

Economics and Marketing

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Are There Economics of a “Sustainable” Green Industry?

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Nature of Work: There is no single indicator of “sustainability” in the environmental horticulture industries, nor is there a single definition of “sustainable.” The American Society of Agronomy (1989) defined sustainable as specific systems, processes or practices that “enhance environmental quality and the resource base on which agriculture depends, provide for basic human food and fiber needs, are economically viable, and enhance the quality of life for farmers and society as a whole.” The US Department of Agriculture Secretary’s Memorandum on Sustainable Development (1995) cited sustainable as having “goals of improved production and profitability, stewardship of the natural resource base and ecological system, and enhancement of the vitality of rural communities.” In 1999, the National Sustainable Agriculture Information Service indicated sustainable included three guiding principles of “environmental stewardship, farm profitability, and a prosperous farming community.” In a 2007 draft, the Sustainable Agriculture Practice Standard cited, “The sustainable agriculture framework ... can be grouped under three categories – environmental sustainability, social and economic sustainability, and product integrity -- ... such that agricultural production and product handling activities result in the production and delivery of products in a manner that is economically viable, ecologically sound, and socially responsible.”

Commonalities to these varied definitions were an integrated system of practices that focused on (1) environmental quality and stewardship, ecologically-sound, site-specific applications that integrate natural biological cycles and controls; (2) long-term economic viability, farm profitability emphasizing cost savings, and competitive advantage; and (3) quality of life, vitality of communities, and socially supportive and responsible. Utilizing as case studies four grower-marketer nursery operations in Georgia and South Carolina which are pursuing the goal of being sustainable, their actions directed at economic vitality, viability, and profitability were monitored and evaluated. Just as there is no single indicator or definition of sustainable, there is not a single recipe or set of activities to become sustainable.

Results and Discussion: The following factors, concepts, observations, and issues were derived from the reviews of the four firms who made strides toward economic sustainability:

- The process of developing a business plan occurred: identify values; review current situation and inventory resources; draft statements of vision, mission, and goals/objectives; research, develop, and evaluate business strategies; and implement the plan with monitoring benchmarks to evaluate performance.
- Are there limits to adopting and implementing the business plan, such as firm size, access to credit, labor availability, access to information, geography, economic efficiency, markets? Financial exigencies do not lead to decisions that compromise

environmental protection and social sustainability objectives, the other common concepts for sustainability.

- Investment for assets and practices and reinvestment decisions should support management objectives with respect to environmental and social sustainability.
- Commitment to maximizing utilization of production resources, technology, and information that increases production at a lower cost, and a commitment to targeted markets must occur.
- Increases in agricultural productivity have resulted in lower prices, discounted for inflation, by the use of substitutable inputs, i.e., fertilizer for land.
- The goal of using fewer resources to produce a given amount of output can lead to increasing profits; for instance, insecticide (fungicide) use is negatively and significantly related to integrated pest management (IPM) use for insects (diseases) leading to the following observations – a 10% increase in the probability of IPM use for insects (diseases) lead to decreasing the number of applications 4% (1%) which in turn resulted in an increase of variable farm profits 1% (3%).

Four critical economic factors affecting the adoption of sustainable production practices were:

- profitability, with respect to conservation of energy and water, integrated pest management, enhanced nutrient management, and precision agriculture;
- structural barriers, such as managerial time constraints and off-farm income opportunities, farm size affecting the adoption of “profitability” practices, labor availability including operator and unpaid family labor, and integration and diversification;
- heterogeneity or diversity of the natural resource base, particularly concerning varied soil, water, and climatic resources; and
- economic risk considerations, such as probability or sensitivity statistical analyses, “what-if...?” analyses, and operators’ risk attitudes; results vary substantially by site- and management-specific conditions.

Significance to Industry: Six conclusions were drawn from the case study analyses of the four nurseries striving toward “sustainable” production and marketing:

- The implications of economic risk are important as grower-marketers may undermine many of the benefits associated with sustainable production practices.
 - The environmental and natural resource effects of a sustainable technology are location-specific, which limits the power of inferences drawn from the case studies.
 - Even when a sustainable technology is “profitable” for one operation, there are many impediments to adoption and diffusion – structural barriers, risk, and heterogeneity of the resource base – requiring policy instruments, regulations, certifications and economic incentives, typically cost sharing.
 - Heterogeneity of the resource base implies technology transfer programs must be tailored to regional conditions and spatial variation with great flexibility, cautioning against a “one-size-fits-all” approach.
 - Environmental and economic trade-offs are associated with technologies examined; controlling one type of problem might exacerbate another.
 - Market development for more sustainable crops, especially high-value products, offers producers who use sustainable production practices opportunity to obtain a premium for choosing to exercise environmental stewardship and sustainability.
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Literature Cited:

1. Hrubovcak, James, Utpal Vasavada, and Joseph E. Aldy. *Green Technologies for a More Sustainable Agriculture*, USDA/ERS AIB-752, July 1999.
2. White, Jennifer Duffield. "Where Green & Sustainable Meet," *Grower Talks* 71(7): 46-48, November 2007.

Landscape Professional Perspectives on Ornamental Host Plant Resistance

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Significance to Industry: In the last 25 years, academic, botanic garden and commercial trials have greatly increased knowledge about ornamental host plants that offer resistance or tolerance to insect pest and plant disease pressure in the landscape. However, much of this information remains difficult to access both by the gardening public and landscape managers and designers. Efforts are in progress to establish a database that includes lists of host plant resistant selections coupled with details of peer-reviewed trials and best management recommendations. Results of this survey indicate that landscape management professionals perceive value in insect and disease resistant plants and anticipate several advantages to business profitability and efficiency once these data are made easily accessible. Less than 5 percent of surveyed grounds management professionals believed that increased availability of insect and disease resistant ornamental plants would be detrimental to business and indicated unwillingness to recommend these plant options to clients.

Nature of Work: Ornamental host plant resistance to pests and diseases is a critical component of successful landscape Integrated Pest Management (IPM) strategies and results of ornamental plant species and cultivar screenings for pest and disease injury have been partly compiled into lists of plants demonstrating tolerance and resistance to specific pests and diseases (8). Following initial public skepticism about IPM (1, 5), there appears to be growing willingness among garden and landscape enthusiasts to seek pest and disease resistant ornamental plants (3, 4, 6). While this is true for Master Gardeners and gardening enthusiasts, opinions of landscape management professionals (e.g., grounds managers, landscape designers, landscape architects, pesticide spray technicians, etc.) about perceived effects of ornamental host plant resistance to company profitability have not been assessed. Surveys have demonstrated that landscape professionals have adopted some IPM practices within their management strategies and are interested in increasing use of non-chemical pest management alternatives (3, 2). Yet, if some proportion of landscape management professionals remain unwilling to adopt or advocate use of ornamental host plants that are resistant to certain pests or diseases (because of concerns about profit decline or client unwillingness to accept plant substitutes) then the market for these plants will be limited. Therefore, objectives of this study were to assess among landscape management professionals, stated perceptions about the potential for pest or disease resistant ornamental plants to affect company or personal profitability, as well as client satisfaction, and to qualify these beliefs as they relate to both personal and firm demographics.

A 4-page questionnaire was developed, pre-tested then mailed in April by the UGA Survey Center to more than 1,500 landscape management professionals and firms registered in Tennessee and Georgia. Anticipating low response rates, mailed surveys were also supplemented with presentations to landscape management professionals attending service-learning workshops (from June 2006 through October 2007) at the: Tennessee Nursery and Landscape Association (TNLA) winter workshop in Pigeon Forge, TN, Middle Tennessee Nursery Association Trade Show in McMinnville, TN, Spring Express Landscape Seminar in Chattanooga, TN, Tri-Cities Landscape Seminar in Jonesboro, TN, Southern Nursery Association Tech Shop in Atlanta, GA, Southeastern Greenhouse Conference in Greenville, SC and three separate Georgia/Florida Green Industry Update Conferences in Jacksonville, FL and Quincy, FL. Respondents at outreach sessions who indicated that they had completed the survey by mail were either excused from participation in the subsequent assessment or their notated second survey was excluded from data analyses. By November 2007, respondents had returned 391 completed surveys. Frequencies of valid responses were recorded and data were further assessed using chi-square comparisons, Student's *t*- and Pearson's correlation coefficient tests (7).

Results and Discussion: Respondents returned 391 completed surveys suitable for analyses. Of these, 52% were from landscape management professionals working in Tennessee, 28% were from Georgia, 16% were from Florida, with 4% representing other states. Nearly half were 45 years old or younger and 82% were men. Respondents were most likely to be sole employees or owners of the business (56%) with the next largest professional classes represented by landscape crew forepersons or crewmembers at 12% and 9%, respectively. In all, respondents had on average 16 years of professional experience serving the Green Industry. About 49% had achieved at least a Bachelor's degree and 21% of respondents had some level of post-graduate education.

More than 77% of respondents either planted new plants or replaced dead plants in client landscapes. About 59% also confirmed that they were responsible for treating landscape insect and disease problems with an additional 20% saying that they would do so "when asked" by clients.

On average, grounds' management professionals believed that increased availability of insect and disease resistant ornamental plants would offer between "slight" and "moderate" benefits to company business. Very few responses indicated negative effects of insect and disease resistant ornamental plants to business thus; these categories were pooled to show that just 4% expected that "some negative effect" would result (Figure 1). Respondents were also questioned about ways in which insect and disease resistant ornamental plants would influence management actions. Client satisfaction was expected to see the greatest gains. On average, fungicide applications were perceived to be most reduced followed by insecticide applications. Yet average expectation about number of annual site visits was shown to be slightly less than present levels. Company profits were expected to see "slight" increases, likely in response to slightly higher costs that could be charged for insect and disease resistant

ornamental plants (Table 1). Indeed, about 45% of respondents anticipate that clients will be willing to pay slightly more, while 20% expect to be able to charge “moderate” to “much” more for these products (Figure 2).

References Cited:

1. Ball, J. 1986. Public perception of an integrated pest management program. *J. Arboric.* 12: 135-140.
2. Braman, S.K., J.G. Latimer, and C.D. Robacker. 1998a. Factors influencing pesticide use and integrated pest management in urban landscapes: a case study in Atlanta. *HortTechnology* 8: 145-149.
3. Garber, M.P. and K. Bondari. 1996. Landscape maintenance firms: II. Pest management practices. *J. Environ. Hort.* 14: 58-61.
4. Klingeman, W.E., D.B. Eastwood, J.R. Brooker, C.R. Hall, B.K. Behe, and P.R. Knight. 2004. Consumer survey identifies plant management awareness and added value of dogwood powdery mildew-resistance. *HortTechnology* 14(2): 275-282.
5. Koehler, C.S. 1989. Prospects of implementation of IPM programs for ornamental plants. *Fla. Entomol.* 72: 391-394.
6. Klingeman, W., C. Hall and B. Babbit. 2006. Master Gardener perception of genetically modified ornamental plants provides strategies for promoting research products through outreach and marketing. *HortScience* 41(5): 1263-1268.
7. SPSS, Inc. 2003. *SPSS Help Manual Vers. 15.0.* Chicago, IL.
8. Smith-Fiola, D.C. 1995. Pest resistant ornamental plants: ornamental landscape plant cultivars and varieties documented to be resistant to specific insects and diseases. Toms River, NJ.

Table 1. Mean responses given by Landscape Grounds Management Professionals when questioned to reveal perceptions about the influence of insect and disease resistant ornamental plants on their businesses' performance.

Variable:	Mean (± SEM)
Given a fair price and equivalent plant quality, how willing would you be to: <i>recommend insect or disease resistant ornamental plants for use or replacement in client landscapes?</i>	6.16 (0.06) ^z
<i>If you planted insect or disease resistant ornamental plants in client landscapes, how would it affect your company's...</i>	
Number of annual site visits?	3.85 (0.07) ^y
Amount of <i>insecticides</i> applied?	2.93 (0.07)
Amount of <i>fungicides</i> applied?	2.83 (0.07)
Customer/client satisfaction?	5.02 (0.08)
Company profits?	4.97 (0.07)
"New" insect/disease problems?	3.91 (0.08)
Cost of resistant plants?	4.56 (0.07)
Would greater availability of insect or disease resistant plants [be extremely bad, have no effect, or be extremely good] for your business?	5.51 (0.06) ^x
<i>About what percent of a client's landscape could be planted with insect or disease resistant ornamental plants without decreasing company profits, if any?</i>	60.90 (1.35) ^w
<i>Compared with insect and disease susceptible plants how much do you believe clients would be willing to pay for similar but insect and disease resistant landscape plants?</i>	4.87 (0.04) ^v
<i>In terms of insect or disease resistance, how do U.S. native landscape plants compare with landscape plants imported from other countries?</i>	4.80 (0.06) ^u

^z Scale: 1= 'not at all willing' to 7= 'very willing'

^y Scale: 1= 'decrease greatly' to 7= 'increase greatly'

^x Scale: 1= 'extremely bad for business' to 7= 'extremely good for business'

^w Scale: 0 = 'no percent of landscape plants' to 100 = '100 percent of landscape plants'

^v Scale: 1= 'much less money' to 7 = 'much more money'

^u Scale: 1 = 'much less resistance' to 7 = 'much more resistance'

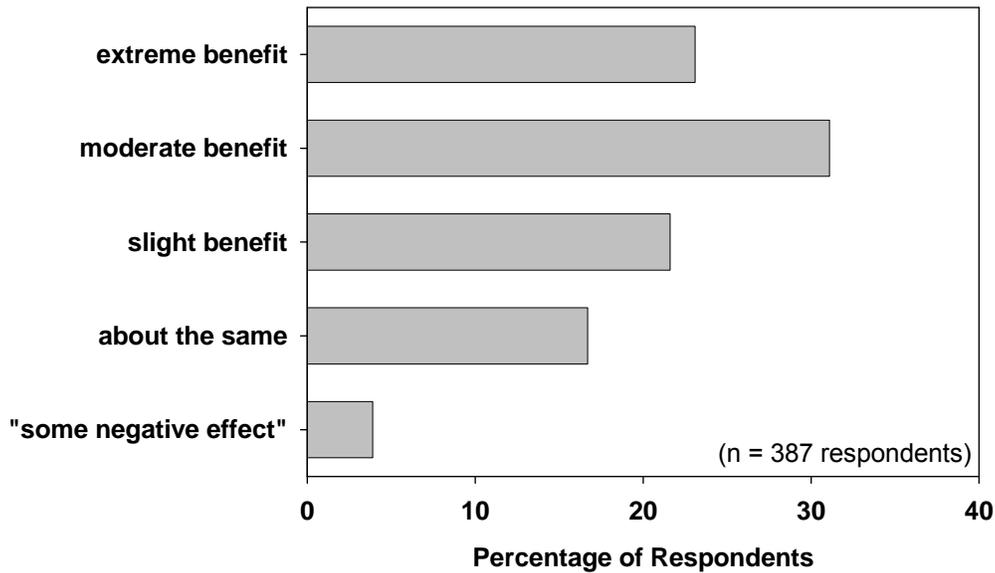


Figure 1. Surveyed distribution of Landscape Grounds Management Professional's responses when asked: "Would greater availability of insect or disease resistant plants [be extremely bad, have no effect, or be extremely good] for your business?"

