Mobile may have influenced the fertility of the mixtures and the results obtained.

V. COMPARISON OF PROCESSED GARBAGE, SAWDUST, AND PINE STRAW IN MULCHING GARDEN CHRYSANTHEMUMS 1967

(Orr, Sanderson, and Martin)

Rooted cuttings of 19 varieties of Hardy Chrysanthemums were received from the Fred C. Gloeckner Company and potted in 3-inch-square peat pots on June 21. Plants were grown in the greenhouse until July 18, when they were planted in beds in the garden at a spacing of 15" x 18". Fertilization in the greenhouse was 20-20-20 at 1 oz. per 4 gal. water weekly. Fertilization in the beds was 3 lb. 8-8-8 per 100 sq. ft. prior to planting and monthly applications thereafter at the same rate. Plants received 3 soft pinches - June 28, July 18, and August 15.

Each bed was divided into 3 sections, lengthwise, with 4-inch aluminum lawn edging. A 1-inch mulch was applied to each section using sawdust, pine straw, and composted garbage. Comparisons were made on each mum variety in each mulch as to flowering date, height, and spread of plants.

There were no differences in any of the three mulches in the flowering date, height, and spread of the plants. The data is presented in Table 4.

VI. COMPARISON OF PROCESSED GARBAGE, SAWDUST AND PINE STRAW IN MULCHING PETUNIAS 1967

(Sanderson, Orr and Martin)

Fifty-four petunia varieties were planted in a mulching study using pine straw, sawdust, and processed garbage. The petunias were produced by sowing seed in February and transplanting to peat pots in March. Plants were planted in beds on April 16, 1968. The beds were divided into three sections, lengthwise, with 4 inch aluminum lawn edging. The mulches were applied on May 2 to a depth of approximately two inches.

Fertilization consisted of 3 lb. of 8-8-8 per 100 sq. ft. incorporated prior to planting and 3 lb. of 12-6-6 with a systemic insecticide (2% Di-Syston) applied three weeks after planting.

No apparent differences were observed in the growth and flowering of the plants with any of the mulches. Leaf and flower color was comparable in all the mulches.

Table 4. Effect of Various Mulches on Mean Height Spread of Garden Chrysanthemums

Variety	Flowering date	Height - in.			Spread - in.		
		Sawdust	Pine straw	Garbage	Sawdust	Pine straw	Garbage
Cheyenne	10/23	20.0	19.5	20.0	17.5	18.0	18.0
Chiquita	10/9	17.0	17.5	17.5	16.5	16.0	16.5
Corvette	10/9	18.0	17.5	17.5	16.5	16.0	16.5
Early Gold	9/25	12.0	13.0	13.0	14.0	13.0	14.0
Falcon	10/9	14.0	14.5	14.0	18.0	18.5	19.0
Gemini	10/23	20.0	20.0	18.0	21.0	21.0	20.0
Jessamine Williams	10/9	18.5	18.0	18.0	19.5	19.5	19.5
Lawrence Blaney	10/2	19.0	17.5	17.5	17.0	17.0	18.5
Mango	10/9	16.5	16.5	16.5	20.5	20.0	20.0
Minnehaha	10/9	19.5	19.0	18.5	18.5	18.0	18.0
Millionaire	10/9	18.5	19.0	18.5	20.0	19.5	19.5
Powder River	10/2	13.0	12.5	13.0	15.5	15.5	16.0
Red Desert	10/9	12.0	13.0	12.5	15.5	13.0	15.5
Rosey Nook	10/16	14.0	14.0	14.0	19.0	20.0	19.0
Shining Light	10/2	16.0	16.0	15.5	16.5	16.5	15.5
Tranquility	10/2	16.5	16.5	17.0	17.5	17.0	17.0
Yellow Fujii Williams	10/9	17.0	17.0	17.0	18.5	18.0	18.5
Yellow Joanette	10/9	20.5	20.5	20.0	19.5	20.0	19.5
Yellow Minnpink	11.0	10.5	10.5	19.0	19.0	19.0	
Mean		16.5	15.9	16.2	17.9	17.7	17.9

VII. ANNUALS - TRIALS 1968

(Martin and Orr)

Spring flowering annuals grown in a Test Garden included petunias, ageratum, browallia, snapdragons, salvia, celosia, marigolds, amaranthus, and carefree geraniums. Seeds were furnished by Pan-American Seed Company, West Chicago, Illinois and Henry F. Mitchell, King of Prussia, Pa. Seed were sown in February. The seedlings were transplanted to peat pots in March and planted in beds in the garden April 16. Records were taken June 25 on height and spread of the plants.

Some of the more outstanding and new varieties are listed below with the height and spread:

Ageratum - Blue Blazer 9" x 14"
Salvia - Red Sentinel 19" x 17"
Geranium - Carefree White 12" x 12"
Geranium - Carefree Light Pink 13" x 13"
Geranium - Carefree Deep Salmon 12" x 12"
Amaranthus - Early Splendor 40" x 33"
Marigold - Spanish Brocade 18" x 21"

Marigold - Orange Jubilee 22" x 30"
Petunia - Miss Blue (New) Height - 19"
Petunia - Lavender Lady (New) Height - 13"
Petunia - Rose Magic (New) Height - 16"
Petunia - Scarlet Magic (New) Height - 14"
Petunia - Lillipop (New) Height - 14"
Petunia - Pink Bells (New) Height - 15"

VIII. SOUTHERN REGIONAL MARKETING OF WOODY ORNAMENTALS - ALABAMA

(Orr and Miller)

Objective 1

The purpose of this study was to determine movement patterns and marketing channels for woody ornamental plants and handling practices and pricing behavior of firms that market them.

The data from the questionnaire of this objective have been analyzed by computer and are in the process of being formulated into a publication which is anticipated to be available to all nurserymen in the spring of 1969.

This information should serve as a basis for nurseries to analyze their management practices and aid in expanded growth of the industry.

Objective 2

The purpose of this study is to determine the factors that influence firms in their decisions to purchase woody ornamentals for resale.

Currently the project is concerned with which nurseries will participate in answering the questionnaire. Preliminary questions on cards have been mailed to retail nurseries, landscape contractors, and garden centers. The cards of respondents to these questions will be analyzed to determine which firms will participate in answering the final questionnaire in order to get a representative cross section of the firms retailing woody ornamental plants.

The final questionnaire for Objective 2 will be completed during September 1968 and the data analyzed during the Winter 1968-69.

The results of this study should indicate the methods now being used to purchase and resell woody ornamentals and to provide insight to improved marketing techniques.