RESEARCH RESULTS FOR NURSERYMEN

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I. NATIVE AND INTRODUCED PLANTS FOR ROADSIDE PLANTING -- THEIR SURVIVAL, ESTABLISHMENT AND MAINTENANCE. (Orr, Bryce and Hogg)

For six years the Department of Horticulture of the Auburn University Agricultural Experiment Station has been working with the Alabama State Highway Department in selecting species of trees, shrubs and vines adaptable for use on Alabama highways. This research for the last three years had the following objectives:

1. To determine the adaptability and survival of selected woody plants along roadsides in Alabama.

2. To collect, characterize, propagate and establish native species in stock blocks at Auburn University and in selected locations on the roadside.

3. To evaluate the feasibility of using chemicals for the control of weeds around established roadside plantings.

Woody Plant Evaluation:

A part of the recent study was to evaluate landscape plantings that had been established on portions of the interstate system in Alabama now open to the public. Three areas of the State were selected for study. These included: I-65 in Escambia, Conecuh and Butler counties; I-65 in Jefferson, Blount and Cullman counties; and I-59 in Dekalb County.

Woody plant species particularly adaptable to adverse conditions along a cut in research plots on I-85 near Tuskegee included: Savin Juniper (Von Ehron) - Juniperus sabina lusitanica 'Von Ehron', Shore Juniper - Juniperus conferta, Halls Japanese Honeysuckle - Lonicera japonica halliana, Rose-acacia Locust - Robinia hispida, Father Hugo Rose - Rosa hugonis, Wichura Rose - Rosa wichuriana, and Oriental Bittersweet - Celastrus orbiculata. Of these the performance of the two junipers was outstanding.

Outstanding species on undistrubed right-of-way included: Almey Crab - Malus sp., Black Locust - Robinia pseudoacacia, Thorny Elaeagnus - Elaeagnus pungens, Chinese Firethorn - Pyracantha crenato-serrata, Arrowwood Viburnum - Viburnum dentatum, Lilac Chastetree - Vitex agnuscastus, Pfitzer Chinese Juniper - Juniperus chinensis 'Pfitzer'.

Of all the plants commercially planted on the interstate system in Alabama, the three most adaptable species were:

Barberis julianae	-	Wintergreen Barberry
Malus sp.	-	Flowering Crab
Myrica cerifera	-	Southern Waxmyrtle

Other satisfactory species included:

Acer rubrum	-	Red Maple
Berberis sargentiana	-	Sargent Barberry
Elaeagnus pungens reflexa	-	Bronze Elaeagnus
Ilex cornuta	-	Burford Chinese Holly
Lagerstroemia indica	-	Common Crapemyrtle
Ligustrum indicum	-	India Privet
Magnolia grandiflora	-	Southern Magnolia
Pinus strobus	-	Eastern White Pine
Prunus caroliniana	-	Carolina Laurelcherry
Prunus cerasifera	-	Pissard Myrobalan Plum
Pyracantha crenato-serrata	-	Chinese Firethorn
Pyracantha lalandi	-	Laland Firethorn
Quercus palustris	-	Pin Oak
Rhus glabra	-	Smooth Sumac

Native Plant Materials:

In a search for inexpensive and reliable techniques of providing appropriate plants in the landscape of new roadways, propagation from seed must be considered. Means to hasten seed germination of valuable species were explored.

Gibberellic acid (75% K) treatments were found to hasten the germination of certain native woody plant species including: Acer floridanum, Florida Maple; Diospyros virginiana, Common Persimmon; Halesia carolina, Carolina Silverbell and Callicarpa americana, American Beautyberry. These treatments did not hasten germination of Osmanthus americanus, Devilwood Osmanthus or Symphoricarpus orbiculatus, Indian Currant Coralberry.

Alabama is blessed with a wealth of native plants that could possibly fill the need for multiple-purpose plantings along roadsides. An evaluation of fifty usable species was included.

During January 1967, plots along both sides of I-85 in Lee County (between U.S. 29 and State Highway 169) were selected and coordinated with Highway Department personnel for establishment and evaluation studies of native species in several environments. Those sites included dry, open, undisturbed right-of-way locations; damp, low locations; exposed bank locations; and shady locations.

Although more years of evaluation are needed, the following observations should be valuable in considering native plants for roadside use:

1. Where two sizes of a plant species were compared, the larger size (18" - 24") usually had the better survival rate, growth and vigor.

2. With the use of container-grown plants, usually the 1-gallon size plant survived and grew better than the larger container size, often 2-gallon or larger.

3. The following native plant species would be valuable additives to the roadside landscape in selected locations:

Dry, open - American Filbert, Corylus americana - Flameleaf Sumac, Rhus copallina - Silky Sassafras, Sassafras albidum molle - Red Maple, Acer rubrum and American Bittersweet, Celastrus scandens.

Exposed banks - Flameleaf Sumac, Rhus copallina - Shadblow Serviceberry, Amelanchier canadensis and Devil's Walkingstick, Aralia spinosa.

Damp locations - Grey Dogwood, Cornus racemosa - Vernal Witchhazel, Hamamelis vernalis, and Common Bald Cypress, Taxodium distichum.