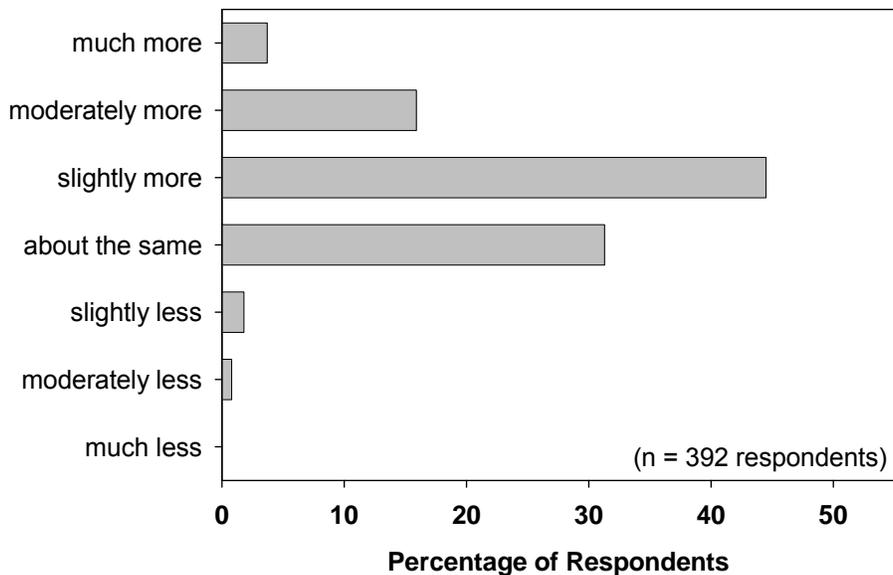


Figure 2. Landscape Grounds Management Professional's beliefs about client "willingness-to-pay" for insect or disease resistant ornamental landscape plants?"

Using MSBG to Generate Enterprise Budgets for Ornamental Crops

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Significance to Industry: The importance of the ornamental plants sector of agriculture was emphasized in results from a national economic impact study in 2004 that indicated the 'green industry' provided about \$147.8 billion in output, nearly 2 million jobs, about \$26 billion in sales and \$18.1 billion in value added (Hall, 2005). The impact in the Southeast region was important at about \$13.5 billion in 2004.

This project estimated cost of production (COP) budgets for selected container grown ornamental plants. Enterprise budgets provide information to the grower at several levels. Growers face choices involving risk - crop mix, expansion, and pricing and price negotiations – and should address these from an informed decision framework. Improved cost information adds to the group of risk management tools, and strategies and experience base can help to generate better results at choice points. These should reduce risk and improve profitability. Budgets are useful to other segments of the industry as well. For example, they can provide evaluation benchmarks for lenders in the form of objective evaluations of the variable and fixed costs of production. These objective benchmarks to evaluate production efficiency and reference materials for lenders have not been readily available.

Nature of Work: The specific objective of this research was to estimate costs of production for selected container grown ornamental plants. In this document, we focus on production costs of selected woody ornamentals and perennials in Plant Hardiness Zones 8 and 9, on and close to the Gulf of Mexico and the lower Atlantic. Enterprise budgets are an important component of a grower's information base at several levels, including choices involving risk, crop mix, expansion, and pricing and price negotiations. Plants selected for budgeting were chosen to represent groups of common plants with similar production practices, inputs and labor rates. The individual plants are Indica azalea, Crape myrtle, Southern Live Oak, Fig, Lantana, and Liriope.

Estimation of COP follows a general procedure that can be traced to Badenhop (1979) and Badenhop and Phillips (1983). They chose an economic engineering approach, which incorporates the idea that an acceptably precise planning budget can be prepared through consultation with knowledgeable individuals and experts. The budgets generated and presented were based on the knowledge and experience of horticulturalists and agricultural economists from participating states. The overall COP process was placed in the context of a complete nursery operation, and the plants identified above were the basis for analysis. Results were presented as capital requirements, production activities and inputs, and costs, for production nurseries of alternative sizes. Other examples of similar approaches to generation and updating of COP budgets include (Taylor et al. 1986) and Perry et al. (1990).

This research project followed the process described in the previous paragraph in terms of use of the economic engineering approach. However, in the previous research calculations were done by hand or by spreadsheets. In contrast, we used the Mississippi State Budget Generator (MSBG, version 6.0) as a tool to calculate costs for the budget situations specified. MSBG provides a standard format for crop and livestock budgets. Its computational procedures are widely accepted, and the procedure can be updated easily for budgeting or for considering alternative farm situations. COP budget estimates are point estimates, and looking at alternative production practices or performance rates can be a laborious process. With MSBG, comparisons of this kind can be done quickly. After the basic budget files and sequence of operations have been created, these budgets can be altered to represent other general situations or to tailor the budget to a specific farming operation.

From MSBG's multiple functions, we generated individual enterprise budgets. To prepare a budget, the user must specify what activities occur, when they occur, the machinery or equipment used, and the operating inputs included. Through this process, a set of activities and associated inputs that represent a general production situation in plant hardiness zones 8 and 9 was identified. The pieces of information needed for budget preparation were (i) sequence of operations required for production of the plant, (ii) machinery and equipment requirements, (iii) operating inputs with their rates of use and costs per unit, and (iv) labor requirements. These were specified by LSU and MSU Extension Specialists. Preliminary budgets were presented to a panel of growers from the central gulf coast region in Mobile, AL. Growers were very interested in the process, the assumptions, and the results, and their feedback resulted in modifications that ensured the grower level applicability of the work. The budgets also were used in extension meetings in winter months of 2008, and no suggestions for revisions were received from those reviews.

Cost Assumptions:

Capital: Most growers use their own capital to fund long term investment and operating expenses, but interest charges are included in the budget for working capital and for investment in machinery and equipment.

Labor: Growers and their family members provide some of the nursery's labor force and additional labor is hired by the hour as required to get activities completed. We include a standard cost or wage rate to all hours required for production activities of the enterprise. The wage rates were \$9.60/hour for hired labor and \$15.30/hour for manager labor (Salassi and Diliberto 2008).

Machinery: Machinery size affects operating and fixed costs. Generally, nursery activities do not involve heavy agricultural work such as soil tilling, and diesel tractors in the 20 and 35 horsepower range, and one tractor of about 50 hp, would be found on the nursery, along with specialized pieces of equipment.

Land: Ownership, rental, lease or other arrangements are ways to bring land under control of the grower. Consideration of land expense must be included in decision-making. Because of the extensive variation in land value across these plant hardiness zones, a land cost was not included.

Marketing: Selling, delivery expenses, and office and administrative costs were not included. The budgets presented begin with preparation of nursery bed space and end when the plant

has been loaded on a truck, ready to be moved to the customer.

Production: Most of the crop situations budgeted here were about 18 months long, beginning with planting liners in October. After initial overwintering, crop maintenance activities are carried out in the summer, and 25% of the crop is assumed sold in a small fall harvest. Winter maintenance activities occur during the cool months, and harvest is completed the next March. As an example, Azalea budgets began in October 2007 and finish with harvest activities in 2009. Exceptions to this were Fig, Lantana and Liriope, which had production cycles within a calendar year, and most other budgets had similar production cycles.

Irrigation: Overhead irrigation is the standard water delivery system for small containers (7 gallons or less) in commercial ornamental production, and a water well was assumed as the source. Custom installation of the irrigation system, including service to the field and layout in the field, was assumed at a cost of about \$5,150 per acre, and with a cost per acre inch of about \$3.92. Water requirements were estimated at 178 acre inches per acre annually. We assumed that azalea liners were purchased at \$0.50, with some variation for other plants. Transplanting was in a central location and was assisted by a 2 cubic yard capacity mixing machine and a potting machine with capacity of 3,000 containers per hour, but we assumed that growers could consistently achieve a rate of only 2,250 containers per hour. After potting, cans were moved to the growing area by wagon. The team at the potting machine location loaded cans onto the wagon. After being moved to the field, a crew unloaded the wagons into a 'can-tight' arrangement on the bed.

Maintenance: Regular applications of herbicide were applied to growing plants, either with a cyclone-style spreader or a spreader mounted on a utility vehicle. Recommended application rates per acre and number of applications per year were made to control expected problems. Disease and insect control were handled similarly. Controlled-release fertilizers, intended to provide typical nutrient requirements, were included at two points – in the growing medium before potting, and in the field applied directly to pots on a schedule determined by the expected slow-release specifications of the product.

Frost protection: This activity is not always needed but was included in the budget. We assumed that frost protection blankets product were used. This product was expected to last 3 years. We include a frost protection activity as moving the blankets to the field, covering the crop, and removing the blankets when appropriate. Another activity uncovered the crop and moved the blankets back to storage.

Harvest: This was essentially the reverse process of taking plants to the field – at harvest, plants were picked up, placed on the conveyor, loaded onto wagons, hauled back to the central location, and stationed to be accessible to the loading dock. The final activity in the budget is loading onto the equipment that will haul the product away from the nursery, which we assumed to be 40' trailers.

Results and Discussion: A summary of results by crop and container size is presented in Table 1. Most differences were in the pace of work and length of the production period. The 1 gallon Azalea probably is the most commonly produced single plant in these hardiness zones. Given our assumptions, production costs were \$1.73, but increased to \$1.82 if a 5% loss was assumed. Costs per unit of the other plants are included in Table 1.

Larger container plants had higher costs on a total and unit cost basis than smaller container plants. Lantana and Liriope had lowest cost because production was in a single growing season, and somewhat less intensive use of protection products was needed.

COP budgets often include detailed information about what production activities consist of and the machine and labor costs of those activities. Space did not permit those tables to be presented in this paper, but a publication is available that provides a thorough presentation of the outcome of the calculations (Hinson et al. 2008).

Considering other situations budgeted, the 3 gallon size plants – Azalea, Crape Myrtle and Fig – had production periods similar to the 1 gallon azalea. However, multiple liners usually were planted in each container, and the planting, moving to production beds, and harvest activities were slower, leading to higher costs. The 7 gallon Live Oak tree had highest cost among these budgets. To produce this product in the specified time frame, the 1 gallon plant was used as the liner, and hand-planting was required because the potting machine did not have the capability to handle containers of this size.

In conclusion, these cost estimates provide production cost information, and a reference point for growers to compare the efficiency of their own operations to a standard, as a management tool to help enhance the competitiveness of the nursery operation.

Table 1. Summary of Estimated Costs for Selected Container-grown Ornamental Plants.

Crop\cost item	Production cost (\$/Acre)	Harvest cost (\$/Acre)	Total cost (\$/Acre)	Cost /plant (\$)	Cost @ 5% loss (\$/plant)
Azalea, 1 gallon	44,695	7,178	51,873	1.73	1.82
Azalea, 3 gallon	56,569	5,683	62,252	4.61	4.84
Crape Myrtle, 3 gallon	47,717	5,721	53,438	3.96	4.16
Live Oak, 7 gallon	39,918	5,318	45,236	6.46	6.79
Fig, 3 gallon	na	na	41,333	3.06	3.21
Lantana, 1 gallon	na	na	41,453	1.38	1.45
Liriope, 1 gallon	na	na	37,103	1.24	1.30

Literature Cited

1. Badenhop, M. 1979. Factors Affecting Southern Regional Production Advantages for Kurume Azaleas. Southern Regional Cooperative Series Bulletin 241, Tn. Agricultural Experiment Station, Knoxville, TN.
2. Badenhop, M. and T. Phillips. 1983. Costs of Producing and Marketing Container-Grown Woody Landscape Plants: Pfitzer Juniper. Southern Regional Cooperative Series Bulletin 299, Tenn. Agricultural Experiment Station, Knoxville.
3. Hall, C., A. Hodges and J. Haydu. 2005. Economic Impact of the Green Industry in the United States. University of Tennessee Agricultural Extension Service, Knoxville. www.utextension.utk.edu/hbin/greenimpact.html.
4. Hinson, R., A. Owings, J. Black and R. Harkess. 2008. Enterprise Budgets for Ornamental Crops in Plant Hardiness Zones 8 and 9. Working Paper, Department of Agricultural Economics and Agribusiness, LSU AgCenter, Baton Rouge.
5. Perry, F., T. Phillips, L. Wilson and J. Adrian. 1990. Establishment and Operation of 20 and 40-Acre Container Nurseries in Climatic Zone 9. Southern Regional Cooperative Series Bulletin 341, Alabama Agricultural Experiment Station, Auburn, AL.
6. Salassi, M. and M. Diliberto. 2008. Projected Costs And Returns - Rice, Louisiana, Soybeans, Wheat, Sorghum, Southwest Louisiana, 2008. LSU AgCenter, Department of Agricultural Economics and Agribusiness, A.E.A. Information Series No. 252, 2008.
7. Taylor, R., H. Kneen, E. Smith, D. Hahn and S. Uchida. 1986. Costs of Establishing and Operating Field Nurseries by Size of Firm and Species of Plant in USDA Hardiness Zones 5 and 6. Ohio Agricultural Research and Development Center, Research Bul. 1177.

Employee Wages and Benefits in the Florida Landscape Industry

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Significance to the Industry

The landscape services industry in the United States has rapidly grown due to the expansion in residential housing and commercial development, and increasing use of professional lawn and garden maintenance services. Growth in the industry has been particularly strong in Florida, where sales of landscape services in Florida grew from \$3.2 billion in 1997 to \$5.3 billion in 2005, representing average annual growth of 6.5 percent in inflation adjusted terms (Hodges and Haydu, 2006).

The landscape industry is facing a variety of challenging labor issues. Because of the labor-intensive nature of landscaping, employee compensation and benefits represent the dominant cost of business. Many industry employees are currently not covered by private health insurance. Increasingly stringent worker protection standards regarding safety equipment and pesticide handling are an increasing concern for employers. In some areas, it is becoming increasingly difficult to find qualified employees. Anecdotal reports suggest that a large share of employees in the industry are illegal or undocumented immigrants. Proposals to reform the immigration and border control system in the U.S. may have profound impacts on the nursery and landscape industries.

According to official data for Florida, there were nearly 92,000 jobs in specific landscape service occupations in 2006, with average hourly wages ranging from \$10.52 to over \$14, while earnings for experienced employees were about \$12 to \$16 (Florida Department of Labor). In a 2004 survey of 48 Florida companies, mainly landscape contractors, the average entry level wage for laborers was \$7.13 per hour, and the average wage for experienced laborer employees was \$10.21 (FNGLA). Benefits such as health insurance were provided by 53 percent of employers, along with paid holidays (88%), disability insurance (3%), retirement plans (40%), and education (40%). A national survey of readers of *Lawn and Landscape* magazine in 2004 found an average hourly rate of \$8.00 for entry level mower-operators, \$9.40 for lawn care technicians, and \$8.80 for landscape construction workers. A common problem with earlier wage and benefit studies was the small survey sample, which rendered the results statistically unreliable.

Nature of Work

This study was undertaken to document current compensation levels, benefits and employment practices prevailing in the landscape industry in Florida through a survey of a random sample of landscape firms in Florida selected from the *OneSource*

business directory. The survey questionnaire was developed in consultation with FNGLA Landscape Division Leaders. Some 16 specific positions common in the landscape industry were identified, and for each position respondents were asked to indicate the average hourly wage or annual salary, both for entry level and experienced employees. The data for hourly wages were converted to annual fulltime equivalent salaries (2000 hours per year). Information was also collected on the benefits provided for each position, including health insurance (medical, dental, or drug coverage), life/disability insurance, bonuses, paid leave (sick, vacation, family, or Federal holidays), retirement pension, education/training/certification, uniforms, personal vehicle/telephone. In addition, information was collected on total employment, annual sales volume (specified, or selected range), share of business from major types of landscape services (design/build, installation, maintenance, other), educational attainment and professional certifications held by employees, and various employee policies and practices.

The survey was conducted by telephone interviews during May through July, 2007. Interviews were completed with a total of 208 firms, of which the principal activity was landscape maintenance (51%), landscape installation (23%), design/build (8%), or other activity (18%). In terms of business size, 5 percent of respondent firms had annual sales volume of \$10 million or more, 5 percent had \$2 to \$9.9 million, 14 percent had \$500 thousand to \$1.9 million, 71 percent were less than \$500 thousand, and 5 percent did not report sales. Some 26 percent of firms had 10 or more employees, and 2 percent had 100 or more employees.

Results

Employment reported by survey respondents totaled 2,608 employees, including fulltime (81%), part-time (8%), and temporary or seasonal (11%) workers. Laborers represented over 51 percent of all employees, followed by equipment operator (10%) foreman/supervisor (8%), horticultural/irrigation technician (7%), president/CEO/owner (5%), estimator (3%), accountant/clerk (3%), and other unspecified employees (4%). Other specialized positions reported in lesser numbers were office manager (1.2%), mechanic (1.3%), landscape designer (1.2%), project manager (1.1%), purchasing agent (1.2%), vice-president/CFO/COO (1.0%), sales manager (0.5%), and landscape architect (0.2%).

Average annual equivalent salaries are summarized by position in Figure 1. The average annual equivalent salary was \$20,148 for laborer, \$29,644 for horticultural/irrigation technician, \$27,180 for equipment operator, \$28,321 for mechanic, \$32,018 for foreman/supervisor, \$37,635 for estimator, \$31,655 for purchasing agent, \$25,517 for accountant/clerk, \$42,867 for landscape designer, \$50,143 for landscape architect, \$37,743 for salesperson, \$37,077 for sales manager, \$49,142 for project manager, \$32,393 for office manager, \$48,390 for president/CEO/owner, \$52,189 for vice-president/CFO/COO, and \$34,625 for other unspecified employees.

The overall average hourly wage was \$9.90 for laborers, and \$12.60 for experienced workers, which was very close to the median wages reported by Florida Department of Labor. The average annual equivalent salary for entry-level laborers was

\$17,046, and the average for experienced workers was \$25,381. For other positions that were predominantly reported as hourly employees, wages averaged \$14.60 for horticultural/irrigation technician, \$13.10 for equipment operator, \$14.30 for mechanic, and \$14.80 for foreman/supervisor.

As an indication of variability in salaries, the relative standard error (ratio of the standard error to the mean) ranged from less than 2 percent for laborers, and other common positions, to over 15 percent for some other senior technical or managerial positions. A maximum annual salary of \$100,000 or higher was reported for equipment operator, estimator, landscape designer, landscape architect, sales manager, president/CEO/owner, and vice-president/CFO/COO.

Benefits provided to employees varied widely across companies and positions, with the lowest level of benefits for typically unskilled positions. For laborers, health insurance was received by 22 percent of employees, life/disability insurance by 19 percent, bonuses by 49 percent, paid leave by 81 percent, retirement by 17 percent, education or training by 28 percent, uniforms by 80 percent, personal vehicle or phone by 32 percent, and miscellaneous other unspecified benefits by 12 percent (Figure 2). Some 19 percent of employers provided none of these benefits to laborers, however, only 3 percent of employees received none of these benefits. For the position of horticultural technician, typically having some training or higher skilled level, benefits were generally provided more frequently.

The key benefit of health insurance was provided by 14 to 40 percent of employers surveyed, depending upon position, while the share of employees covered by this benefit ranged from 22 to 58 percent. Over half of employees in the positions of estimator and horticultural technician received this benefit. The average share of health insurance premiums paid by employers was 32 percent, and this was similar across firm size groups, but was somewhat higher (46%) for design/build firms. Life/disability insurance was provided by 9 to 34 percent of employers depending upon position, and covering 10 to 39 percent of employees. Employee bonuses can be considered a primary form of incentive pay, and were a much more common benefit, provided by 27 to 63 percent of firms, and received by 36 to 85 percent of employees, with more than 70 percent employees receiving this benefit in the positions of horticultural technician, equipment operator, and foreman/supervisor. Paid leave was provided by 31 to 66 percent of employers, and received by over half of employees in all positions, and by over 80 percent of laborers, horticultural technicians, and foreman/supervisors.

Education and skills held by employees are critical to their productivity, and affect compensation and benefits provided. An average of 8.4 percent of all industry employees were reported to have college degrees, however, it ranged as high as 13 percent for large firms, and 13 percent for landscape installation companies, and as low as 3.8 percent for landscape maintenance firms. Surprisingly, design/build firms had a lower share of college-educated employees (8.7%). The most commonly held certification was licensed pesticide applicator, followed by FNGLA Professional. Certifications from other professional organizations held by smaller numbers of employees included the Irrigation Association, International Society of Arborists, Professional Landcare Network, and Landscape Maintenance Association. A small number of design employees were registered Landscape Architects or certified by the Association of Professional Landscape Designers.

Another question asked in this survey was “what percentage of your workforce are not native-born U.S. citizens?” Although respondents may not be able to answer this question completely honestly, the results indicate that at least 42 percent of employees in the Florida landscape industry may be foreign-born. The share of foreign-born employees was much higher for very large firms (71%), and marginally higher for large firms (53%) and firms doing landscape installation (57%).

Employee policies and procedures used by surveyed firms included written job descriptions (34% of firms), formal process for employee review (40%), employee policy manual (36%), and a safety program (61%), while 32 percent of respondents did not have any of these policies/procedures. In general, these employee policies and procedures were more common for medium to very large firms, and for design/build or installation firms.

Discussion and Conclusions

This study showed that compensation paid to employees in the Florida landscape industry was generally higher than previously reported in Florida and nationally. Average wages for laborers were about 28 percent higher than 2004, in constant dollar terms (GDP Implicit Price Deflator), so it appears that growth in wages has outpaced inflation. The landscape industry is generally not affected by the recent increase in the state of Florida minimum wage to \$6.67 per hour, since virtually all employees were well above this level. Wages were also significantly higher than previously reported for experienced laborers and for other hourly positions such as horticultural/irrigation technician and equipment operator, as well as for positions that are typically salaried, such as project manager and landscape designer. Compensation differed dramatically across occupations (positions), reflecting difference in skills and experience, however, the difference in annual compensation between the lowest and highest paid employees was only a factor of 2 to 3, in contrast to many other industries where the difference may be 10 fold or more.

Some benefits have been adopted nearly universally in the industry, such as paid leave, bonuses, and uniforms, while other benefits are available to a majority of experienced employees, including health insurance, education/training, personal vehicle or phone, and health insurance. The benefits of life/disability insurance and retirement are offered to relatively few employees. A small percentage of firms (12%) provided no benefits. Among those companies that provided health insurance, the share of premiums paid by employers (32%) was likely lower than most other industries.

In regard to employee policies, a chief concern was for safety, with a majority (61%) of firms reported having an established employee safety program. On the other hand, less than half of companies had established procedures for employee performance review (40%), had an employee policy manual (36%), or had written job descriptions (34%). Of concern is the substantial share of firms (32%) that followed none of these standard policies or practices. The share of firms that had written job descriptions is about the same as in the previous FNGLA study in 2004 (34% vs. 38%), while the share that have an employee manual appears to have declined.

A surprisingly low share of employees (8%) held college degrees, which would suggest there may be a need to promote higher education to achieve more professional management.

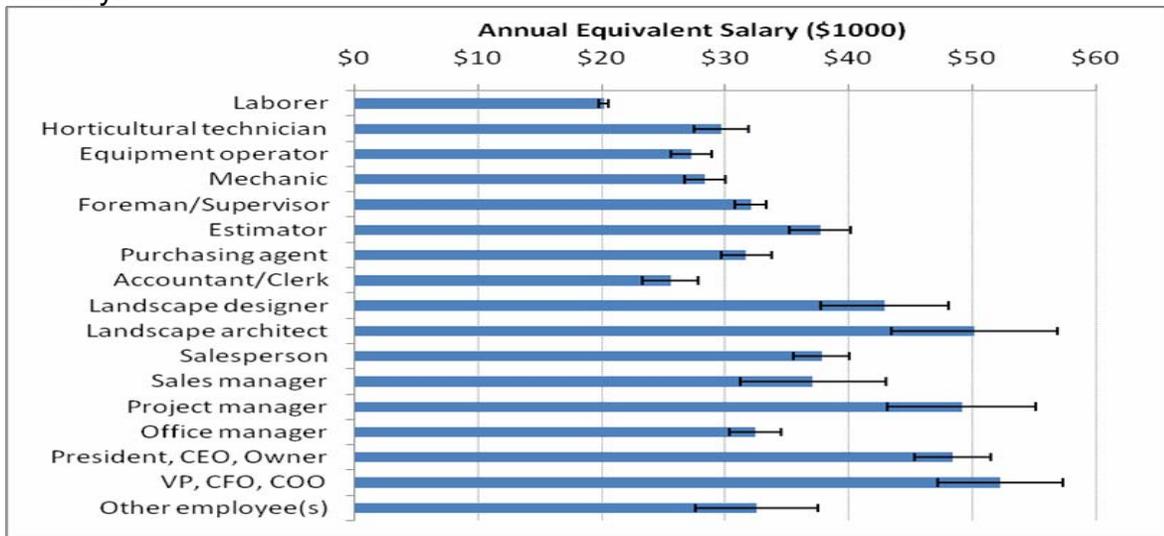
This study confirmed that a substantial share of the workforce in the Florida landscape industry (42%) is non-native born U.S. citizens, however, this is less than some have suggested anecdotally. Many survey respondents stated that it is difficult to find workers in this industry, qualified or otherwise, who are willing to accept the demanding physical labor.

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Literature and Information Sources Cited

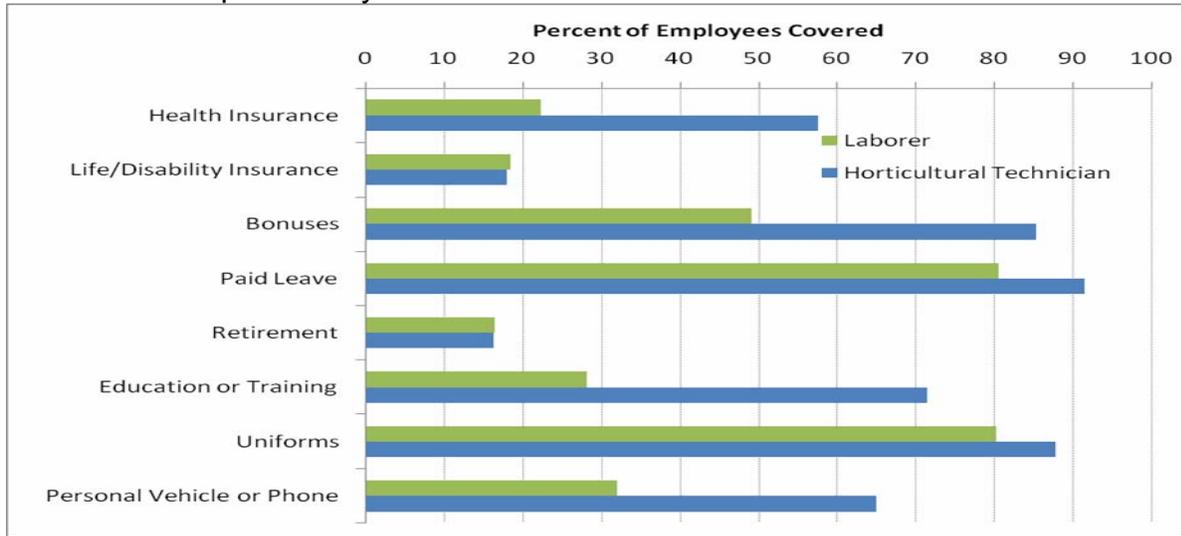
1. Anon. Landscaping in the New Economy: 2004 State of the Industry Report. *Lawn and Landscape Magazine*.
2. Florida Department of Labor, Quarterly Census of Employment and Wages, available at <http://www.labormarketinfo.com/library/qcew.htm>.
3. Hodges, A.W. and J.J. Haydu. Economic Impact of the Florida Environmental Horticulture Industry in 2005. By Final project report to Florida Nursery, Growers and Landscape Association, 40 pages, September 2006, available at <http://www.economicimpact.ifas.ufl.edu>.
4. John Deere Landscapes. Wage and Compensation Report. *Lawn and Landscape Magazine*, 2003. Sponsored supplement.

Figure 1. Average annual equivalent salaries, by position in the Florida landscape industry.



Note: bars indicate standard errors.

Figure 2. Incidence of benefits provided for laborers and horticultural technicians in the Florida landscape industry.



Regional Marketing Practices in the U.S. Nursery Industry

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Index words: marketing practices, nursery, regional, survey

Significance to the Nursery Industry: The nursery industry is a large and significant component of production agriculture. While the USDA annually surveys nurseries in only 15 states to generate production data, there is no regional information comparing and contrasting marketing practices. The *National Nursery Survey* was conducted four times at five year intervals in 1988, 1993, 1998, and 2003 by the Green Industry Research Consortium to supplement USDA information. This paper presents results from the 2003 survey comparing advertising and product outlets used by 2485 nurseries from eight geographic regions. Analysis shows variability in the retail outlets supplied, their relative importance, and methods of advertising used. Results may be of value to allied industries which supply nurseries to gain a better understanding of the regional variability. It also provides useful insight to markets served by nurseries in distinct geographic regions.

Nature of work:

Production of nursery crops, comprised mainly of plants with woody stems, is substantial in terms of direct and indirect economic impacts (Hall et. al, 2006). The 2006 gross value of sales for twelve categories of nursery plants totaled \$4.65 billion, up 40% from \$3.32 billion in 2000 (USDA, 2007) yielding 6.6% annual growth. There were 7,292 nursery operations, up from 6,535 businesses (12%) from six years earlier. While the USDA annually surveys nurseries in 15 states to generate national production data, there is no regional information comparing and contrasting marketing practices. Our objective was to compare and contrast the selected marketing practices of U.S. commercial nurseries to determine differences among regions.

The *National Nursery Survey* was conducted four times at five year intervals in 1988, 1993, 1998, and 2003 by the Green Industry Research Consortium (USDA S-1021 multi-state committee on economics and marketing of horticultural products). Mail surveys were used to collect information on selected production and marketing practices, such as distribution channels, interstate and international shipments, advertising expenditures, selling methods, and other information. The goal of these surveys was to help fill the void of publicly available information on management characteristics of the nursery and greenhouse industry, and to provide information useful to growers, allied industry professionals, extension personnel and researchers. Results of the *National Nursery Surveys* were reported by Brooker et al., (1990, 1995, 2000, 2005). For the first time, the *National Nursery Survey* in 2003 was conducted using a standard sampling methodology, with a total of 44 states participating, giving unprecedented coverage for the survey.

Methods:

Questions on the *National Nursery Survey* evolved over time, reflecting changes in the industry. For example, questions about market channels were revised to capture sales made to mass-merchandise or chain stores, home centers, multiple-location garden centers, and re-wholesalers. A listing of over 38,000 U.S. nursery firms in 44 states was obtained from state trade associations and phytosanitary regulatory agencies. The only states not surveyed were Alaska, Alabama, Arkansas, Wisconsin, Kansas and Maryland, which declined to participate for various reasons. Firms on the list were stratified in four size classes based on production area or inventory of plants. A sample of 15,588 firms was selected from the population to receive the survey, including 100% of the large firms (20 or more acres production area), a random selection of 60% of the medium-sized (5-19 acres) and small-sized (1-4 acres) firms, and 40% of firms of undetermined size.

Results:

A total of 2,485 usable questionnaires were returned, representing an overall response rate of 15.9%. The largest number of firms was in the Southeast (584), followed by the Northeast (534), Midwest (418), Pacific (316), Appalachian (302), and South central (169) regions, and a comparably small number of firms were in the Mountain (106) and Great Plains (56) regions.