Shady locations - Common Sweetshrub, Calycanthus floridus - Yaupon, Ilex vomitoria - Goldleaf Common Ninebark, Physocarpus opulifolius and Indian Currant Coralberry, Symphoricarpus orbiculatus.

Chemical Maintneance:

Herbicide combinations appeared to be more effective than the components used separately. Generally, combinations of grass killers such as Treflan with low rates of Simazine gave excellent results. Simazine gave excellent results. Simazine plus Paraquat was also an excellent combination for use where sprays could be directed and where vegetation was not excessive.

Timing of herbicide application was found to be the key to a successful herbicide program. Fall, winter or spring applications were the most effective with Simazine or Casoron, particularly where a mulch was applied.

Casoron was safer than Simazine on many deciduous shrubs. Casoron moves very slowly downward in the soil and most established ornamentals tested tolerated surface applications. It was very effective around recently planted and also established plantings of ornamentals if applied according to directions underneath a moist mulch.

In a comparison of post-emergence herbicides that included Ammate (Ammonium Sulfamate), Amazine (Amizine) and Herban (Norea), Ammate, at 50 lb./50 gallons of water gave the best overall weed control following the initial spraying.

II. GARDEN CHRYSANTHEMUMS, NATIONAL CHRYSANTHEMUM SOCIETY VARIETY TRIALS - 1968. (Martin, Orr)

Rooted cuttings of 11 varieties of hardy chrysanthemums, received from Yoder Brothers, Barberton, Ohio were potted in 4-inch pots on May 29. Plants were grown in the greenhouse until July 12; the plants were pinched on June 5, June 24 and July 12. On this latter date, the plants were planted in beds in the Test Garden at a spacing of 15 x 21 inches. Three pounds of 8-8-8 fertilizer were incorporated in each 100 sq. ft. of bed space prior to planting. On August 1 the plants were pinched and fertilized with 12-6-6 plus 2 per cent Di-syston at 3 lb. per 100 sq. ft. A final fertilization was given on August 27 with 8-8-8 at 3 lb. per 100 sq. ft. Records were made on each variety as to flowering date, height, spread, flower diameter and rating. These data are presented in Table 1.

Table 1. National Chrysanthemum Society Variety Trials - 1968

Variety	1st. Flower	Full Flower	Height	Spread	Dia. of flower	Rating	Notes
			Inches	Inches	Inches		
Powder River . . .	Sept. 17	Oct. 3	20	20	2-1/2	Good	Strong, compact growth
Ruby Mound	Sept. 20	Oct. 7	18	22	2-1/2	Good to Excellent	Strong, upright compact growth, good color
Tranquility	Sept. 24	Oct. 7	27	24	2-1/2	Good to Excellent	Strong, upright growth, good color, good cut variety
Raspberry Ice . . .	Oct. 5	Oct. 18	30	26	2	Good to Excellent	Good color, strong growth, a little tall, good cut variety
Corsage Cushion . .	Oct. 1	Oct. 12	18	22	2-1/2	Good	Tends to be top heavy
Minnwhite	Sept. 17	Oct. 3	18	22	2	Excellent	Strong, well shaped plants
Tinker Bell	Sept. 23	Oct. 5	19	19	2-1/2	Good to Excellent	Strong, well shaped plants, holds color well
Gold Strike	Sept. 12	Sept. 23	18	17	2	Good	Upright, strong stem
Muted Sunshine . .	Sept. 17	Oct. 7	18	22	2-1/2-3	Poor	Flowers diseased before fully open
Purple Waters . . .	Sept. 23	Oct. 12	24	18	2-1/2	Good	Good color - a little tall, tends to be top heavy
Scarleteer	Oct. 3	Oct. 15	20	20	2	Excellent	Excellent color-strong, compact growth

III. GARDEN CHRYSANTHEMUM TRIALS - 1968. (Martin, Orr)

Rooted cuttings of 13 additional varieties of hardy chrysanthemums were received from Fred C. Gloeckner Company and potted in 4-inch pots on June 21. Plants were grown in the greenhouse until July 12 with the following cultural care:

(1)	June 25	-	Plant pinched.
(2)	July 12	-	Plants pinched and planted in beds in garden - spacing, 15 x 21 inches; 3 lb. 8-8-8 per 100 sq. ft. incorporated prior to planting.
(3)	August 1	-	Plants pinched and fertilized with 12-6-6 plus 2 per cent Di-syston at 3 lb. per 100 sq. ft.
(4)	August 27	-	Plants fertilized with 8-8-8 at 3 lb. per 100 sq. ft.

Records were made on each variety as to flowering date, height, spread, flower diameter and rating. These data are presented in Table 2.

IV. MARKETING OF WOODY ORNAMENTALS BY ALABAMA WHOLESALE NURSERIES IN 1965. (miller, Orr)

Introduction:

The Horticultural Research Institute, Inc., (2) has estimated, through a study of approximately 5,500 nursery businesses, that the wholesale portion of the nursery industry in the United States in 1966 had sales of $525,000,000 which was an estimated 42 per cent of the dollar volume of the entire industry.

A recently completed study of the wholesale nursery industry is an eleven-state southern region indicated a value of approximately $52,000,000 in 1965.