Firms sold plants through a variety of outlets. Mean sales to landscape companies accounted for the greatest percentage of wholesale sales, except for nurseries in the Pacific region (Table 1). Nurseries in the Midwest (41.2%) had the highest mean percentage of sales to landscape companies, similar to nurseries in the Mountain (36.1%), Southeast (33.7%), and Appalachian (32.3%) regions. A lower mean percentage of sales to landscape companies were made from nurseries in the South central (24.9%) region, which was similar to those in the Appalachian and Great Plains regions. Generally, the second largest customer was re-wholesalers. Nurseries in the Pacific (30.1%) and Southeast (30.0%) had the highest percentage of sales to re-wholesalers while nurseries in the Mountain (10.3%), Midwest (15.2%), and Northeast (15.9%) had the lowest mean percentage of sales to re-wholesalers. Garden centers with one location were generally the third largest nursery customer. Nurseries in the Northeast and Great Plains had the highest sales to single location garden centers. Nurseries in the Midwest and Southeast had the lowest sales to single location garden centers, similar to nurseries in other parts of the country. Generally, sales to mass-merchants accounted for < 10% of sales. Nurseries in the Pacific region had the highest percentage of sales to mass-merchants while nurseries in the Midwest and Great Plains had the lowest sales. Sales to multiple-location garden centers and home centers account for \leq 5.2% of sales. Nurseries in the South Central region had highest sales to multiple-location garden centers.

There was tremendous variability in the mean percentage of sales spent on various forms of advertising (Table 2). One exception was the percentage of sales allocated to gardening publications, which had the lowest mean percentage of sales allocated to it and did not vary by geographic region. Billboard advertising expenditures were also very low, but did vary by region, with the lowest mean percentage of total sales in the Southeast region (0.8 %) and the highest in the Great Plains (2.40%).

Website advertising received the next highest mean percentage of total sales, with the least amount spent in the Great Plains (2.10) and the most spent in the Pacific region (6.82). Pacific region nurseries may be more distant from their markets and find Internet advertising cost-effective. The mean percent of total sales spent on newsletter advertising was similarly low in every region except the Great Plains (13.04). Catalog advertising varied from a low in the Southeast (4.0) and Great Plains (7.85) to a high of 15.4% in the Midwest. Radio and television advertising varied from a low of 1.05% in the Pacific region to a high of 10.85% in the Great Plains.

Conclusions:

Nurseries in the Southcentral region sold a majority of product to landscapers (46.7%) and re-wholesalers (21.8%), relatively high among regions. Primary methods of advertising were trade journals (13.5%), relatively high compared to many other regions, and yellow pages (6.22%), relatively low. Nurseries in the Southeast region had relatively high sales to landscape firms (33.7%), and re-wholesale firms (30.0%), which was the highest among regions. Primary advertising methods were trade journals (14.1%), relatively high among regions, and catalog print or CD (7.0%), relatively low among regions. The Pacific region nurseries sold the highest percentage of plants to re-wholesalers and had the highest percentage of website and trade journal advertising compared to nurseries in other regions. Nurseries in the Great Plains region sold the highest mean percentage of plants to single-location garden centers and advertised more than nurseries in most other regions through printed catalogs or cds.

Marketing practices of commercial nurseries do vary by geographic region. These findings on regional differences are important because they may help industry managers with strategic planning and marketing decisions that move them towards a competitive advantage. Nurseries can examine their business practices vis-à-vis competitors in other regions to decide which methods are working best and where opportunities may exist for future growth or change.

Literature Cited

1. Brooker, John R. and Steven C. Turner. 1990. Trade Flows and Marketing Practices within the U.S. Nursery Industry. Southern Coop. Series Bulletin 358, Univ. of Tenn. Ag. Exp. Sta., Oct.
2. Brooker, John R., Steven C. Turner, and Roger A. Hinson. 1995. Trade Flows and Marketing Practices within the U.S. Nursery Industry: 1993. Southern Coop. Series Bull. 384, Univ. of Tenn. Ag. Expt. Sta.
3. Brooker, John R., Roger A. Hinson, and Steven C. Turner. 2000. Trade Flows and Marketing Practices within the U.S. Nursery Industry: 1998. Southern Coop. Series Bull. 397, Univ. of Tenn. Ag. Exp. Sta.
4. Brooker, John R., David Eastwood, Charles Hall, Kirk Morris, Alan Hodges and John Haydu. 2005. Trade Flows and Marketing Practices within the U.S. Nursery Industry: 2003. Southern Coop. Series Bull. 404, Univ. of Tenn. Ag. Expt. Sta. Available at <http://economics.ag.utk.edu/pub/crops/SCB404.pdf>.

5. Hall, Charles R., Alan W. Hodges and John J. Haydu. 2006. The Economic Impacts of the Green Industry in the U.S. HortTechnology 16(2): 345-353.
6. USDA. National Ag Statistics Service. 2007. Nursery Crops Summary. <http://usda.mannlib.cornell.edu/usda/current/NursProd/NursProd-09-26-2007.pdf>. Accessed 11 April 2008.

Table 1. Mean percentage of sales to five types of outlets in eight regions of the U.S. for 2485 production nurseries.

Region	Outlet Type					Re-wholesaler
	Garden Center 1 location	Garden Center >1 location	Home Center	Mass- Merchant	Landscape	
Appalachian	16.3 ab	4.1 ab	3.5 a	5.3 bcd	32.3 abc	21.8 b
Great Plains	18.9 b	1.8 a	1.7 a	1.4 a	30.4 ab	18.8 b
Midwest	11.4 a	2.6 a	0.6 a	1.1 a	41.2 c	15.2 ab
Mountain	14.6 ab	2.2 a	1.4 a	6.7 cd	36.1 bc	10.3 a
Northeast	20.2b	2.9 ab	2.0a	1.9 ab	30.9 ab	15.9 ab
Pacific	15.3 ab	4.4 ab	3.5a	8.5 d	15.4 d	30.1 c
Southcentral	13.8 ab	5.2 b	2.3 a	5.7 bcd	24.9 a	21.8 b
Southeast	11.2 a	2.5 a	3.0 a	3.5 abc	33.7 c	30.0 c

* regions followed by the same letter are statistically similar using Duncan's multiple range test.

Table 2. Mean percentage of total sales spent on nine advertising forms by 2485 nurseries in eight regions of the U.S.

Region	Advertising Form							
	Billboard	Catalog print or cd	Gardening publication	Newsletters	Radio or tv	Trade journals	Websites	Yellow pages
Appalachian	1.46 ab	15.1 a	2.38 a	5.05 a	3.37 ab	14.52 b	5.84 ab	9.09 abc
Great Plains	2.40 b	7.8 b	2.00 a	13.04 b	10.85 c	6.04 a	2.10 a	13.04 a
Midwest	1.63 ab	15.4 a	1.26 a	6.73 a	5.67 b	4.98 a	4.10 ab	12.11 ac
Mountain	0.42 ab	14.8 a	1.59 a	4.99 a	10.74 c	6.65 a	6.08 ab	13.48 a
Northeast	1.08 ab	14.6 a	3.90 a	6.55 a	3.44 ab	5.14 a	4.95 ab	7.09 bc
Pacific	0.53 ab	12.0 ab	2.93 a	7.47 a	1.05 a	10.60 ab	6.82 b	6.25 b
South Central	0.90 ab	9.3 ab	3.62 a	3.99 a	5.20 b	13.54 b	4.56 ab	12.39 ac
Southeast	0.08 a	7.0 b	3.53 a	4.84 a	1.74 a	14.13 b	5.78 ab	6.22 b

* regions followed by the same letter are statistically similar using Duncan's multiple range test.

What Does “Sustainable” Mean to the Consumer Purchasing a Plant?

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Key Index Words: sustainable, consumer perspective, labeling, branding

Nature of Work: A hot buzzword in the nursery industry these days is “sustainable.” Hardly ever does a conference for the nursery and greenhouse industry have a large portion of the program focused on sustainability and sustainable production. However, such attention on the grower-level loses sight of who the industry is about – the consumer. Marketing is about growing what the consumer needs and wants, not about selling what the grower has. So with that in mind, what does “sustainable” mean to the consumer purchasing a plant? Does the term sustainable influence their buying decision? If the plant material is labeled or branded as being sustainable, does that concept mean the same thing to the consumer as to the grower?

Consumer surveys were conducted at eleven independent garden centers in central and north Georgia during the spring 2008 planting season (Easter – Mothers’ Day) for annuals and herbaceous perennials. Thirty undergraduate marketing students in agricultural and applied economics conducted 438 surveys on the weekends of March 15 through May 10, 2008, with the garden centers’ or nurseries’ permission, as part of an out-of-class assignment. The questionnaire instrument asked word-association and completely unstructured open-ended questions as well as importance, rating, intention-to-buy, and Likert scale closed-end questions to determine what the customer perceives when the term “sustainable” is used in conjunction with plant materials.

Results and Discussion: The students met each potential survey respondent with a brief introduction of themselves and why they wanted to get some thoughts and opinions about consumer perceptions on “sustainable plant materials,” showing the customers labels, brands, and literature that cited the term “sustainable.” With the customer’s attention, the following questions were posed.

What are the words, thoughts, or phrases that come to your mind when you hear the term “sustainable”?

“Green” – 68%

“Locally produced/sourced, or home-grown” – 64%

“Organic” – 63%

“Reduced greenhouse gases” – 59%

“Eco- or environmentally-friendly” – 57%

“Expensive or pricey” – 53%

“Socially responsible” – 45%

“Global warming” – 43%

- “Energy savings, efficiency, or conservation” – 35%
- “Lower carbon footprint” – 31%
- “Sales or marketing gimmick” – 27%
- “Certified/certification” – 16%
- “Best management practices” – 13%
- “Biodegradable or recycling” – 11%
- “Other” – 9%
- “No opinion” – 6%

What is your opinion of plant material being labeled “sustainable”? (sample responses)

- Aren't all plants sustainable?
- Sustainable doesn't influence my choice of plants purchased.
- Have never observed sustainable and non-sustainable plants side-by-side to see if any differences.
- A “gee-whiz, nice-to-know” tidbit of information.
- What is the universal definition of sustainable that provides an observable result to the purchase?

A “sustainable” label on environmental horticulture products to me is:

Extremely important	Very important	Somewhat important	Not Very important	Not at all important
1	2	3 <u>3.18</u>	4	5

Plants labeled “sustainable” are generally better plants than those without the label.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3 <u>3.06</u>	4	5

The production and marketing concept of sustainability is a(n) _____ practice.

Excellent	Very Good	Good	Fair	Poor
1	2 <u>2.19</u>	3	4	5

If a “sustainable” label was provided as “point-of-sale” information, I would _____ the plant.

Definitely buy	Probably buy	Not sure	Probably not buy	Definitely not buy
1	<u>1.89</u> 2	3	4	5

Significance to Industry: Considerable educational efforts have been directed toward growers understanding, applying, and succeeding with sustainability. Topics have included sustainable products, using energy efficiently, understanding standards and green certifications, living soils and crop nutrition, training employees to think and sell sustainability, and common sense strategies for sustainability. Production practices are shown to be more important to being sustainable than are the outputs of the production practices. However, minimal if any attention has been paid to the consumer of environmental horticulture. The question has been posed, “Is sustainability really a

consumer trend?” Unfortunately, there has been hearsay and only anecdotal evidence provided to support the contention that the consumer even cares when it comes to ornamental plants and floriculture. This is not to imply that consumers do not care about sustainability with respect to most food and fiber products as well as major capital purchases.

The responses to the questionnaire posed by undergraduate marketing students in Georgia suggest that the consumers are confused and bewildered as to what sustainability in the environmental horticulture industry really should mean to them. Apathy is not a legitimate evaluation of the consumers’ perspective on sustainable – nearly all cited an opinion on the topic; there just is not a consensus. Consequently, educational efforts (articles, interviews, demonstrations, reports, discussions, etc.) should be geared up for the consumer to complement the training, workshops, and seminars being given to the growers.

Literature Cited:

1. Kotler, Philip and Kevin Lane Keller. *Marketing Management* (13th edition). 2009. Pearson-Prentice Hall Publishers.

Consumer Preferences for Orchids

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Index words: Consumer preferences, orchids, attributes, conjoint analysis

Significance to the Industry

In the last decade, the wholesale value of potted orchids has risen 80% to \$126 million in 2007. However, the information concerning consumer and market demand is still limited. The objective of this study was to identify consumer preferences and the relative importance for different orchid attributes, including species, price, size and color, by developing a conjoint analysis experiment to analyze consumer preference for orchid attributes. A survey of orchid market preference was conducted at Akazuka orchid garden in Big Island, Hawaii during 15 Mar to 15 Apr 2008. Hawaii is the third largest orchid consuming state, with sales of \$16.8 million in 2007. Most consumers (42.2%) were not familiar with orchids, which suggest that Hawaii orchid industry needs more marketing support. Conjoint analysis revealed that price (30.90%) was the most important factor in the purchasing decision, followed by size (26.28%) and species (25.58%); while color (17.23%) was the least important orchid attribute.

Nature of Work

A survey was conducted at Akazuka orchid garden in Big Island, Hawaii during 15 Mar to 15 Apr 2008. Akazuka orchid garden is a popular orchid retailer in Hawaii; they provide all kinds of orchids year-round. Big Island county accounted for 65 percent of the State's total wholesale value for orchids in 2006 (Hawaii Flowers & Nursery Products Annual Summary). A conjoint analysis experiment was included in the survey to determine the importance of various attributes and attribute levels that influence consumers' purchasing decisions, including pot size, price, color, and species. Conjoint analysis is a popular technique for marketing research that allows researchers to distinguish the relative importance of each key attribute of the product's features simultaneously. It is also useful to adjust marketing strategies for designing products by using the analysis results of consumer preferences.

Table 1. Orchids Product Profiles Rated by Respondents

	<u>Size</u>	<u>Price</u>	<u>Color</u>	<u>Species</u>
1.	Small (4")	\$8.00/pot	Single-color	Phalaenopsis
2.	Medium (5")	\$16.00/pot	Single-color	Phalaenopsis
3.	Large (6")	\$24.00/pot	Multi-color	Phalaenopsis
4.	Medium (5")	\$8.00/pot	Multi-color	Dendrobium
5.	Large (6")	\$16.00/pot	Single-color	Dendrobium
6.	Small (4")	\$24.00/pot	Single-color	Dendrobium
7.	Large (6")	\$8.00/pot	Single-color	Others
8.	Small (4")	\$16.00/pot	Multi-color	Others
9.	Medium (5")	\$24.00/pot	Single-color	Others
10.*	Medium (5")	\$16.00/pot	Single-color	Phalaenopsis

* Holdout product not included in conjoint analysis estimated model

The two-limit tobit regression model is specified as:

$$Rating_i^* = \beta_0 + \beta_1 SizeM + \beta_2 SizeL + \beta_3 Colormulti + \beta_4 Spph + \beta_5 Spden + \beta_6 Price + \varepsilon_i$$

Results

The parameters estimates of the conjoint analysis model are presented in Table 2, all variables were significant except pot size, suggesting that this product feature does not statistically influence consumer's utility for a product.

Table 2. Parameter Estimates of Conjoint Analysis Model

<u>Variable</u>	<u>Coefficient</u>	<u>Standard Error</u>	<u>t-value</u> ¹
Intercept	7.30	0.49	15.03*
SizeM	0.26	0.26	1.02
SizeL	0.38	0.26	1.47
Colormulti	0.33	0.19	1.73**
Spph	- 0.54	0.25	- 2.11*
Spden	0.45	0.26	1.75**
Price	- 0.07	0.03	- 2.68*

¹Compared with the mean preference value in a two-tail t test

* Significant at the 0.05 level; ** Significant at the 0.10 level.