The following is a discussion of the findings of the study, titled "Marketing Woody Ornamentals: Practices and Trends of Nurseries in the South", (2) as it applies to Alabama wholesale nurseries with some comparisons to the eleven-state southern region.

Study Procedure:

A complete listing of the nurseries in each state was obtained from the state regulatory agencies. In order to obtain additional information about each nursery, a mail survey was conducted. Nursery operators not responding to the mail survey were contacted by telephone or in person to obtain maximum possible response.

The results of the survey were used to separate the nurseries on the basis of sales from own production. All firms with less than $2,000 sales from own production were eliminated. The remaining nurseries were classified as commercial, and were separated into two groups. These sales groups were

Table 2. Garden Chrysanthemum Trials - 1968

Variety	1st. flower	Full flower	Height Inches	Spread Inches	Flower diameter Inches	Rating	Notes
Yellow Fujii . . . Williams	Oct. 7	Oct. 21	20	16	2-1/2-3	Good	Good color,upright growth, tends to be top heavy, good cut variety.
Yell. Minn Pink . .	Sept. 17	Oct. 5	13	20	2	Good to Excellent	Strong, spreading growth habit, good color.
Golden Tran- . . . quility	-------	Oct. 15	18	20	2	Excellent	Excellent color, strong spreading habit.
Zonta	Sept. 23	Oct. 5	19	20	2-1/2	Good to Excellent	Strong growth, well shaped plants - good color.
Tinker Bell	Sept. 23	Oct. 5	19	19	2-1/2	Good to Excellent	Strong, well shaped plants. Holds color well.
Minnwhite	Sept. 17	Oct. 3	18	22	2	Excellent	Strong-well shaped plants.
Shining Light . . .	Sept. 23	Oct. 5	18	20	3-1/2	Poor	Flowers diseased before fully open.
Grandchild	Sept. 23	Oct. 5	21	22	2	Good	Strong, upright growth. Flowers fade.
Corvette	Oct. 3	Oct. 15	24	17	1-1/2	Good	Upright growth, good color, does not break well, good cut variety.
Red Desert	Oct. 5	Oct. 18	22	25	2	Good to Excellent	Good color, strong spreading growth.
Chiquita	Oct. 5	Oct. 18	22	22	1-1/2	Good to Excellent	Good color, strong upright growth. Good cut variety.
Early Gold	Sept. 17	Oct. 1	15	16	2	Fair	Uneven flowering.
Fujii Jess . . . Williams	Oct. 10	Oct. 23	20	20	3	Good	Strong, upright growth, late flowering.

then sampled in the following manner: The first group which had sales greater than $2,000 but less than $49,999, was sampled at a 5 per cent rate. All the second group, firms with sales of $50,000 or more, were included in the sample.

The data were expanded by computer to include all wholesale nurseries after the surveys were completed.

Results:

Nursery Numbers and Sales - The estimated 47 Alabama woody ornamental wholesale nurserymen included in this study accounted for 3 per cent of the total number of nurserymen in the southern region and their sales of $4,839,700 was 9.2 per cent of the eleven-state total value. The individual proprietorship was the major type of business organization in the Alabama woody ornamental wholesale nursery industry; 20 of the 47 nurseries had private owners. Nurseries organized as corporations numbered 18 and there were 9 partnerships.

Average sales for each Alabama nursery was $102,792.31 - the highest average for any of the southern states. The eleven-state average was $39,470. Corporate nurseries in Alabama had average sales of $194,805, proprietorships $14,285 and partnerships $116,388.

As in the whole region, those Alabama nurseries established prior to World War II had higher sales than those established in the 1940's and later decades, Table 3. Alabama nurseries established before 1930 had average sales over $145,000, more than eight times the level for those which were initiated after 1950.

More Alabama nurseries were established prior to 1940 than in later years. Fifty-three per cent of the Alabama nurseries were started before 1940 and only 47 per cent have been started since that time.

Production Distribution - One hundred per cent of the Alabama wholesale nurseries produce broadleaf evergreens, 89.4 per cent produce narrowleaf evergreens, 76.6 per cent produce deciduous shrubs, 57.5 per cent produce ornamental trees, and 14.9 per cent grow woody ornamental vines, Table 4.

Production Volume and Major Genera - Listed in Tables 5 and 8 are the major genera of 4 groups of ornamentals and their methods of preparation for sale by Alabama wholesale nurseries in 1965. In volume of production by all methods of preparation for sale Ilex, Rhododendron (including Azaleas), and Camellia were quite prevalent among the broadleaf evergreens. These were sold either as liners, in containers, or balled and burlapped, Table 5.

Juniperus and Thuja were produced in the highest volume among the narrowleaf evergreens. None of the latter were sold as rooted cuttings or bare root by the wholesale nurseries in this study. The majority of Juniperus was sold as liners, with balled and burlapped plants second, and containers third in volume. The majority of Thuja was sold as balled and burlapped plants, liners almost equal volume, and containers a minor item, Table 6.

Among the deciduous plants, Lagerstroemia, Forsythia, Magnolia, and Deutzia were major production plants. The majority of these 4 genera was sold as liners. None were sold as rooted cuttings or in containers, Table 7.