The parameters of spph (species Phalaenopsis) and price had negative signs implying that these product features will decrease the utility value. The price coefficient - 0.07 means respondents will reduce the preference rating by 0.07 for every one-dollar increases in price.

Table 3 provides the calculated utility values for each level of each variable. Price is a linear quantitative variable; each level's utility value was calculated by multiplying the values of each level with the price's coefficient. For dummy variables, size, color and species, each level's utility value was just the estimated coefficient. Because marginal effects are evaluated at each observation and averaged over the sample, using marginal effects would lead to the same relative rankings. Overall, orchid species *Dendrobium* showed the relatively higher utility value.

The relative importance for each attribute was also calculated from the estimated parameters, expressing as percentages of overall utility values. In table 5, price (30.90%) was the most important attribute, followed by size (26.28%), species (25.58%), and color (17.23) was relatively unimportant. The first-choice product would be the combination of highest utility values, which is large pot size *Dendrobium* with multicolor at the lowest price (\$8.00/pot). The model predicted a utility value for hold-out product of 6.16, compared with the hold-out product's actual average preference rating of 6.93, with standard deviation of 3.03, suggesting that the model have high efficiency in predicting.

Table 3. Attribute Utility Values and relative importance of Conjoint Analysis Model

<u>Factor</u>	<u>Utility</u>	<u>Relative importance (%)</u>
Base level	7.30	
Size		26.28
Small (4")	-0.64	
Medium (5")	0.26	
Large (6")	0.38	
Color		17.23
Multicolor	0.33	
Single-color	-0.33	
Species		25.58
Phalaenopsis	-0.54	
<i>Dendrobium</i>	0.45	
Others	0.09	
Purchase price		30.90
\$8.00/pot	-0.60	
\$16.00/pot	-1.19	
\$24.00/pot	-1.79	

References

1. Floriculture and Nursery Crops Yearbook. 2007. Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture, Washington D.C.
2. Floriculture Crops 2007 Summary. 2008. National Agricultural Statistics Service, U.S. Department of Agriculture, Washington D.C.
3. Hawaii Flowers & Nursery Products Annual Summary. 2007. National Agricultural Statistics Service, Hawaii Department of Agriculture, Honolulu, Hawaii.

**A Tool to Help Greenhouse Managers Take Control of Their
Greenhouse and Outdoor Costs**

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Index Words: Fuel cost, partial budget, floriculture, profit

Significance to Industry:

Competition in the U.S. greenhouse industry has become fierce. Rising energy costs, domestic competition, off-shore production, a weakening and stressed economy, and the growth of the mass market add-up to collectively produce downward pressure on prices.

How do producers make money with shrinking margins, rising costs, and demanding customers? With so many crops, they often don't know which ones are making money. The first step is to determine their costs.

Nature of Work:

A simple Greenhouse Cost accounting program, developed in Microsoft Excel and distributed by Rutgers University lets producers determine the costs and returns of each crop that they produce. The newest version of this user-friendly cost accounting software program also calculates costs of crops produced outdoors as well as greenhouse crops. The program generates information showing total costs, and net returns per unit. It enables users to easily determine the profitability of each crop. From this information, producers can determine which crops are their winners and losers. This software also will assist producers make decisions on pricing, identifying and reducing unprofitable production costs and increasing sales of profitable crops.

New features of the New Jersey Cost Accounting Program include calculating the percentages of each overhead costs, information from the balance sheet and calculation of key ratios. In addition to analyzing their actual costs, managers can use the program as a planning tool to analyze the impact of increased energy costs and prices as well as changes in marketing mixes, or other changes they are considering in their business. The program also can be used by greenhouse management classes or for extension workshops.

A survey of Northeast greenhouse growers found an average size to be 138,759 square feet with sales of \$2.2 million and net returns of \$211,152 or 9.5% (Tables 1 and 2).

Since 2003, fuel oil has tripled. The cost accounting program allows producers to make changes in the data to see how it affects net returns and financial ratios. Inflating fuel prices to 2008 levels and keeping other costs and prices the same, net losses are \$27,788 or -1.7%. Return on assets and return on equity are also negative as a result of fuel increase. Using the program to test “what if” shows that if we take these 2008 costs but inflate prices of crops by 5%, we find that the net returns become positive (Table 3). While the figures in Tables 1 and 2 are actual results of surveys of Northeast growers, Tables 4 and 5 are hypothetical production schedules constructed to match the actual income from the 2003 surveys. The program allows growers to look at “what if.” For example, all crops, both greenhouse and outdoors, are profitable in the 2003 example (Tables 4 and 5). But, when we increase energy costs to the 2008 level, geranium flats and poinsettias become unprofitable. The program gives these results on a per crop, per unit, and per square foot basis. If we then increase prices by 5%, the net return becomes positive (Table 3), but poinsettias are slightly unprofitable, losing \$0.01 per square foot-week.

Summary

With rising fuel costs and competitive markets, managers need to pay close attention to the bottom line and how changes in costs impact it. The Greenhouse Cost Accounting program will allow them to do “what if” planning on paper instead of making bigger, real mistakes in the greenhouse.

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Table 1. Income statement data from a survey of Northeast Greenhouse Growers in 2003 entered into the Rutgers Greenhouse Cost Accounting program.

Values from Income Statement (Schedule F or C)				
	<i>2003 Actual</i>		<i>2008 Fuel Increase</i>	
	\$	% of Sales	\$	% of Sales
Sales	\$2,219,560	100	\$2,219,560	100
Directs costs				
Seeds, cuttings, or plants	\$490,863	22.1	\$490,863	22.1
Pots or containers	\$140,984	6.4	\$140,984	6.4
Marketing containers	\$ 38,567	1.7	\$ 38,567	1.7
Growing medium	\$ 4,689	0.2	\$ 4,689	0.2
Fertilizer and chemicals	\$ 43,163	1.9	\$ 43,163	1.9
Tags	\$ 0	0.0	\$ 0	0.0
Sales Commissions	\$ 2,875	0.1	\$ 2,875	0.1
Other	\$ 37,468	1.7	\$ 37,468	1.7
Overhead salaries (including benefits)	\$ 2,895	0.1	\$ 2,895	0.1
General wages (including benefits)	\$729,233	32.9	\$729,233	32.9
Utilities				
Heating fuel/Machinery Fuel	\$ 77,566	3.5	\$232,698	10.5
Electricity	\$ 40,352	1.8	\$ 40,352	1.8
Telephone	\$ 5,894	0.3	\$ 5,894	0.3
Water	\$ 464	0.0	\$ 464	0.0
Overhead				
Depreciation	\$ 92,642	4.2	\$ 92,642	4.2
Interest	\$ 8,080	0.4	\$ 8,080	0.4
Repairs	\$ 43,829	2.0	\$ 43,829	2.0
Taxes	\$ 26,131	1.2	\$ 26,131	1.2
Insurance	\$ 37,546	1.7	\$ 37,546	1.7
Advertising	\$ 11,277	0.5	\$ 11,277	0.5
Dues and subscriptions	\$ 100	0.0	\$ 100	0.0
Travel and entertainment	\$ 7,431	0.3	\$ 7,431	0.3
Office expense	\$ 9,589	0.4	\$ 9,589	0.4
Professional fees	\$ 19,444	0.9	\$ 19,444	0.9
Truck expense and equipment rental	\$ 46,954	2.1	\$140,762	6.3
Land rental	\$ 2,112	0.1	\$ 2,112	0.1
Contributions	\$ 0	0.0	\$ 0	0.0
Bad debts	\$ 0	0.0	\$ 0	0.0
Miscellaneous	\$ 87,956	4.1	\$ 87,956	4.1
Total expenses	\$2,008,104	90.5	\$2,257,044	101.5
Net Returns	\$ 211,152	9.5	(27,788)	-1.7
Greenhouse area (ft ²)	138,759		138,759	
Greenhouse space used for production (%) (e.g., enter 75% as 75, 125% as 125)		82		82
Weeks in operation (52 if a full year)		40		40

Table 2. Balance Sheet data from a survey of Northeast Greenhouse Growers in 2003 entered into the Rutgers Greenhouse Cost Accounting program.

Assets

Current Assets

Cash/Checking/Savings	\$	128,362
Accounts Receivable	\$	86,364
Other Stocks and Certificates	\$	616
Prepaid Expenses	\$	3,707
Other Current Assets	\$	<u>230,753</u>
Total Current Assets	\$	449,802

Long Term Assets

Buildings & Improvements (Owned)	\$	504,180
Machinery and Eq.(Owned)	\$	276,784
Leased Machinery & Eq.	\$	<u>1,335</u>
Total Assets	\$	<u>782,299</u>
Total Long Term Assets	\$	1,232,101

Liabilities

Current Liabilities

Accounts Payable	\$	115,408
Operating Debt	\$	4,013
Other Current Liabilities	\$	<u>123,219</u>
Total current liabilities	\$	242,640

Long Term Liabilities

Leased Structures	\$	1,335
Leased Machinery and Equipment	\$	<u>562</u>
Total long term liabilities	\$	231,306
Total Liabilities	\$	<u>473,946</u>
Net Worth (Owner's Equity)	\$	758,155

Table 3. Ratios using actual 2003 data from Northeast greenhouses, changes to ratios by inflating fuel to 2008 prices, and after inflating to 2008 prices and increasing prices by 5%.

Ratio	Actuals, 2003	Fuel increase, 2008	Fuel increase, 2008, Price increase 5%
Net Income	\$211,152	(\$37,788)	\$73,175
Gross Margin	34.2%	34.2%	32.6%
Profit Margin	9.5%	-1.7%	3.1%
Return on Equity	27.9%	-5.0%	9.7%
Return on Assets	17.1%	-3.1%	5.9%
Financial Efficiency Ratio	86.0%	97.1%	92.5%
Asset Turnover Ratio	180.1%	180.1%	189.1%
Operating Expense Ratio	13.5%	17.8%	17.0%
Depreciation Expense Ratio	4.2%	4.2%	4.0%
Interest Expense Ratio	0.4%	0.4%	0.4%
Current Ratio	1.9	1.9	1.9
Working Capital	\$207,162	\$207,162	\$207,162
Debt/Asset Ratio	38.5%	38.5%	38.5%
Equity/Asset Ratio	61.5%	61.5%	61.5%
Debt/Equity Ratio	62.5%	62.5%	62.5%
Working Capital Ratio	10.3%	9.2%	9.2%
Leverage Factor	1.6	1.6	1.6

Table 4. An example of input section 2, which includes information on specific crops, from the Greenhouse Cost Accounting program.

Input section (2)						
Crops						
	Petunia flats	Marigold flats	Geranium flats	Geraniums (4-inch pots)	Poinsettias (6-inch pots)	Outdoor Cut Flowers (bunches)
Number units started	50,000	50,000	50,000	100,000	126,000	26,136
Square feet per unit	1.64	1.64	1.64	0.11	1.00	1 acre
Weeks to grow	8	6	13	6	15	15
Percent sold	0.98	0.98	0.98	0.95	0.95	0.95
Sales price	\$ 7.93	\$ 7.00	\$ 11.73	\$ 1.20	\$ 5.00	\$4.00

Table 5. An example from the Greenhouse Cost Accounting program of output information per units and per crop using 2003 Northeast cost.

	Crops					
	Petunia Flats	Marigold flats	Geranium flats	Geraniums (4-inch pots)	Poinsettias (6-inch pots)	Outdoor Cut Flowers
Sales	\$388,570	\$343,000	\$574,770	\$157,700	\$653,562	\$99,317
Profit (loss) per crop	\$ 69,844	\$ 50,080	\$ 54,026	\$ 14,039	\$ 64,424	\$19,188
Profit (loss) per unit	\$ 1.43	\$ 1.02	\$ 1.10	\$ 0.15	\$ 0.54	\$ 0.77
Profit (loss) / sq. ft/wk	\$ 0.11	\$ 0.10	\$ 0.05	\$ 0.21	\$ 0.03	\$ 0.03
Everything held constant, but energy adjusted to 2008 fuel prices.						
Sales	\$388,570	\$343,000	\$574,770	\$157,700	\$653,562	\$99,317
Profit (loss) per crop	\$ 30,682	\$ 20,709	-\$ 9,612	\$ 10,098	-\$ 48,405	\$19,188
Profit (loss) per unit	\$ 0.63	\$ 1.42	-\$ 0.20	\$ 0.11	-\$ 0.40	\$ 0.77
Profit (loss) / sq. ft/wk	\$ 0.05	\$ 0.04	-\$ 0.01	\$ 0.15	-\$ 0.03	\$ 0.03
Everything held constant, but energy adjusted to 2008 fuel prices and sales prices increased 5%.						
Sales	\$407,999	\$360,150	\$603,508	\$165,585	\$686,240	\$104,283
Profit (loss) per crop	\$ 50,111	\$ 37,859	\$ 19,126	\$ 17,983	-\$ 15,726	\$ 24,154
Profit (loss) per unit	\$ 1.02	\$ 0.77	\$ 0.39	\$ 0.19	-\$ 0.13	\$ 0.97
Profit (loss) / sq. ft/wk	\$ 0.08	\$ 0.08	\$ 0.02	\$ 0.27	-\$ 0.01	\$ 0.04
Price	\$ 8.33	\$ 7.35	\$ 12.32	\$ 1.74	\$ 5.73	

**A Regional Empirical Examination of Practices
and Technologies Used by Growers**

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Index words: National nursery industry survey, native plants, irrigation sources, water usage.

Nature of Work: Production-related data have been collected as part of the S-1021 Research Committee's activity since 1988 (formerly S-103 and S-290). Beginning with 1988, and then at five year intervals for 1993, 1998, and 2003, mail-back surveys have been used to collect information on selected production practices, sales by type of outlet, distribution of wholesale sales by state destination, advertising expenditures, and selling methods. The marketing and production data collected with three prior surveys are reported in Southern Cooperative Bulletins SCB- 358, SCB-384, SCB-397. Two of the new questions added to the latest nationwide survey questionnaire that were not part of the previous three surveys are examined in this paper. One question relates to water use and the source of irrigation water. The other question focused on sales of native plants, which was defined as those present in the state before European settlement.

Objectives: The overall goal of these surveys was to obtain data to permit analyses designed to provide growers with insight to help them with production and marketing decisions. Also, this type of information is beneficial to other industry participants, such as Extension personnel, researchers, and input suppliers. This effort began because of the void of industry-wide data regarding production and marketing practices of nurserymen. The data collected supplements rather than duplicates data collected by NASS. The objective of this study was to provide a regional analysis of nursery production practices, since production practices and technology use may differ across regions in response to varying economic and environmental conditions.

Procedure: The population lists for each state were assembled from each state's Department of Agriculture office responsible for licensing nursery producers. Two states had recently completed nursery surveys, so they were excluded (AL and AZ). Four other states were excluded because of small nursery numbers (AK, KS, MD, and WI). The remaining 44 states resulted in a combined listing of 38,269 certified nursery operations. A total of 2,485 usable questionnaires were returned from a sample size of 15,588 nursery firms. The native plant question was simply stated by asking nursery professional for an estimate as to the firm's share of total annual sales attributable to native plants. The water related questions first asked for the distribution of irrigation

water among four possible sources - natural surface, recaptured, city, and well. Next, respondents were asked to indicate if their use of irrigation water on a per-acre basis had changed over the past five years. Then, if use increased or decreased, by what percent did usage change? The last part of the water-related questions asked about irrigation methods used.

Results and Discussion: For the first time in 2003, the *National Nursery Survey* was conducted using a standard sampling methodology, with 15,588 total firms representing 44 states. From analysis of the 2,485 returned surveys, firms in the northern and interior regions of the country with more seasonal activity made greater use of temporary labor. Containerized growing systems were the predominant system throughout the U.S., however, firms in the Southeast, Southcentral and Pacific coast regions used this system to a greater degree, while firms in other regions also commonly used bare root and ball & burlapped systems. Nurseries in the southeast region, with a warmer climate, used Integrated Pest Management (IPM) practices more prevalently. Most regions had a significant share of total production from native American plants, approaching or exceeding 20% of total sales, except the Pacific region. In some regions, forward-contracting accounted for a significantly higher share of total sales, perhaps indicating greater aversion to market risk. The Mountain region stood out for its high level of adoption of computer technologies for production, marketing and management. Data on water use and irrigation technology did not indicate any clear pattern with respect to regional differences in relation to water scarcity.

Native Plants

Native plants have become increasingly important in the U.S. nursery industry, due to growing consumer awareness about invasive exotics and mandates by local governments that specify a minimum percentage of natives in new landscapes (Zimmerman and Ankersen, 2005). Native plants were defined in the survey questionnaire as those present in a state before European settlement. This question simply asked for the percent of total sales of native plants. Annual sales values provided by the respondents were used to weight the sales percentages reported for this question. For the total sample, 13.2% of total sales were accounted for by native plants in 2003. Table 1 presents the breakdown of sales of native plants by region.

Water Sources and Usage

Availability of water supplies for irrigation by nursery producers is an increasingly critical issue in many parts of the United States. A section of the survey inquired about sources of irrigation water and changes in water use over the past five years. The categories of sources of irrigation water were natural surface, recaptured, city, or wells. Overall, 53% of all respondents' used irrigation water supplied by wells, and this ranged from 27% in the Appalachian region to nearly 72% in the Southeast (Table 2). Natural surface water was the next most important source and supplied water for 24% of respondents overall, but ranged from 14% in the Southcentral region to 45% in the Appalachian region. Recaptured water was a source for less than 5% percent of respondents, except in the Appalachian region (8.6%). City water was most important in the Mountain, Pacific,

and Southcentral regions, with 20.8%, 24.3%, and 29.6% of respondents using, respectively.

Another survey question asked whether use of irrigation water over the past five years (on a per-acre basis) had increased, remained the same, or decreased. If there was a change, respondents were asked to provide a percentage estimate. In general, it appeared that the majority of firms held water use on a per-acre basis constant, while most of the remaining share of firms increased rather than decreased water use. Nurseries in the Southeast, Mountain, and Pacific regions maintained relative constant use of water, while more of the Great Plains, Northeast, Midwest, Appalachian, and Southcentral region nurseries indicated a slight increase in the amount of water used on a per-acre basis. The change in irrigation water used ranged from a 6.9% increase in the Mountain region to a 12.1%, 12.8% and 15.5% increase in the Appalachian, Northeast and Southcentral regions, respectively.

Overhead irrigation systems were used by the majority of nursery firms responding, ranging from 42% usage in the Great Plains to 78% in the Southeast (Table 3). Other major irrigation systems used included drip irrigation, particularly in the Pacific (44.7%), Mountain (46.6%) and Southeast (52.4%) regions. Subirrigation methods were seldom used except in the Great Plains (10.4%) and Mountain (22.7%) regions. Almost 21% of the Great Plains nurseries used irrigation systems other than those specified. Note that respondents were allowed to choose more than one type of water source or irrigation system, so percentages could sum to more than 100%.

References:

1. Trade Flows and Marketing Practices within the United States Nursery Industry, Sou. Coop. Series Bull. 358, Published at The Univ. of Tenn. Agri. Exp. Sta. for Sou. Regional Research Project S-103, Oct.1990.
2. Trade Flows and Marketing Practices within the United States Nursery Industry: 1993, Sou. Coop. Series Bull. 384, Published at The Univ. of Tenn. Agri. Exp. Sta. for Sou. Regional Research Project S-103, 1995.
3. Trade Flows and Marketing Practices within the United States Nursery Industry: 1998, Sou. Coop. Series Bull. 397, Published at The Univ. of Tenn. Agri. Exp. Sta. for Sou. Regional Research Project S-290, 2000. USDA, Floriculture and Nursery Crops Situation and Outlook Yearbook, FLO-2004, Economic Research Service/ USDA, Washington, D.C., June 2004.

Table 1. Native plant sales as a percentage of total sales by surveyed nurseries in eight U.S. regions in 2003.

Region	Percent of Sales	
Appalachian	27.1	a
Great Plains	25.9	a
Midwest	23.2	a
Mountain	23.9	a
Northeast	19.7	ab
Pacific	13.2	b
Southcentral	23.9	a
Southeast	22.5	a
All Regions	21.9	

Table entries followed by different letters indicate statistically different values ($p < 0.05$).

Table 2. Water sources used for irrigation by surveyed nurseries in eight U.S. regions in 2003.

Region	Wells		Percent of Respondents Using					
			Natural surface		Recaptured		City (Municipal)	
Appalachian	27.2	c	45.1	c	8.6	b	15.4	bc
Great Plains	62.2	b	18.6	ab	2.5	a	12.5	ab
Midwest	44.8	a	39.8	c	3.5	a	6.3	a
Mountain	51.9	a	22.9	ab	4.4	a	20.8	c
Northeast	49.6	a	27.8	b	3.5	a	14.6	bc
Pacific	49.9	a	19.9	ab	3.8	a	24.3	c
Southeast	71.6	b	16.1	a	3.7	a	6.6	a
Southcentral	49.8	a	13.5	a	4.7	a	29.6	c
All Regions	51.1		26.5		4.3		14.3	

Table entries followed by different letters indicate statistically different values ($p < 0.05$). Note that percentages may not sum to 100% within each region due to independent values reported.

Table 3. Irrigation methods used by surveyed nurseries in eight U.S. regions in 2003.

Region	Percent of Respondents Using							
	Overhead irrigation		Drip irrigation		Subirrigation		Other Method:	
Appalachian	64.4	a	38.0	a	1.6	a	8.0	c
Great Plains	41.7	b	37.5	a	10.4	c	20.8	b
Midwest	55.4	a	33.5	a	3.1	ab	13.5	abc
Mountain	65.9	a	46.6	ab	22.7	d	13.6	abc
Northeast	58.5	a	39.1	a	5.2	abc	14.4	abc
Pacific	63.8	a	44.7	ab	6.4	abc	18.7	ab
Southeast	77.6	c	52.4	b	4.6	abc	10.1	ac
Southcentral	61.6	a	39.1	a	7.5	bc	18.8	ab
All Regions	62.7		40.6		5.3		13.4	

Table entries followed by different letters indicate statistically different values ($p < 0.05$). Note that percentages may not sum to 100% within each region due to independent values reported.

Operational Characteristics of Nurseries and Greenhouses in the Northern Gulf of Mexico

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Index Words: socioeconomic survey, technical and economic characteristics, type of nursery operations

Significance to the Industry: As the real value of horticulture production in the northern Gulf of Mexico region increases over time, it is expected that nursery/greenhouse growers will intensify efficient input use, increase adoption of mechanized/automated production technologies, improve working conditions and workers' safety, and enhance markets of horticulture products. The specific objectives of this paper were to compare the socioeconomic characteristics of managers or operators of nurseries and greenhouses in the northern Gulf of Mexico region and to compare the economic and technical characteristics of nurseries and greenhouses in the region. It is expected that this information on the operational characteristics of nurseries and greenhouses will be used by researchers, specialists, growers, lenders and investors in updating enterprise and partial budgets for nursery and greenhouse operations.

Nature of Work: A socioeconomic survey of nurseries and greenhouses was conducted among wholesale nurseries and greenhouses located in the northern Gulf of Mexico region: Mississippi, Alabama and Louisiana (1). The nursery and greenhouse survey which was conducted between Dec. 2003 and Mar. 2005, lasted from 30 min to 1 h. Official lists of certified nurseries were requested from the Mississippi Department of Agriculture and Commerce (2), the Alabama Department of Agriculture and Industries (3) and the Louisiana Department of Agriculture and Forestry (4). From these official lists of nursery growers, industry associations buyers' guides (5), online buyers' guides (6), and extension service reference guides (7), the wholesale growers in every state were identified and numbered from 1 to N. Using Excel (8), 50 random integers were individually generated from 1 to N, where N = the number of wholesale growers in each state. Individual letters of introduction were sent to the 50 selected nurseries and greenhouses in each state in advance. Follow-up telephone calls were made with each of the nurseries and greenhouses selected to determine their willingness to participate and their availability for the interviews. All personal interviews were conducted by the Research Associate hired for this purpose by the Mississippi State University-Coastal Research and Extension Center (1). The respondents to the survey were the owners or operators of the selected nurseries and greenhouses.

Results and Discussion: A total of 87 nursery automation survey forms were completed from personal interviews with nurseries and greenhouses. The socioeconomic characteristics of managers or operators included in this paper were gender, marital status, ethnic origin, age, educational attainment, length of nursery experience, level of satisfaction with current lifestyle, perception of labor availability, perception of long-term availability of capital, and perception of operating capital availability (Table 1). The selected technical characteristics of nurseries and greenhouses were total acreage, acreage under production, acreage used in open field production, greenhouse production area, number of greenhouses for production, number of greenhouses for overwintering, and number of greenhouses heated (Table 2). The selected economic characteristics of nurseries and greenhouses were years operating since establishment, type of business organization, number of workers, annual gross sales, and types of products produced (Tables 3-4). The operational characteristics of nurseries/greenhouses were compared by type of operation by using the General Linear Model multi-variate procedure and Chi square test (9). Nursery type consisted of nursery only, greenhouse only and mixed nursery and greenhouse operations. Majority of the managers or operators of nurseries and greenhouses who participated in the socioeconomic survey were male (81%), married (87%) and of Caucasian origin (97%, Table 1). Half of them were between 40 and 49 years old, more than two-thirds had at least some college education, and had been with the nursery and greenhouse industry during the past 19 years. Majority of the respondents were satisfied with their current lifestyle (87%), believed that labor was available (73%), and that long-term (76%) and operating capital (82%) were available or highly available. The typical nursery and greenhouse operation occupied an average 20.9 acres per operation with 60% or 12.6 acres under production (Table 2). The acreage devoted to container production, in-ground field production, and pot-in-pot production and the greenhouse production area and number of greenhouses by type of operation are presented in Table 2. The average nursery and greenhouse had been in operation for the past 23 years (Table 3). Most of them were organized either as sole proprietorships (54%) or corporations (30%). Majority of the participating nurseries and greenhouses (57%) reported annual gross sales less than \$250,000. The most commonly sold plant products included liners in 2, 4, 6, and 8-inch pots, liners in 18 and 36# trays, plants in 1 and 3-gal pots, and plants in 12-inch baskets (Table 4). In some cases, the most common types of plant products sold by the participating nurseries and greenhouses varied by type of operation.

Literature Cited

1. Posadas, B.C., G.B. Fain, C.H. Coker, P.R. Knight, C.D. Veal, and R.Y. Coker. 2004. Socioeconomic survey of nursery automation. Proc. Southern Nursery Assn. Res. Conf. 49:306-309.
2. Mississippi Department of Agriculture and Commerce. 2003. Directory of Mississippi certified nurseries and nursery dealers. Bureau of Plant Industry, Mississippi State, MS.

3. Alabama Department of Agriculture and Industries. 2004. Certified nurseries. Bureau of Plant Industry. Montgomery, AL.
4. Louisiana Department of Agriculture and Forestry. 2008. Nursery certificate listing. Horticulture and Quarantine Programs, Baton Rouge, LA.
5. Louisiana Nursery and Landscape Association. 2005. Louisiana wholesale nursery buyer's guide. Baton Rouge, LA.
6. Alabama Nursery and Landscape Association. 2008. Buyers' guide. 17 Apr. 2008. <http://www.alnla.org/Publications/bg1.pdf>
7. Johnson, K. and W. Wells. 2007. A quick reference guide to wholesale nurseries and commercial sod producers, Publication 2348. Mississippi State University Extension Service, Mississippi State, MS.
8. Microsoft Corp. Office 2003. Redmond, WA.
9. SPSS 14.0 for Windows. 2005. Chicago, IL.

Table 1. Selected socioeconomic characteristics of managers/operators of nurseries and greenhouses which participated in the socioeconomic survey in the northern Gulf of Mexico region from Dec. 2003 to Mar. 2005.

Characteristic	Nursery only	Greenhouse only	Mixed operations	Total
Gender (%):				
Male	90	68	83	81
Marital status (%)				
Married	100	77	86	87
Separated/Divorced/Widowed	0	9	5	5
Single	0	14	9	8
Respondent's ethnic origin (%):				
Caucasian	100	100	93	97
Age group (%):				
30-39 years old	10	0	7	6
40-49 years old	43	68	44	50
50-59 years old	19	23	28	24
60-69 years old	19	0	16	13
70 years old and above	10	9	5	7
Educational attainment (%):				
High school	10	9	12	11
Some college	15	23	30	25
Associate degree	5	18	12	12
College degree	65	46	30	42
Advanced degree	5	5	16	11
Years of nursery experience	16	18	21	19
Percent satisfied or very	95	100	76	87
Percent who said that labor was	75	65	77	73
Percent who said that long-term	72	85	73	76
Percent who said that operating	89	90	74	82

Table 2. Selected technical characteristics of nurseries and greenhouses which participated in the socioeconomic survey in the northern Gulf of Mexico region from Dec. 2003 to Mar. 2005.

Characteristic	Nursery only	Greenhouse only	Mixed operation	Total
Total acres per operation	34.5	3.8	21.9	20.9
Total acres under production per operation	22.0	1.5	12.9	12.6
Acres under container production per operation	0.9	0.0	8.5	4.4
Acres in-ground field production per operation	21.3	0.0	0.2	5.7
Acres under pot-in-pot production per operation	0.1	0.0	1.2	0.6
Total acres used in open field production per operation	22.2	0.0	9.9	10.8
Total greenhouse production area per operation ^z	0.0 a	27,227.0 ab	48,910.5 b	30,721.3
Production greenhouses per operation	0.0	6.9	14.0	8.6
Overwintering greenhouses per operation	0.1	3.5	9.3	5.4
Heated greenhouses ^z	0.1 a	6.5 b	7.0 b	5.1

^z - Numbers in the same row with different letters are significantly different at P≤0.05.

Table 3. Selected economic characteristics of nurseries and greenhouses which participated in the socioeconomic survey in the northern Gulf of Mexico region from Dec. 2003 to Mar. 2005.

Characteristic	Nursery only	Greenhouse only	Mixed operation	Total
Number of years since establishment	19	19	27	23
Type of business organization (%):				
Corporations	18	36	33	30
Partnerships	14	14	2	8
Sole proprietorship	68	50	48	54
Limited liability corporations	0	0	10	5
Cooperatives and others	0	0	7	4
Number workers per operation:				
Full-time	3.1	2.7	6.2	4.5
Part-time	0.8	0.8	3.9	2.3
Annual gross sales (%): ^Z				
Below \$250,000	71	68	44	57
\$250,000-\$499,999	24	18	17	19
\$500,000-\$999,999	0	14	17	12
\$1,000,000 and above	5	0	22	12

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Table 4. Types of products sold by nurseries and greenhouses which participated in the socioeconomic survey in the northern Gulf of Mexico region from Dec. 2003 to Mar. 2005.