Cornus, Magnolia, Cercis, Albizzia, and Acer were among the major genera of ornamental trees produced by Alabama wholesale nurseries. These were sold variously as liners, bare root, or balled and burlapped with containers being a minor method of preparation for sale. None of the trees were sold as rooted cuttings, Table 8.

Production Changes - The 1960 production of broadleaf evergreens in Alabama was approximately 90 per cent of the 1965 production. However, the Alabama nurserymen interviewed plan to increase production by 25 per cent by 1970, as compared to 30 per cent for the region, Table 9. Narrowleaf evergreen production in 1960 was 93 per cent of the 1965 production. However, an increase by 69 per cent is planned to be achieved by 1970 compared to 37 per cent for the region. Deciduous shrub production in 1960 was about 5 per cent higher in 1960 than in 1965, but an almost 14 per cent increase in production over the 1965 production is planned for 1970, as compared to approximately 8 per cent for the region.

Ornamental tree production decreased 134 per cent from 1960 to 1965, however Alabama nurseries planned to increase production by 283 per cent from 1965 to 1970. However, tree production in the region may decrease by approximately 28 per cent.

Sales Outlets and Distribution - Forty-six per cent of all sales made by Alabama nurseries in 1965 were to local buyers (located within 25 miles of the nursery), 32 per cent went to distant southern cities, and 22 per cent went to states outside the South. Individual consumers (33 per cent) and retailers (35 per cent) were the major local buyers. Landscape sales made directly by the nurserymen interviewed are classified in the individual consumer category, Table 10.

Listed in Table 11 are the distant southern cities to which Alabama nurseries distributed their products with an indication of the volume of sales to these cities. The largest volume, by far, was shipped to Atlanta (29.4 per cent). However, Dallas-Fort Worth, Houston, Birmingham, Norfolk-Portsmouth, and Shreveport also received a great portion (33.6 per cent) of the distant sales.

For shipment of products to states outside the South, Table 12, New York was, by far, the highest volume importer of Alabama nursery products. However, Illinois, Indiana, Iowa, Maryland, Michigan, Ohio, Pennsylvania, and Wisconsin imported a total of 58 per cent from Alabama.

Labor Productivity - When the relationship between volume of sales of nursery stock and man-hours worked is examined, nurseries in Alabama, with $2.87 sales per man-hour of employment, ranked second to Florida with $4.04 sales per man-hour of employment. Mississippi had the lowest sales per man-hour of employment at $1.85 and the average for the entire region was $2.87, Table 13. Alabama's average labor productivity was in fourth place in the

nursery size grouping of $50,000 or greater ($4.12) but in seventh place in the less than $50,000 group ($1.75).

Each Alabama nursery on the average employed 15.6 full-time workers which was the highest in the region. Average full-time employees per nursery in other states ranged from 11.8 in Virginia to 4.3 in Florida with a region average of 6.8. The average Alabama nursery also employed 12,554 part-time man hours, with the peak season for part-time employment being in the months of March, April, May and June.

Acreage Requirements for Field Production - For field production of four types of woody ornamentals, Alabama nurseries use less total acres per acre of sales than any other of the eleven southern states. Field grown vine production is not included because only one Alabama nursery reported field grown vines whereas other states had as many as 48 nurseries with field grown vines, Table 14.

The total number of acres required per acre of sales in Alabama was 3.5 acres for broadleaf evergreens, narrowleaf evergreens, and ornamental trees, and 3.2 acres for deciduous shrubs. The regional average was 4.4 acres for broadleaf and narrowleaf evergreens, 4.0 acres for deciduous shrubs, and 5.1 acres for ornamental trees.

Not all of these total numbers of acres are used full time for growing field plants. Part of the total acreage may lie fallow for a short time before it is replanted and part of the acreage may be planted in a cover crop or soil improvement crop before being used again for producing nursery stock. The number of years before replanting in Alabama ranges from 0.5 year for deciduous shrubs to 0.6 year for the other three ornamental groups. The regional average of years before replanting is somewhat higher, ranging from 0.7 year for trees, 0.8 year for broadleaf evergreens, and 0.9 year for narrowleaf evergreens, to 1.3 years for deciduous shrubs.

Pricing Procedure - Price "followership" or imitating prices of larger, nearby nurseries was the leading method used by Alabama wholesale nurserymen in establishing prices for their products, Table 15. More than one-half of the nurserymen interviewed in this study reported that they set their prices at the approximate level of those established by larger nurseries in the vicinity. Only 15 per cent used cost of production and only 8 per cent used quality of grades as a primary factor in establishing prices of their products. This same trend was also estimated for the region.

Marketing Practices - Only 21.3 per cent of the Alabama wholesale nurserymen indicated that they could determine production costs per plant from their records. However, 95.7 per cent indicated that prices for specific grades and sizes are reasonably stable, Table 15.

Approximately 3/4 of the nurseries advertise their plants for sale and 2/3 sell their plants under their own label but none of the Alabama nurserymen package their plants under a buyers label.

Production Problems - Alabama nurserymen classified labor shortage as their most important production problem. However, weather hazards and weed control problems were also of primary importance followed by wage rates for

unskilled labor, insect control, and lack of production capital, Table 16. This same trend of problems was established for the entire region.