Product	Nursery only	Greenhouse only	Mixed operation	Total
Percent selling liners in 2-inch pots	5	41	31	27
Percent selling liners in 3-inch pots	5	23	10	12
Percent selling liners in 4-inch pots [∠]	9	86	41	44
Percent selling liners in 5-inch pots	0	0	5	1
Percent selling liners in 6-inch pots [∠]	23	68	52	49
Percent selling liners in 8-inch pots	18	36	36	31
Percent selling liners in 10-inch pots	0	18	10	9
Percent selling liners in 12-inch pots	0	0	5	2
Percent selling liners in 6# trays	0	0	5	2
Percent selling liners in 18# trays [∠]	5	23	36	24
Percent selling liners in 20# trays	0	0	2	1
Percent selling liners in 32# trays	0	0	2	1
Percent selling liners in 36# trays [∠]	5	36	36	28
Percent selling liners in 48# trays	0	5	0	1
Percent selling liners in 72# trays	0	5	14	8
Percent selling plants in 1-gal pots [∠]	46	14	57	43
Percent selling plants in 2-gal pots	0	0	0	0
Percent selling plants in 3-gal pots [∠]	32	5	41	29
Percent selling plants in 5-gal pots [∠]	27	0	19	16
Percent selling plants in 7-gal pots	18	0	17	13
Percent selling plants in 15-gal pots	14	0	21	14
Percent selling plants in 30-gal pots	0	0	12	6
Percent selling plants in 45-gal pots	0	0	7	4
Percent selling plants in 65-gal pots	0	0	2	1
Percent selling plants in 8-inch baskets	0	0	2	1
Percent selling plants in 10-inch baskets ^z	5	73	43	41
Percent selling plants in 12-inch baskets	0	5	5	4
Percent selling plants in 16-inch baskets	0	0	0	0
Percent selling in bonsai	0	0	2	1
Percent selling palms in ground	5	0	0	1

^z - Numbers in the same row are significantly different at P≤0.05.

W.W. Moore, Jr. Detention Home Nursery and Arboretum Project

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Index Words: juvenile delinquents, underemployed youth

Significance to Industry: The horticulture industry needs skilled and semi-skilled labor to fill a work force not being populated by blue collar American workers. One potential source of employees is unskilled horticultural migrant labor, but a more lucrative and nationalistic source is troubled youth who have had a least one altercation that the law. Training programs in high schools, detention homes, botanical gardens, and arboreta are beginning to train semi-skilled and more highly educated workers for the green industry.

Nature of Work: The mission of the school program at W. W. Moore, Jr. Detention Home is to provide instruction that is based on the Standards of Learning (SOL's), to provide educational support that will meet the individual needs of students, to promote academic achievement, and to provide character education in order to foster the development of learners who are responsible and productive citizens.

One of the areas within the Moore school program is horticulture, with Moore teacher Ms. Jane Clardy and Danville, VA horticulture extension agent Mr. Stuart Sutphin currently providing instruction for the students. Though this program is very capable of meeting the school program's mission, their actual horticultural facilities have been extremely limited (one very small greenhouse).

Results and Discussion: To expand their facilities, to add a commercial horticulture industry component to the program offering, and to provide a model of alternative agriculture for southside Virginia, Dr. Bonnie Appleton, Extension Nursery/Landscape Management Specialist at Virginia Tech's Hampton Roads Agricultural Research and Extension Center (AREC) is helping develop a prototype nursery for the production of overhead utility compatible trees, and a utility line arboretum. Developing the nursery and arboretum tie in to two goals of Virginia's Municipal Tree Restoration Program (MTRP): to identify, through research and on-the-ground experience, utility compatible trees; and to increase the availability of utility compatible tree species through Virginia's nurseries.

To begin development of the nursery and arboretum, in 2005 Dr. Appleton obtained funding via a Virginia Urban and Community Forestry Assistance grant (administered by the Virginia Department of Forestry). This initial grant of \$13,250 has permitted the installation of four 6-quart and four 7-gallon Cellugro units (a hybrid in-ground container production system) and the planting of approximately 2,500 tree seedlings on

the Home grounds as of May 2006. In addition the newly started utility line arboretum adjacent to the prototype nursery has approximately 15 utility compatible trees in it (some of which are donations from the J. Frank Schmidt Nursery, Boring, OR UtiliTrees program). Installation of the nursery and arboretum has been a cooperative effort between Ms. Clardy, her students, other Moore instructors and staff, Mr. Sutphin, Dr. Appleton and her technician Pete Edlund, and landscape services personnel of the City of Danville.

Funding is currently being sought to complete the nursery (to double its current size), to continue to expand the utility line arboretum, and to install and equip a commercial greenhouse that is being dismantled and donated to the Home. Funding is also being sought to begin to use this nursery and arboretum as a place to train others who might wish to develop similar facilities (already requests from Martinsville and Lynchburg), to educate tobacco growers and others interested in alternative agriculture, and to further expand educational opportunities for at-risk youth. It is hoped that over time, as the Home is able to sell the trees it is producing, that this program will become financially self supporting.

**Quality Assessment and Purchasing Decisions of Nursery Liner Buyers:
A Conjoint Analysis**

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Index Words: Bare root, plant quality characteristics, preference, survey

Significance to Industry: Liner production is an important nursery industry segment. The American Nursery and Landscape Association (ANLA) have established some guidelines about minimum height, caliper, and root length requirements for liners. But informal interviews reveal that buyers may weigh other criteria when establishing their perceptions of quality and making their purchase decisions. To better assist growers with marketing the perceived qualities of their liner products, we employed conjoint analyses to grower survey data to better define the relative importance of six key plant “quality” attributes in purchase decision-making.

Nature of Work: Plant producers can assess seedling quality using physiological or morphological metrics. Physiological measurements of quality are often destructive to the plant, and are both expensive and time consuming. Instead, commercial nursery growers need a quick and effective method to consistently assess liner quality, preferably based on the same attributes that buyers will use to judge a grower’s stock (2). The objective of this study was to measure the relative importance of key plant attributes on purchase decisions made by nursery liner buyers during a point-of-purchase plant inspection.

For the purposes of this study, we define a liner as a rooted plant started from seed or cutting, that has been grown in a seedbed or container for one year. To mimic the buying process, a conjoint analysis survey was designed using a series of eighteen photographic images of liners with different variations on variables of perceived liner quality. Conjoint analysis techniques are based on the premise that while people may state one preference in a product’s traits, they may then choose a product based on an entirely different product trait or traits. In a conjoint survey the respondent is made to choose, qualify their choice and in the process ranks different variations of quality attribute within the product.

Based on a review of the literature and informal phone interviews with retail and wholesale nursery liner buyers, we identified six key attributes that might affect buyer perceptions of plant quality: price, region of origin, uniformity of canopy, height, and caliper and first order lateral root (FOLR) number, defined as the number of side roots 1mm or more in diameter, the design of which would yield a 2 x 2 x 2 x 3 x 3 x 3 factorial model with 216 possible character sets, if complete. To make this study

feasible for our target audience, Conjoint Designer software was next used to generate a fractional factorial design (1), which provided an orthogonal subset with 16 feature level combinations for images of tree liner product attributes. We used bareroot 1-0 Nuttall Oak (*Quercus nuttallii*) liners to create photographic images that depicted different levels for each of these attributes (Table 1).

In addition, the experiment included two “holdout” products (HO1: 8 to 9 roots, uniform stem height; uniform stem caliper; uniform canopy density, grown in the Southeastern U.S., \$1.60 per liner; HO2: 4 to 5 roots, mixed stem height; mixed stem caliper; mixed canopy density, grown in a non-specified U.S. region, costing \$1.30 per liner). Holdout products are used to assess model efficiency by enabling predictions about product utility, and can also generate data about a potential liner product of interest (5). Base level features in this study were liners with 4 to 5 roots 1mm diameter or greater, mixed stem height; mixed stem caliper; mixed canopy density, that were grown in an non-specified U.S. region.

Surveys were administered to liner buyers and growers at the 2007 Southern Nursery Association Trade Show, the 2007 Tennessee Green Industry Field Day, during the 2007 Smoky Mountain Nursery Tour and at the 2008 Mid-States Horticultural Exposition. Respondents answered a short set of questions related to their experience with nursery liners, self-identified their perception about each plant quality attribute, provided relevant demographic data, and then were asked to rank their preference for the pictured product and its listed attributes on a ‘1’ = least to ‘10’ = most preferred scale. Data were entered into Excel and analyzed using TSP econometric modeling software (7).

Results and Discussion: Of the 248 completed surveys returned by respondents, 76% were from men. In all, 34% were from Tennessee, 17% from Kentucky, 11% from Georgia, 8% from Florida, 6% from Indiana, and 23% represented all other states. Of those who answered the question, 172 respondents stated that they, personally, grew, bought, or sold liners. Almost 50% of respondents had 10 or more years experience serving the Green Industry. Approximately 50% of these individuals purchased at least 5,000 liners per year while about half reported that their businesses use ≤ 2 acres of land for liner production. Half of respondents reported annual gross sales exceeding \$500,000 per year. .

When assessing images of 1+0 bare-root liners, buyers attributed high FOLR number with 65.4% relative importance to their perception of pictured liner stock as high quality. Uniform canopy density and uniform height contributed (16.2%) and (11.3%), respectively in purchase acceptance, as a determining factor in liner quality. In contrast, caliper uniformity (3.2%), price (2.4%) and production region (1.5%) were perceived to be the least important attributes of quality pertaining to bare-rooted lines (Figure1). This was consistent with self-stated attribute rankings for root number characteristics (4.21). But, price (3.83) was identified as the third most important parameter that affected acceptance according to self-stated assessment. Region of origin (3.03) was consistently the least important characteristic attributed with liner quality (Table 2).

That first order lateral root (FOLR) numbers were the most important attribute of perceived quality was expected. First order lateral root measurements are primary predictors of in-field performance of 1+0 liner stock (3) and were readily apparent in our photographic images. Canopy density and liner height could also be readily assessed by participants and were found to be relatively important in affecting quality rankings during hypothetical purchase inspections.

In contrast both to *a priori* expectations about price's importance in purchase preferences and buyers self-stated ranking of price, this parameter contributed just 2.4% in relative importance to the hypothetical purchase decision (Figure 1). In part, this may be explained if the range of prices presented to respondents was too similar to liner costs typically encountered by nursery buyers. Because liners in the images are visually similar to other woody plant genera covering a broad range of potential cost per-liner and were not specifically identified as "oaks", respondents may have shifted attention to other product attributes in the absence of a text notation.

Finally, liner growers can manipulate liner height, canopy, and caliper uniformity, as well as FOLR. By lowering densities of cuttings stuck in planting beds, FOLR number and caliper uniformity can be increased (6). To increase liner quality perception among buyers, growers should also prune canopies of liner stock to uniform height and density.

References Cited:

1. Bretton-Clark, I. 1987. Conjoint Designer Manual. New York, NY.
2. Clark, S.L., Schlarbaum, S.E., and Kormanik, P.P. 2000. Visual grading and quality of 1+0 Northern Red Oak seedling. S. J. Appl. For. VOL: p-p.
3. Dey, D.C., and Parker, W.C. 1997. Morphological indicators of stock quality and field performance of Red Oak (*Quercus rubra* L) seedlings underplanted in a central Ontario shelterwood. New Forest. 14: 145-156.
4. Gineo, W.M. 1990. A conjoint/logit analysis of nursery stock purchases. Northeastern J. Agric. Res. Econ. 19 (1): 49.
5. Herman, S. 1988. Software for full profile conjoint analysis. Proceedings 2nd Sawtooth Conference. Sun Valley, Idaho.
6. Schultz, R.C., and Thompson, J.R. 1996. Effect of density control and undercutting on root morphology of 1+0 bareroot hardwood seedlings: five year field performance of root-graded stock in the Central USA. New Forests. 13: 297-310.
7. TSP International. 2003. TSP software (Vers.4.5), Palo Alto, CA.

Table 1: Parameters of 1+0 bare-root liner attribute levels visually tested using conjoint survey analyses to quantify relative importance of each character to hypothetical point-of-purchase acceptance by respondents (as “buyers”).

Attribute:	Level
First Order Lateral Roots (FOLR) (FOLR = side roots ≥ 1mm diam)	4 or 5; 6 or 7; 8 or 9
Height Uniformity	Mixed; Uniform
Canopy Density Uniformity	Mixed; Uniform
Caliper Uniformity	Mixed; Uniform
Region	Northwestern; Southeastern; Non-specified U.S.
Price	\$1.30; \$1.60; \$1.90 per liner

Table 2: Respondents’ quality preferences for 1+0 bare-root nursery liners indicating the self-stated importance of independent liner characteristics. Reported values represent mean individual attribute rankings generated using a Likert scale where ‘5’ = highly preferred.

Liner Attribute:	Average Rank
Root Number (FOLR)	4.21
Height Uniformity	3.87
Price	3.86
Canopy Density Uniformity	3.83
Caliper Uniformity	3.78
Region of Origin	3.03

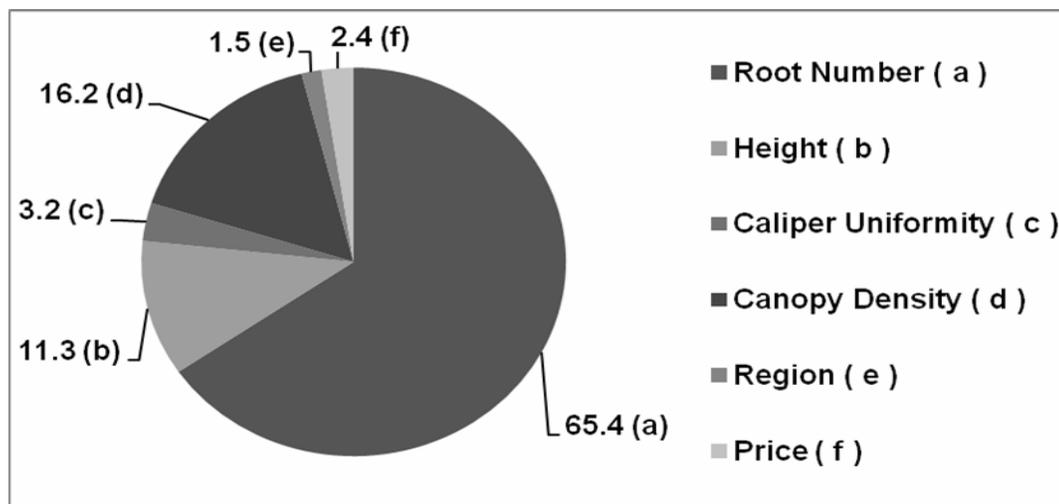


Figure 1: Relative importance-to-sale of liner characteristics that buyers associated with quality when viewing 1+0 bare-rooted tree liners. Letters are solely used to indicate values reported for each attribute.

State Plant Selection/Introduction Programs and Their Potential Benefit to the Green Industry

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Index Words: plant selection, plant introduction, promotion, survey and marketing

Significance to the Industry:

Over the past fifteen years, many states have developed plant selection/introduction programs to market and promote selected plants to consumers. Of the programs contacted during our survey, thirteen responded and over half said the program had a positive economic impact on the local green industry by increasing the sales of these selected plants and not just the year selected but following years as well. These results can be used to evaluate the potential for plant selection/introduction program in states without programs and to improve currently existing programs. The survey results indicate a lack of industry support, which limits the effectiveness of the programs. Industry can supply funding for financial support and help advertise the selected plants to increase consumer awareness. If adequate support is received, then previously published reports and these survey results indicate programs in return can help industry by increasing sales for growers and retailers.