Marketing Problems - Eighty per cent of the Alabama wholesale nurseries indicated adequate information was available concerning markets for their products, Table 17. None of the nurseries had a problem obtaining credit from their supplier, however, 46 per cent had a problem extending credit to their customers. Eighty per cent indicated they could split shipments of products among customers, however, 34 per cent indicated they did have problems with transportation facilities or agencies. Fifty-two per cent of the nurseries indicated there were changes in preferences for different plant forms and 39 per cent indicated changes in preferences for different kinds of plants. Only 20 per cent indicated they sold plants directly to state, federal, or other public agencies, and only 26 per cent indicated they sold plants to landscape contractors for use in community or highway beautification.

In comparing these marketing problems to the southern regional nurseries, 58 per cent indicated there were changes in preferences for different kinds of plants and 39 per cent indicated there were changes in preferences for different plant forms. The per cent of nurserymen indicating adequate available market information for their products dropped from 80 in Alabama to 68 in the southern region.

Discussion:

Our present concept of the modern, up-to-date, successful farmer is of a specialist. He specializes in one or two related crops, be it field crops or animals and concentrates his knowledge on this special crop to the best of his ability.

However, even though we might consider the nurseryman a specialist because he produces only ornamental plants, these plants in many ways are very unrelated in their requirements, growth habits, and production practices, such as the differences between broadleaf evergreens and deciduous plants. However, all of the wholesale nurseries are producing broadleaf evergreens with 89.4 per cent also producing narrowleaf evergreens and 76.6 per cent producing deciduous plants. In many ways this is not specializing. It may be possible for the wholesale nurseryman to concentrate all of his efforts and knowledge on a single plant type, thereby producing an improved quality plant in less time and with increased profit.

It is interesting to note the proposed changes in production figures from 1965 to 1970 and compare these with the response to the questions on changes in preferences for different kinds of plants and plant forms.

Those people associated with the ornamental industry realize that a major portion of these preference changes are related to a demand for more dwarf, slower growing, compact plants which require much less pruning to keep them in bounds. The nurserymen in Alabama have indicated they propose to increase the production of narrowleaf evergreens by 69 per cent by 1970. It is known that the demand for spreading junipers has greatly increased during recent years partly because of architectural innovations in home design.

There may be a 25 per cent increase in production of broadleaf evergreens. Part of this increase may be because of the normal increase in demand for plants as the population of the United States increases, and a small portion of the increase may be a result of increased demand for dwarf or compact broadleaf evergreens to be used in more modern landscape design.

The enormous proposed increase in production of ornamental trees is not fully understood. However, Alabama nurserymen may be taking a clue from nurseries in Tennessee, which have produced large quantities of seedling small trees during recent years. They may also be foreseeing the need for additional trees as our highway and parks landscaping is improved.

In terms of labor productivity, the larger nurseries, those which gross $50,000 or more per year, obtain a greater dollar return per man-hour ($3.12) than those which gross less than $50,000 per year ($1.75). Not only is this true for Alabama but also for the entire region, although the difference may be much less in some states than others.

It is the opinion of the authors that most businesses use the cost of production of a product plus a profit margin to determine the selling price of that product. The price may be adjusted depending upon supply and demand. However, the majority of the nurseries in Alabama have indicated they can not determine cost of production from their books, therefore, they imitate prices of larger, nearby nurseries and possibly adjust the price on quality, supply and demand.

Alabama nurseries must create the initiative to overcome this pricing procedure by keeping a more accurate accounting system so that they can better analyze their production costs and possibly increase the productiveness of their business thereby increasing profits of their labor.

By increasing productiveness and profit it may be possible to attract more qualified labor into the industry, thereby decreasing one of the primary production problems -- labor shortage.

A major marketing problem appears to be that of wholesalers extending credit to their customers. In this era of major use of credit by businesses as well as personal, surely there must be a credit plan in use by other businesses which can be extended to the wholesale nursery industry.

Table 3. Proportion of nurseries and average value of sales by year of establishment, 1965

Period	Per cent of nurseries	Average value of dollar sales per nursery
Before 1930	25.5	$145,208
1930-39	27.7	185,346
1940-49	14.9	52,857
1950-59	23.4	18,518
1960-65	8.5	28,500
All nurseries	100.0	$102,972

Table 4. Proportion of Alabama and region wholesale nurseries producing specified types of woody ornamentals, 1965

Plant type	Per cent of Alabama wholesale nurseries producing	Per cent of region nurseries producing
Broadleaf evergreens	100.0	77.1
Narrowleaf evergreens	89.4	62.3
Deciduous plants	76.6	51.9
Ornamental trees	57.5	57.9
Vines	14.9	25.9

Table 5. Major genera of broadleaf evergreens and methods of preparation for sale by Alabama wholesale nurseries, 1965