Nature of Work: Plant selection/introduction programs all have the same basic goal of selecting and promoting plants to increase sales through consumer preferences (3). However, each program is unique in how it is set up and the program's economic impact. Several success stories for state plant selection/introduction programs have been published discussing their goals and their benefits for the green industry. The Coordinated Education and Marketing Assistance Program (CEMAP) in Texas has had many successful Texas SuperStar™ promotional campaigns. One success was mari-mum (*Tagetes erecta* 'Antigua'). Before promotion as a Texas SuperStar™, only 1,000 plants were sold at four selected nurseries but the year of promotion 90,374 plants were sold and the following year 96,460 plants were sold without the promotion. This caused an increase in sales of over \$200,000 for mari-mums at the four selected nurseries. Another success story was the 5000% increase in sales for 'VIP' petunia (*Petunia violacea*) at a retail nursery with several locations in Dallas and Fort Worth, TX (2). Oklahoma Proven has reported similar success. One nursery reported increases in sales ranging from 26% to 228% for that year's selected plants when compared to the previous year's sales without the Oklahoma Proven promotional campaign. This caused a 117% increase in units sold for the selected plants and revenue to increase 81% for the nursery (1). Many of the selected plants remain popular with consumers in the years following promotion as seen with mari-mums in Texas (4, 2). Even though some programs have reported increased sales, there has been no research in evaluating these programs to determine what makes a program successful. Our objective was to evaluate these programs on their structure, organization, marketing techniques, and economic impact for the green industry.

Nineteen state plant selection/introduction programs were identified nationwide. On June 4, 2007, an informational email was sent to the nineteen known state programs to inform them of the upcoming survey they would be receiving and the purpose of the survey. After sending out the emails, two programs responded saying their programs were no longer functioning. On June 21, 2007, an email containing a link to an online, confidential survey was sent to functioning programs. The online survey contained forty-nine questions about program structure, how they operate, market selected plants and the program's impact (Figure 1). The original deadline for the survey was July 1, 2007, and later extended to the end of July due to low response. Weekly email reminders were sent to the programs that had not responded the survey. Data were analyzed using frequencies and crosstabs in SPSS® (5).

Results and Discussion:

Thirteen programs responded to the survey resulting in a 76% response rate. Most programs began through a joint effort between a university, industry, state association, and/or other organization. Sixty-one percent said the programs were modeled after another existing program. When starting the programs, 69% said funding was an issue. Programs reported funding came from different areas including organizations, associations, royalties, university grants, sale of plant tags, and trial fees. Most of the money collected goes to personnel and advertising; they were listed as the most expensive aspects. Almost 40% said the programs generated a revenue stream (Figure 2). Most of the programs have been established for several years; ninety-two percent of the programs had been in existence for 6 years or more (Figure 3).

Results indicate programs are having an impact on the green industry. Nearly 70% of the programs reported having a positive economic response while 30% said they were not sure. However no program reported having a negative economic response. Most did not know the exact increase in sales, but according to those programs that did know the increase ranged from 10% - 50% for the selected plants. Also Oklahoma Proven and Texas SuperStar™ have published reports indicating significant sales increases for the selected plant (1, 2). Looking at how plant were chosen, thirty-nine percent did not perform plant trials while 61% did perform plant trials as part of the selection process. Though some programs do not perform plant trials, they select plants with a proven performance in the landscape through recommendations and committee discussions. The top three problems that face the programs are grower support/acceptance, retailer support/acceptance, and consumer awareness. When asked how many retailers and growers participate in marketing the programs, the numbers were split. Seventy-seven percent had 60 or less retail garden centers marketing the programs and 23% had over 100 marketing the programs. Sixty-two percent had 40 or less growers marketing the programs and 23% had over 100 growers marketing the program. To help market and advertise the plants ninety-two percent of the programs offer promotional items to retailers and growers including pot tags/labels, bookmarks, advertisement materials, brochures/flyers, and signs which are the most popular item. Ninety-two percent of the programs market directly to consumers. The most popular way for direct marketing is through website, followed by newspaper articles, magazine articles, television spots and direct mail.

There were significant relationships in the analyses. The relationship between landscapers being on a plant nominating committee and the number of growers marketing the plants had an r value of 1.000 indicating a very high positive correlation. Other positive relationships include home gardeners on a plant nominating committee and generation of revenue (r value = 0.707), home gardeners on an awarding committee and generation of revenue for the program (r value = 0.884), and master gardeners on a plant awarding committee and generation of revenue (r value = 0.707). Some negative correlations were also found including university faculty on a nominating committee and the number of growers marketing the plants (r value = -0.980). Also there was a very negative correlation with anyone on a plant nominating committee and generation of revenue (r value = -1.000). There was no significant correlation between programs performing plant trials and programs generating revenue or having a positive economic impact. This indicates that plant trials are not needed for a program to be successful. These correlations indicate involving landscapers, home gardeners, and master gardeners in the programs can increase the economic impact and revenue of the programs. However, the small number of respondents makes it hard to test the validity of the relationships.

With nearly 70% of the programs having a positive economic impact and the sales increases reported from Texas SuperStar™ and Oklahoma Proven (1, 2), this indicates that the programs are benefitting the green industry. One area that is crucial to these programs is marketing. The Mississippi Medallion program used newspapers throughout the state and specialty publications along with the marketing by garden centers to promote the selected plants. Through this effort they reached over 1.5 million people which was over half of Mississippi's population at the time (4). Another problem programs face is support. These programs need support from growers, retailers, and other organizations or associations to be successful. Two respondents commented that they needed more support from the industry. The two programs that are no longer functioning cited reasons of loss of space on campus and no available person to be program director. Support is needed to supply resources and share responsibility for these programs. With these survey results other states without programs can evaluate the potential of a program and existing program structure can improve and lead to more success.

Literature Cited:

1. Anella, L.B., M.A. Schnelle, and D.M. Maronek. 2001. Oklahoma Proven: A plant evaluation and marketing program. *HortTechnology* 11: 381-384.
 2. Mackey, W.A., S.W. George, T.D. Davis, M.A. Arnold, R.D. Lineberger, J. M. Parsons, L.A. Stein, and G.G. Grant. 2001. Texas Superstar and the Coordinated Educational and Marketing Assistance Program (CEMAP): How we operate. *HortTechnology* 11: 389-391
 3. Stegelin, F., S. Turner, and P. Knight. 2001. State plant promotion programs: Histories and perspectives. *Proc. SNA Res. Conf.* 46: 539-541.
 4. Winter, N., K. Hood, and D. Tatum. 2001. The Mississippi Medallion Promotion Campaign. *Proc. SNA Res. Conf.* 46: 550-551
 5. SPSS Inc. 2007. *Statistical Package for the Social Sciences*. Chicago, Illinois.
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Figure 1 Online survey sent to existing programs

Plant Selection Survey - Windows Internet Explorer
http://www.surveymonkey.com/s.aspx?sm=nblU72lUvg8lDyQe5wByABlGAFsNcR9mbNzJk%2F4%3d

Plant Selection Survey
Exit this survey >>

2. Creation of the Program

1. Where is the origin of your plant selection program? (Please check all that apply.)

- Industry
- University
- State association
- Other (please specify)

***2. What were the first actions/activities completed in order to begin your plant selection program?**

***3. How long did it take to officially setup the program?**

- 1-6 months
- 7-12 months
- 13-18 months
- >18 months

4. What issues arose during the setup phase of the program? (Please check all that apply)

- personnel
- funding
- industry support

Figure 2 Revenue generation by programs to support continued work.

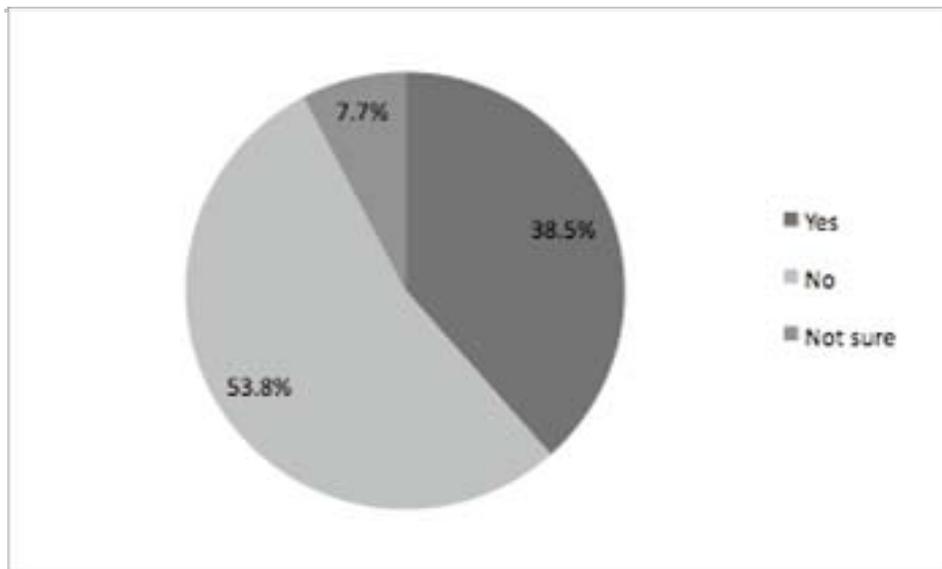
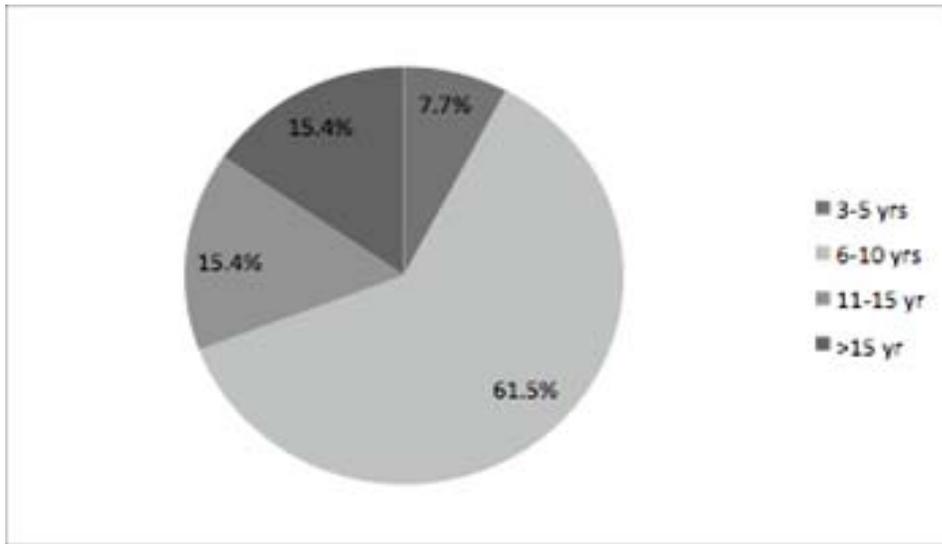


Figure 3 Age distributions of programs.



Partnerships to Enhance Departmental Impact Through Endowments

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Index Words: Endowment, Funding, Program Sustainability, Scholarships

Significance to Industry: Providing opportunities for students pursuing education and training in fields related to the nursery, greenhouse and landscape industries is necessary to sustain the supply of graduates needed in the future. College departments, researchers, nursery and landscape firms, allied industry, supporting organizations, and individuals can contribute by organizing endowments within educational institutions to provide scholarships, graduate fellowships, endowed professorships, support for travel, and other funds to benefit research and outreach for the horticulture industry.

Nature of Work: In pursuing means to provide a stable and sustainable future for the nursery industry, researchers, growers, and universities alike must invest in the present. With increased costs incurred by students and college departments for education and shifts of grant initiatives from traditional programs to more basic research concerning ecological sustainability and other issues (2), funding of applied studies for the nursery trade has become more limited for work outside the basic science/private sector (1). Supplemental income through endowments established by growers, researchers, allied industries, and supporting organizations can help to alleviate increased costs by providing students with financial support in the form of scholarships and providing departments with means to pay program costs, professorships, and fund outreach programs for growers.

Endowments are established by contributors through educational institutions with pre-determined purposes and criteria for the funding of the endowment. Depending on the conditions set forth by the college for initiating endowments, contributors may be required to begin the endowment at a certain balance prior to investment. Once these conditions are established and met, investment of the contribution serving as the principal from which earnings are derived can begin. When invested, the principal of the endowment accrues interest or other forms of revenue growth derived from current market values for endowments. Earnings are generally separated with one portion returned back to the endowment and the other portion used for the purposes set by the endowment during establishment. While often meeting pressing needs, one-time contributions lack the ability to garner interest to sustain longevity of the investment. Thus, longevity provided through endowments helps to secure the future for tradespeople of the horticulture industry while honoring the contributor(s) invested in the endowment.

In recent years, maintenance and liability expenses at Auburn University have been decreased by elimination of a campus motor pool. Subsequent limitations on number of passengers in departmental and rental vans have increased the difficulty of coordinating and paying for industry field trips for classes or groups of students. Furthermore, university tuition provides no allocation for experiential learning such as field trips or travel tours, leaving individual faculty or departments to find the resources to provide these opportunities. Often frequent donors, patrons, or businesses are approached with recurring solicitations by faculty members to provide these experiences. Endowments are less demanding on faculty time and resources and generate perpetual support for needed program activities.

Generally, study abroad programs are operated on a cost-recovery or revenue generating basis. Many students, unable to participate in longer-term academic study abroad programs, can benefit from valuable short-term study tours focused on out-of-region or international horticulture tours to give them the global perspective and experience desired by many companies (3). However, without financial support, such organized horticulture tours seldom occur for students. Again, specific endowments to provide a guaranteed base of funds allows for long-term planning and maximizes student participation in experiences that might never occur otherwise.

Results and Discussion: Historically, garden clubs and industry associations have provided horticulture scholarships from both annual and endowed funds. In recent years, other non-profit organizations such as master gardener associations and various plant societies have contributed scholarships. Examples of recent endowments and uses at Auburn are:

- Bond Endowment for Domestic Travel and Internships
- Henry P. Orr International Horticulture Fund for Excellence
- Campus Club First Ladies Scholarship Endowment- awarding scholarships in honor of each former Auburn University president's wife or female president.
- Garden Clubs of Alabama Scholarships
- Alabama Master Gardener Scholarship Endowments
- Horticulture Faculty Honor Scholarships- an endowment pool awarding scholarships in honor of retired or deceased horticulture department faculty.

Where possible, it is important to secure the future of annual scholarships through endowments. As membership in patron organizations age or priorities shift, annual contributions become more difficult to sustain or are discontinued. However, creating an endowment captures increased scholarship opportunity with surges of interest or energy to provide scholarships without draining future resources when interest or personal energy of the patron organizations are limited.

With potential to ensure a sustained supply of well trained and experienced graduates for the nursery and landscape trades, industry members can help to establish endowments in many ways. Such means of developing funds for contribution include; proceeds from sale of donated property or other items, tax deductible donations of plant material from growers to college horticulture clubs and supporting organizations for plant sales, use of research plant material no longer under observation for use in plant sales, golf/fishing tournaments, and direct contributions. By donating excess plant material and otherwise research refuse, both growers and education/research institutions can benefit by reusing this material for the establishment of endowments to fund future industry leaders and research to ensure a stable, sustainable, and professional personnel base for the greenhouse/nursery and landscape industries.

Literature Cited:

1. Northeastern Regional Association of State Agricultural Experiment Station Directors (NERA). 2005. NERA News and Notes Vol 3, Issue 1. 25 May 2008. <<http://www.nera.umd.edu/workroom/newsletter/Volume3Issue1.pdf>>.
2. United States Department of Agriculture (USDA). 2008. Cooperative State Research, Education, and Extension Service (CSREES) Horticulture Program Overview. 29 May 2008. <http://www.csrees.usda.gov/nea/plants/in_focus/hort_if_professionals.html>.
3. White, E. 2005. Executives with global experience are among the most in-demand. p. B6 January 25, 2005. Wall Street Journal.