Type of broadleaf evergreens	No. of nurseries	No. sold by sample	Method of preparation for sale				
			No. rooted cuttings	No. liners	No. containers	No. bare root	No. balled & burlapped
Abelia . . .	2	80,000		80,000			
Aucuba . . .	1	3,000			3,000		
Buxus . . .	4	94,000		80,000	10,000		4,000
Camellia . .	3	175,000		43,600	118,000		13,600
Cleyera . .	1	34,000		20,000	8,000		6,000
Fatsia . . .	1	2,000			2,000		
Gardenia . .	3	30,200		2,000	25,000		3,200
Ilex	11	2,957,300		2,331,100	542,600		83,600
Ligustrum .	5	41,000			25,000		16,000
Magnolia . .	5	77,200	20,000	19,900	35,200		2,100
Photinia . .	2	34,000		10,000	22,000		2,000
Pittosporum .	1	6,000		2,000	2,000		2,000
Podocarpus . .	1	10,000					10,000
Prunus	2	4,000					4,000
Pyracantha . .	1	52,000		5,000	47,000		
Rhododendron .	7	3,827,900		2,271,000	1,426,800	57,500	72,600
Other	8	880,200		696,300	102,200		81,700

Table 6. Major genera of narrowleaf evergreens and methods of preparation for sale by Alabama wholesale nurseries, 1965

Type of narrowleaf evergreens	No. of nurseries	No. sold by samples	Method of preparation for sale				
			No. rooted cuttings	No. liners	No. containers	No. bare root	No. balled & burlapped
Cedrus . . .	1	5,000					5,000
Chamaecyparis . .	1	2,000		1,000	500		500
Juniperus . .	9	943,300		748,000	24,000		171,300
Picea	1	1,000					1,000
Pinus	3	29,000		8,500	9,000		11,500
Taxus	1	20,000					20,000
Thuja	8	209,200		93,000	1,000		115,200
Other	3	80,500		66,000			14,500

Table 7. Major genera of deciduous plants and methods of preparation for sale by Alabama wholesale nurseries, 1965

Type of deciduous plants	No. of nurseries	No. sold by sample	Method of preparation for sale: No. rooted cuttings	No. liners	No. containers	No. bare root	No. balled and burlapped
Berberis	1	4,000		4,000			
Buddleia	1	1,000		500		500	
Cercis	3	1,800				1,800	
Chaenomeles	2	1,000				1,000	
Cydonia	5	5,600		4,200		1,200	200
Deutzia	1	15,000		10,000			5,000
Forsythia	8	26,500		19,200		2,300	5,000
Hibiscus	4	1,500		200		1,200	100
Lagerstroemia	10	36,200		32,300		3,500	400
Ligustrum	2	200				200	
Magnolia	3	21,000		19,500			1,500
Prunus	1	5,000		5,000			
Punica	1	500					500
Spiraea	6	4,400				1,300	3,100
Viburnum	1	2,000		1,500		500	
Weigela	2	2,100		2,000		100	
Other	4	8,200		4,000	4,000		200

Table 8. Major genera of trees and methods of preparation for sale by Alabama wholesale nurseries, 1965

Types of ornamental trees	No. of nurseries	No. sold by samples	Method of preparation for sale: No. rooted cuttings	No. liners	No. containers	No. bare root	No. balled and burlapped
Acer	5	8,600				8,600	
Albizzia	4	11,400		10,000	400	1,000	
Betula	3	3,300				2,800	500
Cercis	4	14,000		10,000		2,500	1,500
Cornus	5	37,300				21,500	15,800
Fraxinus	1	2,000				1,800	200
Ginkgo	1	200			200		
Koelreuteria	2	700				200	500
Liriodendron	1	1,000				1,000	
Magnolia	1	20,000				10,000	10,000
Malus	1	3,000				2,700	300
Platanus	1	1,000					1,000
Populus	1	500				200	300
Prunus	1	4,000				4,000	
Quercus	4	4,600			200	2,900	500
Salix	1	500				500	
Sorbus	1	3,000				2,800	200
Other	2	3,000		2,000	500		500

Table 9. Five year changes for nurseries producing woody ornamentals in Alabama and region, 1965

Plant type	1960 Percent of 1965	1965 No. plants	19Ø Per cent of 1965
Broadleaf evergreens:			
Alabama	89.95	12,053,600	125.09
Region	80.03	50,102,200	130.82
Narrowleaf evergreens:			
Alabama	93.46	2,738.900	169.46
Region	74.01	22,441,900	137.52
Deciduous shrubs:			
Alabama	104.85	4,795,300	113.56
Region	98.47	41,958,700	107.64
Ornamental trees:			
Alabama	234.48	226,800	383.47
Region	23.50	28,435,000	72.36

Table 10. Value of sales of woody ornamentals in Alabama by location and type of buyer, 1965

Type of outlet	Value of sales		
	Dollars		Per cent
Local Sales *			
Individual consumers	$ 743,350		33.4
Retailers	794,109		35.7
Wholesalers	142,250		6.4
Other growers	282,737		12.7
Public agencies	2,673		0.1
Landscape contractors	261,143		11.7
All local sales	$2,226,262	46	
Distant Sales			
Southern cities	1,508,704		32.0
Cities outside the South	1,064,734		22.0
All distant sales	$2,613,438	54	
All Sales	$4,839,700	100	

* Within 25 miles of the nursery.

Table 11. Sales to distant Southern cities of woody ornamentals produced in Alabama, 1965

City	Dollars	Per cent
Washington, D. C.	33,100	1.4
Dallas-Fort Worth	169,015	7.1
Houston	133,000	5.6
Atlanta	699,222	29.4
New Orleans	16,480	0.7
Memphis	77,860	3.3
Birmingham	151,689	6.4
Norfolk-Portsmouth	218,500	9.2
Nashville	32,600	1.4
Mobile	3,520	0.2
Knoxville	2,100	0.1
Charlotte	3,800	0.2
Chattanooga	24,140	1.0
Shreveport	125,000	5.3
Charleston	10,800	0.5
Columbia	16,560	0.7
Greensboro-High Point	3,800	0.2
Little Rock	35,845	1.5
Baton Rouge	780	0.1
Jackson	48,745	2.1
Columbus	15,330	0.6
Pensacola	10,640	0.5
Montgomery	25,250	1.0
Huntsville	38,220	1.6
Macon	480	0.1
Raleigh	18,800	0.8
Roanoke	15,000	0.6
Ashville	6,750	0.3
Gadsden	2,760	0.1
Anniston	2,760	0.1
Others	434,646	18.3
Total		100.0

Table 12. Sales to states outside the South of woody ornamentals produced in Alabama, 1965

State	Dollars	Per cent
Connecticut	$ 12,500	1.1
Illinois	96,780	8.8
Indiana	43,750	4.0
Iowa	65,750	6.0
Kentucky	4,380	0.4
Maryland	87,500	7.9
Michigan	130,686	11.8
Minnesota	10,500	1.0
Missouri	31,000	2.8
New Jersey	8,000	0.7
New York	388,220	35.1
Ohio	91,184	8.3
Oklahoma	8,640	8
Pennsylvania	76,000	6.9
Wisconsin	50,000	4.5
Total		100.0

Table 13. Value of sales of woody ornamentals, per man hour of labor employed, states of the southern region, 1965

State	Firms with sales of		All firms
	Less than $50.000	$50,000 or more	
	Dollars/man hr.	Dollars/man hr.	Dollars/man hr.
Alabama	1.75	3.12	2.87
Florida	3.03	5.79	4.04
Georgia	1.72	2.71	2.30
Kentucky	1.45	3.99	2.74
Louisiana	2.13	2.14	2.14
Mississippi	1.77	1.91	1.85
North Carolina	1.75	2.83	2.38
South Carolina	1.96	2.20	2.10
Tennessee	1.61	3.26	2.40
Texas	1.98	3.06	2.66
Virginia	2.11	2.94	2.81
Region	2.23	3.32	2.87

Table 14. Acreage requirements for specified types of field grown woody ornamentals, Alabama and region, 1965

	Average size of field grown production	Average plants per acre	Usual maximum age at sale	Yrs. before replanting	Total acres required per acre of sales 1/
	(Acres)	(No.)	(Yrs.)	(Yrs.)	(No.)
Broadleaf evergreens:					
Alabama	45.6	23,000	2.8	0.6	3.5
Region	29.4	14.700	3.5	0.8	4.4
Narrowleaf evergreens:					
Alabama	20.5	15,100	2.9	0.6	3.5
Region	19.7	26,500	3.5	0.9	4.4
Deciduous shrubs:					
Alabama	21.6	120,100	2.7	0.5	3.2
Region	10.5	72,300	2.7	1.3	4.0
Ornamental trees:					
Alabama	8.7	5,700	2.9	0.6	3.5
Region	15.4	14,000	4.4	0.7	5.1

1/ Years required for production translate directly into the number of acres required to sell production from one acre annually.

Table 15. Procedure for establishing prices of woody ornamentals by Alabama wholesale nurserymen, 1965

Pricing practice	Alabama Rank of importance First	Per cent	Second	Third	First region Per cent
Imitate prices of larger nearby nurseries	31	65.9	2	0	37.0
Cost of production	7	14.9	12	2	31.1
Quality of grades	4	8.5	12	10	12.5
Location of buyer	0		0	1	
Credit of buyer	0		0	0	
Aim at set profit margin	5	10.6	4	1	8.1
Supply of product in area	0		0	3	3.2
Other	0		2	2	8.1

Table 16. Marketing practices for production costs, stability of prices, advertising methods and labeling

Practice	Alabama Per cent yes	Region Per cent yes
A. Can you determine production costs per plant from your records?	21.3	28.3
B. Are prices for a specific type grade and size of plants reasonably stable?	95.7	88.4
C. Do you advertise plants for sale?	72.3	63.2
D. Do you sell your plants under your own label?	66.7	60.4
E. Do you package plants under a buyers label?	0.0	5.5

Table 17. Production problems of Alabama and southern region wholesale nurseries, 1965

Problem	Alabama Rank of problem First	Second	Third	Wouthern region Rank of problem First	Second	Third
Obtaining cuttings	0	0	0	12	8	6
Weather hazards	10	7	2	256	211	122
Labor shortage	27	4	1	397	163	69
Wage rates for unskilled labor	0	6	0	78	127	74
Diseases	0	0	0	8	36	48
Nematodes	0	1	1	14	12	10
Inspection service	0	0	0	0	6	4
Insects	0	4	5	44	51	58
Suitable soil for field planting	0	1	0	8	26	12
Irrigation for field planting	0	2	1	7	39	58
Fertilizing	0	0	4	1	13	20
Weed control	7	6	8	156	170	174
Lack of production capital	0	4	0	47	49	45
Other	1	0	1	246	100	41

Table 18. Marketing problems of Alabama and southern region wholesale nurseries, 1965

Problem	Alabama Per cent yes	Southern region Per cent yes
A. Changes in preferences for different kinds of plants	39	58
B. Changes in preferences for different plant forms	52	39
C. Sell plants directly to state, federal or other public agencies	20	23
D. Sold plants to landscape contractors for use in community or highway beautification	26	22
E. Problems with transportation facilities or agencies	34	14
F. Can you split shipments among customers?	80	54
G. Problems in extending credit to your customers	46	33
H. Problems in obtaining credit from your suppliers	0.0	1.7
I. Is adequate information available concerning markets for your products?	80	68

Literature Cited

1. Research Summary: 1968. Scope of the Nursery Industry. Horticultural Research Institute, Inc.

2. Marketing Woody Ornamentals: April, 1969. Practices and Trends of Nurseries in the South. Southern Cooperative Series Bulletin No. 143.

V. PROCESSED GARBAGE - USEFUL MULCH FOR ORNAMENTAL PLANTS. (Sanderson, Orr and Martin)

The smelly garbage crisis facing the nation could wind up smelling like a rose!

Research at Auburn University Agricultural Experiment Station, has revealed that processed garbage is a suitable material for mulching ornamental plants. These experiments, under a grant from the U.S. Public Health Service, found processed garbage mulches to be as effective as many other commonly used mulching materials.

There are several points favoring processed garbage mulches: (1) they are effective for more than 1 year; (2) they influence soil moisture, temperature, pH, and nutrition; (3) while being resistant to erosion, processed garbage mulches do not pack or mat; and (4) weed growth is reduced using this mulch material.

Abundant Supply Available

Each year the average American disposes of 1,600 lb. of solid wastes, primarily cloth, rubber, paper, metal, glass, and wood. Few cities attempt to reclaim any of these materials. In some cities the reusable materials, such as paper, rags, and metals, are being salvaged. The remaining refuse is ground and composted for use as a soil amendment, fertilizer, or mulch.

Auburn's research has used a compost produced by the City of Mobile. This processed garbage has a dark brown color, with large amounts of flexible and rigid plastic apparent. All glass is ground to a size that does not present a problem in handling. Overall texture of the product is somewhat granular. It is difficult to ignite with a match.

Chemical analysis (Spurway) of processed garbage shows nitrates of 2-5 p.p.m., and calcium of 150-300 p.p.m. The pH is 8.6 and highly resistant to change. It has a high salt content (solubridge reading - 1:5 dilution - has averaged 70 mhos), but the salts are easily leached.

Good Mulch Results

Interest that generated experiments with processed garbage mulch was because of the large quantities of the material available that could be used in park and highway plantings. And these mulches have proved successful on numerous plant species.

No apparent differences were observed in the growth of petunias and garden chrysanthemums mulched with either processed garbage, sawdust, or pine straw. Leaf and flower color and plant size were comparable in all the mulches. Kurume azalea, forsythia, shore juniper, pfitzer Chinese juniper, burford Chinese holly, Chinese holly, harland box, pyramidal arborvitae, and burkwood viburnum have grown well when mulched with processed garbage.

Soil moisture and temperature under a processed garbage mulch had been comparable to results with other mulches. Monthly moisture and temperature readings during May to July 1968 of 48 plots on a highway slope showed

the following averages:

Mulch	Available moisture, per cent	Temperature, degree F.
None	78.8	79.3
Turffiber	90.1	78.1
Pecan hulls	92.4	78.3
Pine straw	94.8	76.5
Sawdust	92.5	77.4
Processed garbage	91.7	78.3

Processed garbage mulches were also found to enrich the soil. Marked increase in pH, phosphorus, potassium, and calcium 1 year after mulching were shown by these soil test results:

Mulch	Element, lb. per acre				
	pH	P	K	Ca	Mg
None	5.8	21.4	101.1	882.0	105.8
Turffiber	5.7	20.1	89.5	901.0	105.0
Pecan hulls	5.6	22.1	208.8	851.0	111.0
Pine straw	5.8	21.5	85.4	809.0	111.8
Sawdust	5.6	15.9	88.5	951.0	102.0
Processed garbage	6.6	31.5	230.5	1,204.0	118.5

VI. 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.

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 19. 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 19. 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-O	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-O 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 20 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 20. 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-O 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

VII. 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-O (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-O at 4.1 per cent.
(8) Offshoot-O at 4.1 per cent plus 0.15 per cent B-Nine.
(9) Offshoot-O 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 21 shows that plants pinched with 4.1 per cent Offshoot-O (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-O and 0.15 per cent B-Nine (3.8) produced the most breaks per shoot. Shearing plus 0.05 per cent UNI-F 529 (2.5) and 4.1 per cent Emgard 2077 (2.5) gave the fewest number of breaks per shoot.

Table 21. Effect of chemical pinching agents combined with growth retardants on the number of breaks per shoot on azalea, cv. 'Red Wing'

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